COURSE STRUCTURE(R20)
AND
DETAILED SYLLABUS
(II YEAR)

COMPUTER SCIENCE & SYSTEMS ENGINEERING

For
B.Tech., Four Year Degree Course
(Applicable for the batches admitted from 2020-21)

LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada
Accredited by NAAC with "A" Grade and NBA (CSE, ECE, EEE & ME)
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DEPARTMENT OF COMPUTER SCIENCE AND SYSTEMS ENGINEERING (CSSE)

B. Tech II-Year Course Structure and Syllabus –R20

II Year – I SEMESTER

S.No	Course Code	Course Title	Category	L	T	P	Credits
1	R20CSE-ES2101	Mathematical Foundations Of Computer Science	ES	3	0	0	3
2	R20CSS-PC2101	Software Engineering	PC	3	0	0	3
3	R20CIT-PC2101	Python Programming	PC	3	0	0	3
4	R20ECE-PC2105	Digital Systems Design	PC	3	0	0	3
5	R20CSS-PC2102	Operating System	PC	3	0	0	3
6	R20CIT-PC2102	Python Programming Lab	PC	0	0	3	1.5
7	R20CSS-PC2103	Operating Systems Lab	PC	0	0	3	1.5
8	R20CSS-PC2104	Software Engineering lab	PC	0	0	3	1.5
9	R20BSH-SC2101	Employability Skills-1 (Skill Oriented Course)	SC	1	0	2	2
10	R20BSH-MC2103	Intellectual Property Rights & Patents	MC	2	0	0	0
11	R20BSH-MC1203	Community Service Project (Evaluation)	MC	0	0	0	0
			Total	16	0	11	21.5

II Year – II SEMESTER

S.No	Course Code	Course Title	Category	L	T	P	Credits
1	R20BSH-MA2202	Probability and Statistics	BS	3	0	0	3
2	R20CSE-PC2202	Object Oriented programming through Java	ES	3	0	0	3
3	R20CIT-PC2201	Computer Organization and Architecture	PC	3	0	0	3
4	R20CSS-PC2201	Data Base Management Systems	PC	3	0	0	3
5	R20BSH-HM2202	Managerial Economics and Financial Accountancy	HM	3	0	0	3
6	R20CSE-PC2204	Object Oriented programming through Java LAB	ES	0	0	3	1.5
7	R20CSS-PC2202	Data Base Management Systems Lab	PC	0	0	3	1.5
8	R20CSS-PC2203	Computer Organization and Architecture Lab	PC	0	0	3	1.5
9	R20CSS-SC2201	Linux System Administration lab (Skill Oriented Course)	SC	1	0	2	2
10	R20BSH-MC2203	Essence of Indian Traditional Knowledge	MC	3	0	0	0
		Total		18	1	9	21.5

Honors Course -1

Track No.	Course Code	Course Title	Category	L	T	P	Credits
1	R20CSS-HN2201	Data Communication	HN	3	1	0	4
2	R20CSS-HN2202	Information Security	HN	3	1	0	
3	R20CSS-HN2203	Web UI Framework	HN	3	0	2	
4	R20CSS-HN2204	Advanced Python Programming	HN	3	0	2	

Minor Course-1

Summer Internship-1(After Second Year & Evaluated in III-I Semester)

HONOR DEGREE IN COMPUTER SCIENCE AND ENGINEERING

Track-I (Networks)

S.No	Year & Semester	Course Code	Subject Title	Category	L	T	P	C
1	II-II	R20CSS-HN2201	Data Communication	HN	3	0	2	4
2	III-I	R20CSS-HN3101	TCP/IP Protocol Suite	HN	3	0	2	4
3	III-II	R20CSS-HN3201	Wireless Sensor Networks	HN	3	0	2	4
4	IV-I	R20CSS-HN4101	Internet of Things	HN	3	0	2	4
5	II Year to IV Year	R20CSS-HNMS01.1	Honors MOOCS-1	HN	0	0	0	2
6	II Year to IV Year	R20CSS-HNMS01.2	Honors MOOCS-2	HN	0	0	0	2
							Total	20

Track- II (Cyber Security)

S.No	Year & Semester	Course Code	Subject Title	Category	L	T	P	C
1	II-II	R20CSS-HN2202	Information Security	HN	3	0	2	4
2	III-I	R20CSS-HN3102	Secure Coding	HN	3	0	2	4
3	III-II	R20CSS-HN3202	Blockchain Technologies	HN	3	0	2	4
4	IV-I	R20CSS-HN4102	Vulnerability Assessment & Penetration Testing	HN	3	0	2	4
5	II Year to IV Year	R20CSS-HNMS02.1	Honors MOOCS-1	HN	0	0	0	2
6	II Year to IV Year	R20CSS-HNMS02.2	Honors MOOCS-2	HN	0	0	0	2
							Total	20

Track III (Web Frameworks)

S.No	Year & Semester	Course Code	Subject Title	Category	L	T	P	C
1	II-II	R20CSS-HN2203	Web UI Framework	HN	3	0	2	4
2	III-I	R20CSS-HN3103	Angular Framework	HN	3	0	2	4
3	III-II	R20CSS-HN3203	.Net Framework	HN	3	0	2	4
4	IV-I	R20CSS-HN4103	J2EE Framework	HN	3	0	2	4
5	II Year to IV Year	R20CSS-HNMS03.1	Honors MOOCS-1	HN	0	0	0	2
6	II Year to IV Year	R20CSS-HNMS03.2	Honors MOOCS-2	HN	0	0	0	2
							Total	20

Track IV (Data Science)

S.No	Year & Semester	Course Code	Subject Title	Category	L	T	P	C
1	II-II	R20CSS-HN2203	Advanced Python Programming	HN	3	0	2	4
2	III-I	R20CSS-HN3103	Mathematical Essential For Data Science	HN	3	1	0	4
3	III-II	R20CSS-HN3203	Natural Language Processing	HN	3	0	2	4
4	IV-I	R20CSS-HN4103	Deep Learning	HN	3	0	2	4
5	II Year to IV Year	R20CSS-HNMS03.1	Honors MOOCS-1	HN	0	0	0	2
6	II Year to IV Year	R20CSS-HNMS03.2	Honors MOOCS-2	HN	0	0	0	2
							Total	20

Course Code	Subject Name	L	T	P	C
R20CSE-ES2101	Mathematical Foundations of Computer Science Common to CSE,CSSE,CSIT	3	0	0	3

Course Objectives:
1. To develop logical thinking in the field of Computer Science and Engineering.
2. To introduce basic concepts and various algorithms of graphs.
3. To introduce basics of group theory.
4. To familiarise the concepts ofvarious trees (i.e) spanning trees, shortest spanning trees.
5. To Familiarise closed form solution of linear recurrence relations by various methods.
6. To design the logical circuits using Boolean expressions.

Course Outcomes:
At the end of the course, the student will be able to
1. Test the validity of an argument through enhanced logical capabilities. (L3)
2. Implement Shortest path algorithm for different graphs.(L3)
3. Construct minimal spanning tree usingalgorithms for the graphs.(L3)
4. Understand the algebraic structures and their properties. (L3)
5. Find a general solution of recurrence equation using suitable method and apply the different properties of lattice to simplify Boolean expressions.(L3)

Unit I:

Mathematical logic :
Propositional Calculus: Statements, negation, conjunction, disjunction, conditional and bi-conditional, well formed formulae, tautologies, equivalence of formulae, duality, tautological implications, principal disjunctive and conjunctive normal forms, inference calculus, and rules of inference.

Predicate Calculus: Predicative logic, free & bound variables, quantifiers, rules of inference.

Learning Outcomes:
At the end of this unit, the student will be able to
- evaluate the basic logic statements (including compound statements, implications, inverses, converses and contrapositives) using truth tables and the properties of logic. (L3)
- reduce the given proposition into normal forms using properties of equivalence and implications.(L3)
- express a logic statement in terms of predicates using quantifiers and logical connectives. (L2)
- apply rules of inferences to verify the consistence of data. (L3)

Unit II:

Graph theory : Introduction to relations, Graph, finite and infinite graphs, incidence and degree, types of Graphs, isomorphism, Adjacency Matrix, sub graphs, walk, path and circuit, connected and disconnected graphs, components, Euler graphs, Euler'stheorem, Hamiltonian paths and circuits, Shortest-path algorithm (Dijkstra's Algorithm), planar graphs.

Learning Outcomes:
At the end of this unit, the student will be able to
- Identify different types graphs. (L2)
- represent a graph using an adjacency matrix.(L2)
- construct Euler and Hamiltonian paths.(L3)
- implement Dijkstra's Algorithm for the given graph(L4)

Unit III:

Trees and Directed graphs (Theorems without Proof): Properties of trees, binary trees, spanning trees, minimal spanning trees, Kruskal's algorithm, Prim's algorithm, tree traversals, DFS, BFS, Binary search tree, directed graph, graph coloring, chromatic number for various graphs and trees.

Learning Outcomes:

At the end of this unit, the student will be able to

- construct the spanning tree and binary tree from the given graphs. (L3)
- build minimal spanning tree by using different algorithms. (L3)
- implement DFS, BFS algorithm for the given graph(L3)
- determine the chromatic number of a given graph/ tree. (L3)

Unit IV:

Algebraic Structures: (Theorems without Proof) : Algebraic Structures (semi groups, monoids, group and abelian groups), Sub groups, homomorphism, isomorphism, coset, Lagrange's theorem, normal subgroups, permutation groups and cyclic groups.

Applications: Group Codes

Learning Outcomes:

At the end of this unit, the student will be able to

- identity the given algebraic structure is a group or not.(L2)
- understand the concepts of sub groups, normal subgroups, cosets, cyclic groups, permutation groups, homomorphism and isomorphism of groups . (L2)
- apply error detection and correction techniques in the design of computer systems using group codes(L3)

Unit V:

Lattice Theory & Recurrence relations:

Lattice Theory: POSET, Hasse diagram, Lattice, Distributive lattice, Modular Lattice, complement, De-morgans laws, Boolean algebra(definition only)

Recurrence relations: Recurrence relations, substitution method, solving homogeneous linear recurrence relations by characteristic roots method, non – homogeneous linear recurrence relations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Poset and Lattice(L2)
- apply the different properties of lattice to simplifying Boolean expressions(L3)
- formulate recurrence relations of the sequences.(L3)
- apply substitution method to solve recurrence relations.(L3)
- solve non-homogeneous linear recurrence relationsby characteristic roots method.(L3)

Text Books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 1997. (for Unit 1,4, 5 (Lattice theory))
2. Joe L. Mott, Abraham Kandel and T. P. Baker, Discrete Mathematics for computer scientists & Mathematicians, 2/e, Prentice Hall of India Ltd, 2012. (for Unit 2,3,5 (recurrence relations))

References:

1. Keneth. H. Rosen, Discrete Mathematics and its Applications, 6/e, Tata McGraw-Hill,2009.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India, 2006.
3. Susanna S. Epp, Discrete Mathematics with Application, Brooks/Colt Cengage learning, fourth edition.
4. Richard Johnsonburg, Discrete mathematics, 7/e, Pearson Education, 2008.
5. T. Koshy, Discrete Mathematics with Applications, Elsevier, New York, (2004).
6. J. A. Bondy, U. S. R. Murty, Graph Theory, Springer-Verlag, New York, (2008).
7. K. D. Joshi, Foundations of Discrete Mathematics, New Age International, (1989).

Subject Code	Subject Name	L	T	P	C
R20CSS-PC2101	Software Engineering	3	0	0	3

Course Objectives:
- To understand the software life cycle models.
- To understand the software requirements and SRS document.
- To understand the importance of modeling and Software Design techniques
- To understand the coding standards and Testing process techniques.
- To understand how to ensure good quality software.
- To understand the maintenance of software

Course Outcomes:
1. Understand the software development process models.
2. Demonstrate the Requirements and Design SRS document of the Software Systems process.
3. Implement different modules and objects to organise data.
4. Apply coding standards and software testing approaches.
5. Analyze various testing techniques, Risk management and Software quality of the softwareproducts.

UNIT-1

Introduction: Introduction to Software Engineering, Evolving role of Software, Software Crisis,Changing Nature of Software, Software myths, Process Models for Software Development, Waterfall, prototyping Evolutionary models: Incremental model, Spiral model, Agile developmental process.

Applications: Various models for different projects

Learning Outcomes:
At the end of the module, students will be able to:
- List the steps involved in softwaredevelopment. (L1)
- Explain myths of software. (L2)
- Apply various software process models (L3)

UNIT-2

Software Requirements Engineering: Requirements Gathering and Requirements Analysis, Requirements Elicitation, requirements verification and validation,Functional& Non-functional requirements, , Software Requirement Specification (SRS).

Applications: Finding Functional &Non-functional requirements and preparing Software Requirement Specification (SRS) for banking system

Learning Outcomes:
At the end of the module, students will be able to:
- Gathering and Requirements Analysis for software (L2)
- Define functional and non-functional requirements for software development (L1)
- Analyze Software Requirement Specification (SRS).(L4)

UNIT-3

Design Engineering: Design concepts, software architecture, Architectural styles, Developing the DFD Model of a System, Structured Design, Detailed Design User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development. Applications:Data designing for banking system

Learning Outcomes:
At the end of the module, students will be able to:
- List the software architecture style for the given problem. (L1)
- Develop the DFD Model of a System based on requirements. (L3)
- User Interface Analysis and Design (L5)

UNIT-4

Coding &Testing: Coding standards, code review and verification, Testing levels: Unit testing, integration testing, system testing – alpha and beta testing, black box and white box testing, debugging. Software Documentation

Applications: Applyingtesting techniques on any software project
Learning Outcomes:
At the end of the module, students will be able to:
- Implementation of coding standards(L6)
- Apply different Testing concepts (L3)

UNIT-5

Software Quality Management: Software Reliability, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model

Software Maintenance: Software maintenance, Maintenance Process Models, Software Configuration Management

Applications: analyze the Software Quality and maintenance in any software project

Learning Outcomes:
At the end of the module, students will be able to:
- Evaluatedifferent Risk management techniques. (L5)
- Apply different Software Quality standards concepts(L3)

Text books:

1. Roger S. Pressman, Software Engineering, A practitioner's Approach, 7thEdition, McGraw-Hill International Edition, 2009
2. Rajib Mal, Fundamentals of software Engineering, 3rdEdition, Eastern Economy Edition, 2009

Reference books:

1. Sommerville, Software Engineering, 7thEdition, Pearson education, 2004
2. K KAggarwal and Yogeshsingh, Software engineering,3rd Edition, New age international publication,2008

Course Code	Subject Name	L	T	P	C
R20CIT-PC2101	Python Programming Common to CSE,CSSE,CSIT	3	0	0	3

Course Objectives:
1. Understand structure and data types of python script.
2. Implement iterations and functions in python.
3. Implement modules and data structures using mutable & immutable objects.
4. Understand object oriented concepts on real world scenarios.
5. Understand packages for statistics and gaming.

Course Outcomes:
1. Understand programstructure python REPL shell environment.
2. Implement iterators and functions for data processing.
3. Implement different modules and objects to organise data.
4. Implement different data structures and their functionalities.
5. Understand Object oriented concepts and handle different errors through exceptions.

Unit I:

Introduction: History of Python, Features of Python, Applications, Python Using the REPL (Shell), Running Python Scripts, Variables, Assignment forms, Keywords, Input-Output, Indentation.

Operators and Type Conversion: Data Types: Numeric, Booleans, Sequence, Strings, Operators, Type conversions, Expressions.

Learning Outcomes:
After completing this chapter, student will be able to
1. Understand the environment of python. (L2)
2. Create and run simple scripts in python.(L2)
3. Understand data types and their conversions. (L2)
4. Understand operators for doing operations on different expressions. (L2)

Unit II:

Control Flow: Control Flow- if, if-elif-else, for, while, break, continue, pass.

Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Anonymous Functions, Lambdas, map, reduce and filter.

Learning Outcomes:
After completing this chapter, student will be able to
1. Understand the iterations using looping structures. (L2)
2. Make decisions through conditional statements. (L2)
3. Understand functions to define call and pass as arguments. (L2)
4. Write anonymous functions for resolving complex problems. (L2)

Unit III:

Modules: Creating modules, import statement, from Import statement, name space, builtin modules- os, random, math, json, request, date, RegEx, itertools.

Packages: Introduction to PIP**,** Installing packages using PIP.

Exploring Data Science Libraries: NumPy, Pandas, Matplotlib

After completing this chapter, student will be able to
1. Create and implement modules using import. (L3)
2. Understand different built-in modules. (L2)
3. Understand data science libraries. (L2)

Unit IV:

Strings & Data Structures: String**,** String Formatting**,** List, String and List Slicing, Tuple, Sets, Frozen Sets, Dictionaries, Comprehensions, Built-in methods of all sequences, File I/O Operations.

Learning Outcomes:

After completing this chapter, student will be able to
1. Implement String operations and formatting. (L3)
2. Understand fundamentals of data structures and their methods. (L2)
3. Implementing file operations for data processing. (L3)

Unit V:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor, Inheritance, Polymorphism, and Data Abstraction.

Errors and Exceptions: Syntax Errors, Exceptions, Exception Handlers, Raising Exceptions, User-defined Exceptions

Learning Outcomes:

After completing this chapter, student will be able to
1. Implement Object oriented concepts with real world scenarios. (L3)
2. Understand class hierarchies and abstraction. (L2)
3. Understand error handling and handle exceptions. (L2)

Text Books:

1. Python Programming: Using Problem Solving Approach by Reema Theraja, Oxford publications
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.

Reference Books:

1. Fundamentals of Python by Kenneth H Lambert, Cengage
2. Learning Python, Mark Lutz, Orielly.
3. Python Programming by Ashok N Kamathane, McGrawhill

Course Code	Subject Name	L	T	P	C
R20ECE-PC2105	Digital Systems Design	3	0	0	3

Course Objectives
- The goal of this course is to provide a logical framework for the design of digital systems.
- To prepare students to perform the analysis and design of various digital logic circuits.
- To understand and examine the structure of various number systems and its application in digital design.
- Ability to identify basic requirements for a design application and propose a cost effective solution.

Course Outcome
Upon completion of the course, students are able to:
1. Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as Gray and BCD and understand the minimization techniques.
2. Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
3. Design sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.
4. Design synchronous and asynchronous counters and registers for different applications.
5. Understand the concepts of memory elements and PLDs

Unit I:
Number System and Boolean Algebra: Conversion of bases, Representation of negative numbers, 1's complement, 2's complement, arithmetic using 2's complement Hexadecimal code, weighted codes - BCD, Excess-3 code, Gray Code. Logic gates. Boolean Algebra. Boolean function representation and minimization techniques: Standard and canonical representation and minimization of Boolean expressions using Karnaugh map.

Unit II:
Combinational Logic Design: Outline the formal procedures for the analysis and design of combinational circuits. Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Full adder using half adders, code converters, comparators, BDC adder, Carry Look Ahead adder, Multipliers, Multiplexer/de- multiplexers, Encoders, and Decoders.

Unit III:
Sequential Logic Desig: Sequential circuit analysis. Latches, Flip-Flops, race around condition, Master and slave JK FF, Excitation tables, conversion of Flip Flops. State Diagrams, Sequential circuit design.

Unit IV:
Counters and Registers: Synchronous and Asynchronous counters, Up/Down counters, Design of Synchronous counters, Cascaded Counters, Counter Decoding, Counter applications. Registers, Shift-Registers. Shift register functions, Serial in/serial out shift registers, serial in parallel out/shift registers, Parallel In/ Parallel out shift registers, bidirectional Shift registers, Shift register counters, Shift register Applications.

Unit V:
Memory and Programmable Logic Devices: Combinational and sequential programmable devices, ROM, PLAs, CPLDs, and FPGAs. Design using Programmable Logic Devices.

Text Books
1. M.M. Mano and M.D. Ciletti, Digital Design, Pearson , 5th Ed.
2. J.F. Wakerly, Digital Design Principles & Practices, Prentice Hall

Refence Books
1. C.H. Roth, Fundamentals of Logic Design, Cengage Learning , 5th Ed.
2. Samuel C. Lee, Digital Circuits and Logic Design, PHI

Subject Code	Subject Name	L	T	P	C
R20CSS-PC2102	Operating System	3	0	0	3

Course Objectives:
- Provide knowledge about the services rendered by operating systems.
- Present detail discussion on processes, threads and scheduling algorithms.
- Expose the student with different techniques of handling deadlocks.
- Discuss various file-system implementation issues and memory management techniques.
  - Learn the basics of Linux system and Android Software Platform.

Course Outcomes:
1. Understand the importance of operating systems and different types of system calls(L2)
2. Analyze process scheduling algorithms and various IPC mechanisms.(L4)
3. Understand the process synchronization, different ways for deadlocks handling.(L2)
4. Analyze different page replacement methods, various File management techniques (L4).
5. Understand Linux and Android environment and behavior (L2).

UNIT-I:

Operating Systems Overview: Introduction: What Operating systems Do, Types of Operating systems,Computer system Architecture, Computer system organization Operating system functions, Operating systems operations, Protection and Security.
System structure: Operating System Services, User and Operating-System Interface, System calls, Types of System Calls, Operating system debugging, System Boot.

Applications:
- Chrome, MS Word, Games, etc
- Standalone GUI Apps like Biometric, Photo maker, etc. Data security systems.
- Used in NLP.
- Used to develop new programming language.

Learning outcomes:
Student should be able to
- Understand operating system structure and functions. (L2). Understand operating system services and system calls (L2).

UNIT–II:

Process Management:
Process concept: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication.
Multithreaded Programming: Overview, Multithreading models, Threading Issues.
Process scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

Applications:
- Knowledge based systems.
- Space applications.
- Real time applications like washing machines, Home security systems, etc.

Learning outcomes:
Student should be able to
- Identify various message sharing mechanisms used in IPC. (L2). Understand how to handling multiple threads. (L2).
- Differentiate between preemptive, non-preemptive and real time CPU scheduling (L2).

UNIT-III:

Synchronization: Process Synchronization, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

Applications:
- Security systems. Signal processing

Learning outcomes:
Student should be able to
- Analyze various solutions for process synchronization. (L4).
- Analyze the reasons for deadlocks and proposed solutions to detect, avoid, recovery from deadlocks. (L4).

UNIT-IV:

Memory Management:
Memory Managementstrategies: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.
Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing.
File system Interface and Introduction to Network Programming: - the concept of a file, Access Methods, OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.
Applications:
- Data base security.
- Online Transaction Services. ATM.
- Big data applications.

Learning outcomes: Student should be able to
- Demonstrate the ability to implement various memory management techniques (L2)
- Illustrate various demand paging techniques. (L2).
- Identify various file management and optimization techniques. (L2).
- Understand how data streams are exchanged between I\O subsystems. (L2). Analyze various storage structures to store the data in secondary memory.
- (L4).
- Learns basic concepts of file file system and network programming.

UNIT-V:

Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.
Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.
Applications:
- Computer network applications Mobile applications.
- LAN maintains.
- Apps development.

Learning outcomes:
Student should be able to
- Understand socket programming. (L2). Understand basics of UDP (L2).

Text Books:
1. Silberschatz A, 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. (for Interprocess Communication and File systems).

References:
1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

Course Code	Subject Name	L	T	P	C
R20CIT-PC2102	Python Programming LAB Common to CSE,CSSE & CSIT	0	0	3	1.5

Course Outcomes:
1. Understand the working environment of Python and its program structure.
2. Implement conditional and iterative statements.
3. Create custom modules and functions to handle different operations.
4. Implement Object oriented concepts through real time scenarios and handle errors.

Experiment 1: Basic I/O
  a. Demonstrate the python script by running in Interactive and Script Mode.
  b. Write a python script to read using input() and display using print() functions.
  c. Write a python script to make use of all conversion functions.

Experiment 2: Decision Making
  a. Write a python script to take five subject marks and print the grade for the student.
  b. Write the python script to print whether the roots are equal, distinct or complex for given coefficients a, b and c for quadratic equation.

Experiment 3: Loops
  a. Write a program to take input as integer N and check whether N is Pronic Number or not. (Product of two consecutive numbers is pronic N(N+1): Eg 110 = 10*11)
  b. Write a python script to take input as amount in rupees R and find out the least number of notes N that can be possible to store in a Wallet.(Hint Notes: 2000,500,200,100,50,20,10) Eg: R=2589, N=5
  c. Write a program to check whether given number N is N-Series(Disarium) number or not. (Eg. 135 is N-Series Number because $1^1+3^2+5^3$ = 135 and some others are 89, 175, 518 etc)

Experiment 4: Nested Loops
  a. Write a python script to take input as String S="LENDI", print the following:
```
   L
    LEL
   LENEL
  LENDNEL
 LENDIDNEL
```

  b. Write a python script to print the any alphabet shape using *s.
```
 * * *
 *     *
 * * * *
 *     *
 *     *
```

Experiment 5: Modules & Functions
  a. Using Recursion, Write a program to take input as vehicle Number N and check whether N is Fancy number or not. (Folding of digits of number should be 9)
  b. Create a module named "Lendi" and create functions addStudent, removeStudent, searchStudent. Access the above module using import statement.
  c. Write a python script using lambdas, to take input as String, and sort the string SS in descending/ascending order according to their frequency of its occurrences of characters.(Eg.S='missisippi', SS=ispm)

Experiment 6: Permutations & Combinations
  a. Write a python script to take input as number N, and find out the largest number L , that can be formed with N.Eg. N=679, P={679,697,769,796,967,976}, L = 976
  b. Write a python script to take input as list, L and print output as largest number L and total combinations C for given N digit number formed by the combination of L.(Eg. L=[1,2,1,4], N=3, L=421,C=12).

Experiment 7: String &Regular Expressions
   a. Write a python script to take two string S1 and S2 and do the following:
      i)   Check S1 and S2 are anagrams or not.
      ii)   Check S1 is Sub string of S2 or not.
      iii)   S1 is palindrome or not
   b. Write a python script to take input as multi-line string and find the sum of all numbers in that string using re module. (Eg. S="he11o they are 40students in97 room of 4th line", Sum= 152)

Experiment 8: Lists & Dictionary
   a. Write a program to take input as String S and print frequency of each character in S using List data structure.
   b. Write a program to take input as String S contains characters and special symbols, reverse the String S such that special symbols remains at same position. (Eg. S="m@d#u" , Output="u@d#m").
   c. Write a python script to take input as String sentence S and print each word count using dictionary.

Experiment 9: OOPS
   a. Using Python OOPS, create a class, constructor, method, __str__ and __repr__ for:
      i.   Employee
      ii. Student

Experiment 10: Exceptions
   a. Write a python program to implement Exceptions hierarchy.
   b. Create a user defined Exception named "FundsLessException" and raise the exception when there are no enough funds in the bank account.

Experiment 11: Data Analysis
   a. Using NumPy, implement different matrix operations in python.
   b. Using pandas, read the data from anytext files.

Experiment 12: Plotting
   a. Using MatPlotlib library, plot the graph with all different plot types.(Pie Chart, Area Plot, Scatter Plot, Histogram and Bar Graph)

APPLICATIONS:
   • Web Application Development and Scraping
   • Designing Games
   • Machine Learning and AI based applications
   • Data Science and Visualization
   • Embedded and CAD Applications

Subject Code	Subject Name	L	T	P	C
R20CSS-PC2103	Operating Systems Lab	0	0	3	1.5

Course Objectives:

- To gain knowledge about the Operating Systems concepts such as process, main memory management, secondary memory management, CPU and disk scheduling etc
- Simulation of CPU scheduling algorithms, file allocation strategies, file organization techniques
- Simulation of Deadlock Avoidance and prevention. Algorithms Simulation of Page replacement algorithms and paging techniques
- Introduced the student to Unix/Linux kernel programming techniques.
- Review basic concepts coveredin the core operating Systems course prerequisite as they are realized in the Linux platform.

Course Outcomes:

1. Implement various process scheduling programs
2. Implement various memory management algorithms.
3. Identify various solutions for critical section problems and also implement different algorithms that are applied in virtual memory .
4. Implement various file allocation algorithms
5. Describe and write shell scripts in order to perform basic shell programming.

Operating Systems

1. Simulate the following CPU scheduling algorithms
   (a)Round Robin (b) SJF (c) FCFS (d) Priority
2. Multiprogramming-Memory management- Implementation of fork (), wait (), exec() andexit (), System calls
3. Simulate the following
   a. Multiprogramming with a fixed number of tasks (MFT)
   b. Multiprogramming with a variable number of tasks (MVT)
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate Bankers Algorithm for Dead Lock Prevention.
6. Simulate the following page replacement algorithms.
   (a) FIFO b) LRU c) LFU
7. Simulate the following File allocation strategies
   (a)Sequenced (b) Indexed (c) Linked

Linux Programming

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 vi editor.
   (c)Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
   (d)Study of Unix/Linux file system (tree structure).
   (e)Study of .bashrc, /etc/bashrc and Environment variables.
2. Write a C program that makes a copy of a file using standard I/O, and system calls
3. Write a C program to emulate the UNIX ls –l command.
4. Write a C program that illustrates how to execute two commands concurrently with a command pipe.Ex: - ls –l | sort
5. Write a C program that illustrates two processes communicating using sharedmemory
6. Write a C program to simulate producer and consumer problem usingsemaphores

7. Write C program to create a thread using pthreads library and let it run its function.
8. Write a C program to illustrate concurrent execution of threads using pthreads library.

Text Books:

1. Operating System -Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. The ultimate guide unix, Sumitan das.

Subject Code	Subject Name	L	T	P	C
R20CSS-PC2104	Software Engineering lab	0	0	3	1.5

Course Objectives:
- To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes:
1. Ability to translate end-user requirements into system and software requirements
2. Ability to generate a high-level design of the system from the software requirements
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

List of Experiments

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:
1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

Sample Projects:
1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

Text Books:
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

Course Code	Subject Name	L	T	P	C
R20BSH-SC2101	Employability Skills-1 (Skill Oriented Course)	1	0	2	2

Course Objectives

1. Aims to help learners develop their English language skills, particularly those planning to appear for Competitive Exams that test their English Language abilities.
2. Gains the power of expression through rich Vocabulary.
3. Imparts critical reading strategies for comprehension of complex texts
4. Provides training and opportunities to develop fluency in English through participation in formal group discussions and Self Introductions.
5. Demonstrates good writing skills for effective Paragraph Writing, Essay Writing and formal correspondence through Emails.
6. Encourages use of a wide range of grammatical structures, Phrases, Clauses and Idioms in speech and writing.

Course Outcomes

1. Enable students to identify Parts of Speech and use them flawlessly, write Emails in formal correspondence effectively, participate confidently by introducing oneself in any formal discussion.
2. Attain Language Proficiency & Accuracy through Contextualized Vocabulary, Verb forms, Tense and subject verb agreement, produce coherent expressions for professional writing, introduce themselves unhesitatingly with Task-Based Activities.
3. Develop the fluency and accuracy to write Technical Reports and Emails for professional communication by using appropriate vocabulary and participate confidently in any formal discussion.
4. Assimilate lifelong reading habit to comprehend a passage for its gist. Avoid the errors in both Speech & Writing and write Letters and Emails for official communication.
5. Realise the technical communicative competence and attainment of grammatically correct structures for formal communication.

Unit 1

Vocabulary: How to talk about actions. **Grammar:**Using and Identifying Parts of Speech accurately **. Writing:** Paragraph Writing and formal correspondence through Emails**. Speaking:**Background to Group discussions & Self-introductions.

Learning Outcomes

At the end of the module, the learner will be able to

- Acquire vocabulary and use it contextually(L2)
- identify parts of speech and use them flawlessly in both Speech and Writing (L3)
- write paragraphs and Emails in formal correspondence effectively (L3)
- participate confidently in any formal discussion and introduce themselves unhesitatingly (L3)

Unit 2

Vocabulary: How to talk about various speech habits.**Grammar**: Learning Verb forms, Tenses and Subject-verb agreement and using them accurately in both Speaking and Writing contexts. **Writing :**Essay Writing and formal correspondence through Emails. **Speaking:**Four major areas -Subject Knowledge, Oral Communication Skills, Leadership Skills and Team Management-of GD;Real time GDs for Evaluation.

Learning Outcomes

- At the end of the module, the learner will be able to
- Acquire vocabulary and use it contextually (L2)
- use Verb forms,Tense and subject verb agreement for effective speaking and writing (L3)
- produce coherent expressions for professional writing (L4)

participate confidently in any formal discussion and introduce themselves unhesitatingly (L3)

Unit 3

Vocabulary: How to insult your enemies**. Grammar:** Sentence Analysis & Synthesis - Voice, Degrees of Comparison, Reported Speech and Types & Forms of sentences. **Writing:** Report writing and Emails for formal correspondence**. Speaking:** Roles in structured GDs; real time GDs for practicing the above roles.

Learning Outcomes
- At the end of the module, the learner will be able to
- Acquire vocabulary and use it contextually(L2)
- identify the complexity in the structure of a sentence (L2)
- write technical reports and emails for professional communication (L3)
- participate confidently in any formal discussion and introduce themselves unhesitatingly (L3)

Unit 4

Vocabulary: How to flatter your friends**. Grammar**: Common errors and Correction of Sentences **Reading:**Reading Comprehension passages through Skimming and Scanning and understanding the gist or the specific purpose of them.. **Writing:** Letter writing and Emails. **Speaking:**Advantages of GDs for hiring process ; real time GDs for evaluating.

Learning Outcomes
At the end of the module, the learner will be able to
- Acquire vocabulary and use it contextually(L2)
- comprehend a passage and know its gist(L3)
- avoid the errors in both Speech and Writing (L2)
- write letters and emails for official communication(L3)
- participate confidently in any formal discussion and introduce themselves unhesitatingly (L3)

Unit 5

Vocabulary & Grammar: High-frequency words for all competitive exams, Clause ,Phrase & Idioms**. Reading:** Reading for Comprehending **Writing:**Business Letters and Emails **Speaking:**Group Discussions for Evaluation

Learning Outcomes
At the end of the module, the learner will be able to
- Acquire vocabulary and use it contextually(L2)
- use grammatically correct structures for formal communication (L3)
- write Business Letters effectively (L3)
- participate confidently in any formal discussion and introduce themselves unhesitatingly (L3)

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skilful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD)
5. Word Power Made Easy by Norman Lewis

Subject Code	Subject Name	L	T	P	C
R20BSH-MC2103	Intellectual Property Rights & Patents	3	0	0	0

Course Objectives:

- Outline and impart knowledge of Intellectual property rights on trademarks, copyrights and patents and also agencies responsible for IPR(L2)
- Comprehend the awareness of copyright law and various rights acquired by the owner or original creators.(L2)
- Illustrate the patent law, registration process and grants, protects in India and abroad.(L3)
- Relate to significance of trademark and service mark in business Organisations and its infringement.(L2)
- Assess and maintain the protection of trade secret in the organisation and also emerging trends in cyber security and cybercrimes.(L3)

Course Outcomes:

1. Knowledge on Intellectual Property Law, Innovations andInventions of Trade related Intellectual
2. Property Rights.(L3)State the principles and rights afforded by Copyright. (L3)
3. Analyze Patent Requirements, Patent Law, Infringement and Litigation.(L3)
4. Outline the registration Processesof Trade Mark and Dilution of Ownership of Trade mark (L2)
5. State the main ideas of Employee Confidentiality Agreement and Trade Secret Litigation and also identify the legal procedures to prevent cybercrimes. (L2)

Unit I:

Introduction to Intellectual Property Rights (IPR): Introduction to IPRs, Basic concepts and need for Intellectual Property – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Agencies for IPR Registration – Emerging trends in IPR - Use and Misuse of Intellectual PropertyRights.

Learning Outcomes:

At the end of this unit student will be able to:
- Knowledge about the elements of IPR (L3)
- Learn International Instruments and emerging areas of IPR (L1)
- Assess Agencies responsible for Registration and laws related to IPR(L3)

Application: Applicability and relativity between elements of Intellectual property rights and creating innovative ideas.

Unit II:

Copyrights and Neighboring Rights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip ProtectionAct.

Learning Outcomes:

At the end of this unit student will be able to:
- Identify how one can generate economic wealth through copyrights(L3)
- Support the various concepts related to protection, promotion and enforcement of copy rights(L2)
- Knowledge of Limitations and Infringement of Copyrights. (L3)

Application: Practice of copyrights case and Identification of the infringement to the owner of the copy right.

Unit III:

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Patent Search - Patent Registration and Granting of Patent - Ownership and Transfer — Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

Learning Outcomes:

At the end of this unit student will be able to:

- Describe the registration process of Patents (L2)
- Gain knowledge of infringement of patents and their remedies(L3)
- Generalize on Patents, Software protection and Computer related Innovations.(L3)

Application: Checking the eligibility for several patents and suggest remedies for problems through case study.

Unit IV:

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies- Case study.

Learning Outcomes:

At the end of this unit student will be able to:

- Knowledge on registration and maintenance of trademarks (L3)
- Illustrate procedure for trademark claims (L2)
- Elaborate on transfer of rights in Trademarks (L3)

Application: Compare and contrast different trademarks and know how to register trademark

Unit V:

Trade Secrets& Cyber Law: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Confidentiality Agreements – Breach of Contract – Trade Secret Litigation . Cyber Law and Cyber Crime. Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - Cyber Crimes - Prevention and Punishment - Case study.

Learning Outcomes:

At the end of this unit student will be able to:

- Assess the level of physical security (L3)
- Outline Employee Confidentiality Agreements (L2)
- Gain knowledge of prevention and punishment of cybercrimes(L3)
- Understand the various levels of liability of network providers(L2)

Application:

1. 1.Adapt how to protect trade secret physically and from the employees of the organization.
2. Choose and exhibit various securities to access like biometrics, login passwords, facial recognition, UID number, which protects the individual properties.

Text Books:

1. Fundamentals of IPR for Engineers- Kompal Bansal &Parishit Bansal, B. S. Publications,2013
2. Intellectual Property -Deborah E.Bouchoux ,Cengage Learning, New Delhi.,2012
3. V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

References Books:

1. Intellectual property rights- PrabuddhaGanuli., Tata Mcgraw hill, 2012.
2. Intellectual property rights M.Ashokkumar and Mohd.Iqbal Ali:, Serials Publications, 2015
2. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi, 2015.
3. Intellectual Property- Richard Stim, Cengage Learning, New Delhi, 2012.
4. 5.S. V. Satakar, ―Intellectual Property Rights and Copy Rights, EssEss Publications, New Delhi,2002

Web links:

1. http://www.ipindia.gov.in/patents.htm
2. http://www.ipindia.gov.in/trade-marks.htm
3. https://copyright.gov.in/
2. 4.http://www.wipo.int/portal/en/index.html
3. 5.https://indiankanoon.org/

Subject Code	Subject Name	L	T	P	C
R20BSH-MA2202	Probability and Statistics Common to CSE,CSSE & CSIT	3	0	0	3

Course Objectives:
1. To familiarize the data Science concepts.
2. To impart knowledge in basic concepts and few techniques in probability and statistics in relation to the engineering applications.

Course Outcomes:
At the end of the course, the students will be able to
1. Evaluate correlation and regression for the given data.(L2)
2. Apply Baye's theoremto probabilistic experiments.(L3)
3. Apply discrete and continuous probability distributions to the real time problems.(L3)
4. Design the components of a classical hypothesis test.(L3)
5. Infer the statistical inferential methods based on small sampling tests. (L3)

Unit I:

Correlation and Regression: Correlation, correlation coefficient, rank correlation. Linear regression coefficients, principle of least squares, method of least squares, regression lines, multiple regression, Logistic regression.

Learning Outcomes:
At the end of this unit, the student will be able to
• Understand the various methods of central tendency and variability.(L2)
• evaluate correlation, correlation coefficient, rank correlation. (L2)
• apply method of least squares to find regression coefficients. (L3)

UNIT II:

Probability: Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem,

Learning Outcomes:
At the end of this unit, the student will be able to
• make use of probabilities of events in finite sample spaces from experiments. (L3)
• apply Baye's theorem to real time problems. (L3)

UNIT III:

Random Variables &Probability Distributions: Random variables (discrete and continuous), probability density functions, properties, mathematical expectation. Probability distribution - Binomial, Poisson distribution and normal distribution-their properties.

Learning Outcomes:
At the end of this unit, the student will be able to
• find the binomial, poisson and normal distribution of the given data data. (L2)

Unit IV:

Estimation and Testing of hypothesis, large sample tests: Introduction to Sampling, parameters, statistics, sampling distribution, point estimation, interval estimations, null hypothesis, alternative hypothesis, the critical & acceptance regions, level of significance, type-1 and type-2 of errors.

Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means,confidence interval for parameters in one sample and two sample problems.

Learning Outcomes:
At the end of this unit, the student will be able to
• explain the concept of estimation, interval estimation and confidence intervals. (L2)
• apply the concept of hypothesis testing for large samples. (L4)

Unit V:

Small sample tests: Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for Single varience, χ^2 - test for goodness of fit, ANOVA(1-way).

Learning Outcomes:

At the end of this unit, the student will be able to
- apply the concept of testing hypothesis for small samples to draw the inferences. (L3)
- estimate the goodness of fit. (L3)
- apply ANOVA test to compare the data (L3)

Text Books:

1. Veerarajan T., Probability, Statistics and Random Processes, 3rd edition, Tata McGraw-Hill, New Delhi, 2008.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44/e, 2017.
3. Miller and John E. Freund, Probability & Statistics for Engineers, Prentice Hall of India.

References:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.
2. T. K. V. Iyengar, B. Krishna Gandhi and Others, Probability & Statistics, S. Chand & Company.
3. S. C. Guptha and V. K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand and Sons Publications, 2012.
4. Sheldon M. Ross,Introduction to Probability and Statistics for Engineers and Scientists, Academic Press,2009.
5. Ronald E.Walpole, Sharon L.Myers, Keying Ye, Probability and Statistics for Engineers and Scientists, Pearson,2007.
6. Ravichandran, Probability and Statistics for Engineers, Wiley, 2019.

Subject Code	Subject Name	L	T	P	C
R20CSE-PC2202	Object Oriented Programming through Java Common to CSE,CSSE & CSIT	3	0	0	3

Course Objectives:
1. To understand the structure and environment of Java.
2. To implement the relationship between objects.
3. To apply data hiding strategy in objects.
4. To implement text processing and error handling.
5. To organize data using different data structures.
6. To create multi threaded graphical user interface applications.

Course Outcomes:
1. Understand the environment of JRE and Control Statements.
2. Implement real world objects using class Hierarchy.
3. Implement generic data structures for iterating distinct objects.
4. Implement error handling through exceptions and file handling through streams.
5. Design thread-safe GUI applications for data communication between objects.

Unit I:

Java Environment and Program Structure: History of Java, Features, Applications, Java Installation - JDK and JRE, JVM Architecture, OOPS Principles, Class and Object, Naming Convention, Data Types, Type Casting, Type Conversion, Wrapper classes, Operators, instance of operator, Command Line Arguments, Decision making, Arrays, and Looping statements.

Learning Outcomes: Student will be able to
1. Understand architecture of Java Virtual Machine.(L2)
2. Understand the structure of java program and its environment. (L2)

Unit II:

Class Hierarchy & Data Hiding: Property, Method, Constructor, Inheritance (IS-A) , Aggregation and Composition (HAS-A), this and super, static and initialize blocks, Method overloading and overriding, static and final keywords, Types of Inheritance, Compile time and Runtime Polymorphism, Access Specifiers and scope, packages and access modifiers, Abstract class, Interface, Interface Inheritance, Achieving Multiple Inheritance, Class casting, Object Cloning, Inner Classes.

Learning Outcomes: Student will be able to
1. Understand the class hierarchy and their scope. (L2)
2. Implement relationship between objects. (L3)
3. Understand data hiding and nested classes. (L2)
4. Implement data type casting and cloning of objects. (L3)

Unit III:

Strings and Collections: String: Methods,StringBuffer and StringBuilder, StringTokenizer,
Collections: Exploring java.util.*, Scanner, Iterable, Collection Hierarchy, Set, List, Queue and Map, Comparable and Comparator, Iterators: foreach, Enumeration, Iterator and ListIterator.

Learning Outcomes: Student will be able to
1. Understand the usage of String and its properties and methods.(L2)
2. Understand data structures and Iterators. (L2)
3. Create the data structures and implement different utility classes. (L3)

Unit IV:

IO and Error Handling: IO Streams: Exploring java.io.*, Character and Byte Streams, Reading and Writing, Serialization and De-serialization,
Error Handling: Error vs Exception, Exception hierarchy, Types of Exception, Exception handlers, User defined exception, Exception propagation.

Learning Outcomes: Student will be able to
1. Understand character and byte streams. (L2)

2. Understand the hierarchy of errors and exceptions. (L2)
3. Implement data streams and exception handlers. (L3)

Unit V:

Threads and GUI: Multi Threading: Process vs Thread, Thread Life Cycle, Thread class and Runnable Interface, Thread synchronization and communication.
GUI: Component, Container, Applet, Applet Life Cycle, Event delegation model, Layouts, Menu, MenuBar, MenuItem.
Learning Outcomes: Student will be able to
1. Understand the Thread Life Cycle and its scheduling.(L2)
2. Implement the synchronization of threads. (L2)
3. Create graphical components using Abstract window toolkit. (L3)

Text Books:
1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.
4. Java: How to Program, 9th Edition (Deitel) 9th Edition.
5. Core Java: An Integrated Approach, Java 8 by R. Nageswara Rao.

Reference Books:
1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

Course Code	Subject Name	L	T	P	C
R20CIT-PC2201	Computer Organization and Architecture Common to CSE,CSSE & CSIT	3	0	0	3

Course Objectives:
1. Understand the architecture of a modern computer with its various processing units.
2. Also the Performance measurement of the computer system.
3. In addition to this the memory management system ofcomputer.

Course Outcomes:
1. Identify the Architecture of modern computer.
2. Measure the performance of a computer.
3. Explain different instruction types, addressing modes
4. Demonstrate the concepts of interrupts and memory accessing methods.
5. Illustrate different memory types and the functions of control unit.

UNIT -I:

Basic Structure of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

Learning Outcomes:

At the end of this unit, students will be able to
1. acquire the knowledge on basic structure of a computer [L2]
2. analyze the performance of a computer system [L4]

Applications:
● design application program interface of a system

UNIT -II:

Machine Instruction and Programs: Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation.

Learning Outcomes:

At the end of this unit, students will be able to
1. create the assembly level programs [L6]
2. acquire knowledge on register transfer notations [L2]
3. analyze the role of a stack in real time programs [L5]

Applications:
● develop a micro level assembly program for high level languages
● design programs using stacks and queues

UNIT -III:

Type of Instructions: Component of Instructions: Logic Instructions, shift and Rotate Instructions, Arithmetic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

Learning Outcomes:

At the end of this unit, students will be able to
1. Apply logical and shift instructions towards arithmetic operations [L3]
2. analyze the branch and jump instructions [L5]
3. analyze addressing mode of a specific instruction [L4]

Applications:
● design branch instructions using assembly level language

UNIT -IV:

Input/Output Organization: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

Learning Outcomes:

At the end of this unit, students will be able to
1. analyze the interrupts, synchronous and asynchronous busses [L4]
2. apply data transfer techniques [l3]
3. explain I/O interfaces[L2]

Applications:
- develop interrupt programs for enabling input/ output interface

UNIT -V:

The Memory Systems: Basic memory circuits, Memory System Consideration, ReadOnly Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING. Secondary **Storage:** Magnetic Hard Disks, Optical Disks

Processing Unit: Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control, **Micro programmed Control**: Microinstructions, Microprogram Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

Learning Outcomes:

Students will be able to
1. Analyze the difference between the functionality of RAM and ROM [L2]
2. Apply cache organization and different mapping techniques [L3]
3. Analyze the performance of different cache organizations in computer system [L2]
4. Acquire knowledge on how execution of an instruction [L2]
5. Analyze different types of control unit designs [L2]
6. Create a small micro-program to perform a specific task [L6]

Applications:
- design a cache level programs for different mapping techniques
- designing of a micro architecture
- designing of an instruction level architecture

Text Books:

1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

Reference Books:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - SivaraamaDandamudi Springer Int. Edition.
4. "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy. 5. J .P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

Subject Code	Subject Name	L	T	P	C
R20CSS-PC2201	Data Base Management Systems	3	0	0	3

Course objectives:

- Learn the fundamental concepts of database systems.
- Enable students to design ER diagram for any customized applications
- Learn simple and Complex queries using SQL.
- Learn schema refinement techniques (Normalization).
- Knowledge about transaction and recovery techniques.

Course Outcomes:

1. Understand File System Vs Databases.
2. Design and implement ER-model and Relational models.
3. Construct simple and Complex queries using SQL.
4. Analyze schema refinement techniques.
5. Design and build database system for a given real world problem

UNIT-I

Introduction-Database system, Characteristics (Database Vs File System),Database Users (Actors on Scene, Workers behind the scene), and Advantages of Data base systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Learning outcomes: Student will be able to
1. Distinguish between Database System and File System (L2)
2. Categorize different kinds of data models (L2)

Applications:
1. Universities and Colleges

UNIT-II

Relational Model: Introduction to relational model, concepts of domain,attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance , Relational algebra, Relational Calculus.

Entity Relationship Model: Introduction, Representation of entities,attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

Learning Outcomes: Student will be able to
1. Develop E-R model for the given problem (L6)
2. Knowledge about integrity constraints in relational model (L1)

Applications:
1. Railway reservation Systems

UNIT-III

Schema Refinement (Normalization): Purpose of Normalization orschema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

Learning Outcomes: Student will be able to
1. Differentiate between various normal forms based on functional dependency (L2)
2. Apply Normalization techniques to eliminate redundancy (L3)

Applications:
Library Management systems.

UNIT-IV

Transaction And Recovery: Transaction State,Implementation of Atomicity and Durability, Concurrent Executions, Serializability,Deadlocks in transactions, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Learning Outcomes: Student will be able to
1. Summarize transaction properties and recoverability (L2)
Applications:
1. Banking
2. Credit card transactions

UNIT-V
File Organization and Indexing, File Types, File Operations ,Cluster Indexes, Primary and Secondary Indexes , Index data Structures, Hash Based Indexing: Tree based Indexing, Indexes and Performance Tuning
Learning Outcomes: Student will be able to
1. Understand basic concepts ofFile Organization and Indexing (L2)
Applications:
1. Telecom
2. Online shopping

Text Books:
1. Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke,TMH
2. Database System Concepts,5/e, Silberschatz, Korth, TMH
3. Introduction to Database Systems, 8/e C J Date, PEA.

Reference Books:
1. Database Management System, 6/e RamezElmasri, Shamkant B. Navathe, PEA
2. Database Principles Fundamentals of Design Implementation and Management, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Course Code	Subject Name	L	T	P	C
R20BSH-HM2202	Managerial Economics and Financial Accountancy	3	0	0	3

Course Objectives
1. Inculcate the basic knowledge with the concepts of Economics & Demand and current business environment.(L2)
2. Analyze various factors of production with proposed theories in relation to cost - volume profit analysis.(L4)
3. Identify micro environment in which markets operate, how price determination is done under different kinds of competitions and know the different forms of Business organization. .(L4)
4. Provide fundamental skills about accounting and explain the process of preparing accounting statements and analysis of financial statements. (L3)
5. Apply the best investment decisions by means of time value of money.(L4)

Course Outcomes:
1. Equipped with the knowledge of fundamentals of economics, estimating the Demand for a product, Capable of analyzing Elasticity & Forecasting methods(L2)
2. Apply production concepts, assess the costs and Determine Break Even Point (BEP) of an enterprise for managerial decision making(L4)
3. Identify the influence and price determination of various markets structures and knowledge of the forms of business organization and Business cycles(L4)
4. Analyze and interpret the process & principles of accounting & apply financial statements for appropriate decisions to run the business profitably(L4)
5. Analyze how to invest adequate amount of capital in order to get maximum return from selected business activity.(L4)

Unit-I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

Learning Outcomes:
At the end of this unit students will be able to:
- Awareness about basics of managerial economics(L1)
- Knowledge of the concepts of demand, elasticity of demand and methods of demand forecasting(L1)

Application:
1. Analyze the demand of a product by applying methods of the elasticity of demand.

Unit – II

Theories of Production and Cost Analysis: Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

Learning Outcomes:
At the end of this unit students will be able to:
- Examine various issues involved in production decision analysis (L1)
- Construct how production function is carried out to achieve least cost combination of inputs(L3)
- Apply Break – Even Analysis and its importance in managerial decision making(L4)

Application:
Compute contribution, revenue, Cost comparison, Margin of safety for making accurate decisions related to profitability of particular Enterprise

Unit – III

Introduction to Markets, Theories of the Firm & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Goods and services Tax, Business Cycles : Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company.

Learning Outcomes:
At the end of this unit students will be able to:
- Identify the various market structures like Monopoly, Monopolistic competition (L4)
- Determine the appropriate pricing strategies to be applied in each market(L2)
- Compare the suitability of various organizational and ownership structures like sole trading, partnership. (L2)

Application: Analyse the leaps and bounds faced by the service providers in estimation of pricing in Telecom sector**.**

Unit – IV

Introduction to Accounting & Financial Analysis: Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements.

Learning Outcomes:
At the end of this unit students will be able to
- Knowledge about the framework for accounting process(L1)
- Analyze financial accounting decisions.(L3)

Application:
Prepare the financial accounting statements like Trading account, Profit and Loss account, Balance sheet of any organization.

Unit – V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Learning Outcomes:
At the end of this unit students will be able to
- Analyze how capital budgeting decisions are carried out(L4)
- Knowledge of the concepts and various methods of capital budgeting(L1)
- Apply traditional or modern methods of Capital budgeting in business decision making(L3)

Application:
1. Assess long term investments and funds required in small scale organization**.**

Text Books:
1. Aryasri, Managerial Economics and Financial Analysis, TMH, 2012.
2. Varshney&Maheshwari, Managerial Economics, Sultan Chand& Sons, 2014.

References:
1. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition
2. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd,
3. MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House Pvt Ltd
4. I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
5. V. Maheswari, Managerial Economics, S. Chand & Company Ltd,

Weblinks

1. https://www.smartzworld.com/notes/managerial-economics-and-financial-analysis-mefa/
2. Production and cost analysis- https://slideplayer.com/slide/5708722/
3. Accountinganalysis -
   https://www.readyratios.com/reference/accounting/accounting_analysis.html
4. 4.https://nptel.ac.in/courses/110/101/110101131/

Subject Code	Subject Name	L	T	P	C
R20CSE-PC2204	Object Oriented programming through Java LAB Common to CSE,CSSE & CSIT	0	0	3	1.5

Course Objectives:
- To understand the structure and environment of Java.
- To implement the relationship between objects.
- To apply data hiding strategy in objects.
- To implement text processing and error handling.
- To organize data using different data structures.
- To create multi threaded graphical user interface applications.

Course Outcomes:
1. Create classes and objects for real world entities.
2. Implement polymorphic and abstract behaviour in objects.
3. Implement the parent-child relationships between objects with access protection.
4. Create exceptions for handling runtime errors during text processing.
5. Implement generic data structures for iterating distinct objects.

Exercise-1:
a. Write a Java program to create Class as Registration with properties as Full Name(String) , Gender(char), Age(int), Height(double), Phone Number(long), and isMarried(Boolean) and print their values.
b. Write a Java program to implement Type Casting and Conversion.
c. Write a Java program to implement Wrapper Classes.

Exercise-2:
a. Write a Java program to take input as Regd.No and print the branch depending upon the department code in that Regd.No using else-if and switch statements. (EgRegNo: 19KD1A0505, 8th character is department Code, 5-CSE, 4-ECE, 3-MECH, 2-EEE etc.
b. Write a Java program to read input integers from Command Line Arguments and print first and second largest numbers.
c. Write a Java program to take input as Integer array and print even indexed even numbers and odd indexed odd numbers.

Exercise-3:
a. Write a Java program to take input as Decimal number and convert into Roman Number.
b. Write a Java program to check whether given number is Extension number. The extension number is the number which is present in the last digit(s) of its square.(Eg. N=25, 625 is Extension number since it contains 25).
c. Write a Java program to take input as Amount in rupees and print their denominations and total number notes.

Exercise-4:
a. Create a Class named Student with properties as Student Id, Student Name, gender, department, Age, Aggregate and methods as insertStudent() for inserting student details and displayStudent() for printing student details.
b. Create a class Student with same properties as above and create a constructor to insert student details and return the data using toString() method.

Exercise-5:
a. Design a Class named Transaction to transfer amount (double) in different ways using Account Number(int) , Phone Number(Long) and qr Code (String) as parameter into a method transferAmount() to achieve Method or Constructor OverLoading.
b. Design a super Class Account and sub Classes as LoanAccount, SavingsAccount and CurrentAccount and implement relationship between parent and child classes. (Implement Packages for the above classes)

Exercise-6:
   a. Write a Java program to implement this and super keywords.
   b. Write a Java program to implement Static property, method, block and package.
   c. Write a Java program to implement final property, method and class.

Exercise-7:
   a. Write a Java program to implement Data Abstraction using Abstract class and Interface.
   b. Write a Java program to implement Multiple Inheritance through Interfaces.

Exercise-8:
   a. Write a Java program to take input as String Sentence S and print largest and shortest word in S.
   b. Write a Java program to take input as String S and remove the consecutive repeated characters from S. (Eg. S = Raaaamaaa then, Rama)
   c. Write a Java program to take input as String Sentence S and print sentence again with all the words with the first letter as capital letter using StringBuffer.

Exercise-9:
   a. Write a Java program to implement Map interface.
   b. Write a Java program to implement Set Interface.
   c. Write a Java program to implement List Interface.
   d. Write a Java program to implement ComparatorInterface.

Exercise-10:
   a. Write a Java program to read data from Employee file and print Highest salary employee information. (Employee File Contains: ID, name, Dept, Salary).
   b. Write a Java program to implements Serializable Interface to read and write Objects to/from the file.

Exercise-11:
   a. Write a Java program to implement try, catch, finally blocks.
   b. Write a Java program to create user defined Exception and implement throw and throws handlers.

Exercise-12:
   a. Write a Java program to create Thread using Thread Class and Runnable Interface.
   b. Write a Java program to implement multi threading and synchronization.
   c. Write a Java program to implement Inter Thread Communication.

Exercise-13:
   a. Create an Applet that changes the Font and background Color depending upon the user selection from the input.
   b. Write a Java program to implement Event Delegation model through AWT Components.
   c. Write a Java program to implement Layout Manager with AWT components.

Subject Code	Subject Name	L	T	P	C
R20CSS-PC2202	Data Base Management Systems Lab	0	0	3	1.5

Course Objectives:

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product- specifictools.
- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing orientedframework
- To give a good formal foundation on the relational model ofdata
- To present SQL and procedural interfaces to SQLcomprehensively
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physicaldesign

Course Outcomes:

1. Understand the procedure for creating the database.
2. Apply querying techniques to create Database tables by properly specifying Integrity constraints.
3. Apply SQL commands such as DDL, DML, DCL, TCL to access data from database objects
4. Understand the procedure to write Nested queries.
5. Develop PL/SQL stored procedures, stored functions, cursors and packages.

List of Experiments:

SQL

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Queries using operators inSQL
3. Queries to Retrieve and Change Data: Select, Insert, Delete, andUpdate
4. Queries using Group By, Order By, and HavingClauses
5. Queries on Controlling Data: Commit, Rollback, and Savepoint
6. Queries to Build Report in SQL*PLUS
7. Queries for Creating, Dropping, and Altering Tables, Views, andConstraints
8. Queries on Joins and CorrelatedSub-Queries
9. Queries on Working with Index, Sequence, Synonym, Controlling Access,and Locking Rows for Update, Creating Password and Securityfeatures

PL/SQL

1. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usageof Assignment Operation
2. Write a PL/SQL Code Bind and Substitution Variables. Printing inPL/SQL
3. Write a PL/SQL block using SQL and Control Structures inPL/SQL
4. Write a PL/SQL Code using Cursors, Exceptions and Composite DataTypes
5. Write a PL/SQL Code using Procedures, Functions, and PackagesFORMS
6. Write a PL/SQL Code Creation of forms for any Information System such asStudent Information System, Employee Information System etc.18
7. Demonstration of databaseconnectivity

Text Books

1. Oracle: The Complete Reference by OraclePress
2. Nilesh Shah, "Database Systems Using Oracle", PHI,2007.
3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education,2007

Subject Code	Subject Name	L	T	P	C
R20CSS-PC2203	Computer Organization and Architecture Lab	0	0	3	1.5

Course Objectives

- To design and realize basic digital combinational and sequential circuits.
- To verify the functionality of basic digital combinational and sequential circuits

Course Outcomes:

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

1. Acquire the knowledge of numbering systems and logic gates.
2. Design of logic gates using IC's.
3. Design of combinational circuits using IC's.
4. Design of Sequential circuits using IC's.
5. Design of synchronous and asynchronous counters using flip-flops.

List of Experiments:

1. Verify the Truth Tables of AND, OR, NOT, NAND, NOR EXOR Logic Gates
2. Realization of logic gates using Universal logic gates.
3. Realization of Boolean function using logic gates
4. Design and realization of Code conversion circuits- BCD to Excess-3 and vice-versa.
5. Design and verify the logic circuit of Half adder and subtractor using logic gates
6. Design and verify the logic circuit Full adder/ subtractor using two half adders
7. Design and implementation of encoder and decoder
8. Design and realization of 8x1 mux using two 4x1 mux.
9. Realization of Flip-Flops using logic gates
10. Design and implementation of shift register
11. Design and verification of 4 bit ripple counter and mod 10/mod 12 ripple counter Design
12. Design and implementation of 3 bit synchronous up/down counter

Subject Code	Subject Name	L	T	P	C
R20CSS-SC2201	Linux System Administration lab (Skill Oriented Course)	1	0	2	2

Course Outcomes:

- Explain the fundamental concepts of open-source operating system Linux
- Understand the basic set of commands and editors in Linux Operating Systems.
- Discuss shell programming in Linux Operating System.
- Demonstrate the role and responsibilities of a Linux System Administration.
- Distinguishavarious filter and server commands.

1. Installation of Red HAT Linux operating system.

       a. Partitioning drives
       b. Configuring boot loader
       c. Network configuration
       d. Setting time zones
       e. Creating password and user accounts
       f. Shutting down

2. Software selection and installation
3. Basic Commands
4. Setting up Samba Server
5. Configuring dhcp server and client
6. Configure a DNS Server with a domain name of your choice.
7. Configure a Linux server and transfer files to a windows client . (Setting up NFS File Server)
8. Connecting to the internet a. Setting up linux as a proxy server b. Configuring mozilla or firefox to use as a proxy.
9. Configure FTP on Linux Server. Transfer files to demonstrate the working of the same.
10. Configuring Apache Web Server.
11.Linux system administration
       a. Becoming super user
       b. Temporarily changing user identity with su command
       c. Using graphical administrative tools
       d. Administrative commands
       e. Administrative configuration files

Subject Code	Subject Name	L	T	P	C
R20BSH-MC2203	Essentials of Indian Tradition Knowledge	2	0	0	0

Course Objectives:

- Facilitate students with the concepts and roots of traditional knowledge system.(L2)
- Importing thought process reasoning and inference sustainability of Indian traditional knowledge system (L2)
- Comprehend the legal framework, traditional knowledge, biological diversity act 2002. (L3)
- Focus on traditional food and modern food. (L2)
- Facilitate traditional knowledge in various sectors. (L3)

Course Outcomes:

After completion of the course students will be able to:

1. Knowledge about the concept of traditional knowledge(L2)
2. Apply significance of traditional knowledge protection(L3)
3. Analyze various enactments related to the protecting facets of traditional knowledge. (L2)
4. Evaluate the significance Traditional Knowledge and modern food. (L2)
5. Compare the traditional knowledge in various sectors(L2)

Unit-I:

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, Indigenous Knowledge(IK),characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge vis-à-vis formal knowledge.

Learning Outcomes:

Atthe end ofthe unit thestudentwill ableto:

- Recognize the social change in traditional knowledge(L2)
- Contrast and compare characteristics importance kinds of traditional knowledge.(L2)
- Analyze physical and social contexts of traditional knowledge. (L3)

Applications: Compare and contrast the traditional knowledge with formal knowledge.

Unit-II:

Protection of Traditional Knowledge: Need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Learning Outcomes:

At the end of the unit the student will able to:

- Identify the need of protecting traditional knowledge.(L2)
- Apply significance of TK protection.(L3)
- Analyze the value of TK in global economy. (L3)

Applications: Identify and implementation of traditional knowledge in present scenario.

Unit-III:

Legal framework and Traditional knowledge: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act,2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PVPFR Act), The Biological Diversity Act 2002and Rules 2004, Systems of traditional knowledge protection- Legal concepts for the protection of traditional knowledge-Certain non IPR mechanisms of traditional knowledge protection.

Learning Outcomes:

At the end of the unit the student will able to:

- Contrast and compare the Scheduled Tribes and other traditional forest dwellers. (L2)
- Analyze plant variant protections and evaluate farmers right act. (L4)
- Analyze legal concepts for the protection of Traditional Knowledge.(L4)

Applications: Case study to recognize legal concepts, protection of culture and Indian traditional knowledge.

Unit-IV:

Traditional knowledge in Food : Evolution of Indian cuisine,Importance of traditional food –Styles of traditional food- Modern Food-Harmful effects of modern food, Factors influencing food choice- Economic and Physical Determinants-Uniqueness of Culture in Food.

Learning Outcomes:
Atthe end ofthe unitthestudent will ableto:
- Recognizing the significance of Traditional food (L2)
- Awareness about the harmful effects of modern food.(L3)

Applications: Distinguish between nutrition levels of traditional and modern food items

Unit-V:

Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture.

LearningOutcomes:
At the end ofthe unitthestudent will ableto:
- Compare traditional knowledge indifferent sectors. (L2)
- Apply traditional knowledge in engineering. (L3)

Applications: Comparative study of traditional knowledge with current practices in different sectors.

Text Books:
1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Knowledge Traditions and Practices of India "Kapil Kapoor, Michel Danino.

ReferenceBooks:
1. TraditionalKnowledgeSystemandTechnologyinIndiabyBasantaKumarMohantaandVipin Kumar Singh, Pratibha Prakashan 2012.
2. TraditionalKnowledgeSystem in India by Amit Jha Atlantic publishers, 2002

E-Resources:
1. https://www.utrechtjournal.org/articles/10.5334/ujiel.283/
2. https://en.wikipedia.org/wiki/Traditional_knowledge
3. https://www.scconline.com/blog/post/2018/04/23/protecting-traditional-knowledge-the-india-story-till-date/
4. https://sciencebusiness.net/news/72773/India-leads-the-way-in-protecting-traditional-knowledge

Subject Code	Subject Name	L	T	P	C
R20CSS-HN2201	Data Communications (Honors Courses 1: Track-1)	3	0	2	4

Course Objectives:
- To have a thorough knowledge of various multiplexing schemes, Network topologies and Data communication protocols.
- To have a detailed study of various analog and digital modulation and demodulation techniques
- To have a thorough knowledge of various multiplexing schemes and Data communication protocols
- To know about the standards and mechanisms of television systems
- Familiarize the student with Wireless communication standards.

COURSE OUTCOMES:
1. Knowledge of working of basic communication systems and Networking.
2. Understand signals, noise, modulation, and demodulation.
3. Understand cable transmission media and Error Control Formats.
4. Understand the optical fiber transmission media.
5. Ability to evaluate alternative models of Wireless communication systems.

Unit I:

Introduction To Data Communications And Networking: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.

Learning Outcomes: Students will be able to:
- Describe application domain of Data communications and Networking (L2)
- Understand design of Serial and parallel Data Transmission Networks (L2)

Unit II:

Signals, Noise, Modulation, And Demodulation: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and M-ary Encoding, Digital Modulation.

Learning Outcomes: Students will be able to:
- Describe design considerations of Signals, Noise, Modulation, and Demodulation. (L2)
- Demonstrate Topologies of Bits, Baud, and M-ary Encoding, Digital Modulation.(L2)

Unit- III:

Metallic Cable Transmission Media: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves.

Data Communications Codes, Error Control, And Data Formats: Data Communications Character Codes, Bar Codes, Error Control, Error Detection and Correction, Character Synchronization.

Learning Outcomes: Students will be able to:
- Understand the Metallic Transmission Lines and Characteristics of Electromagnetic Waves (L2).
- Describe the Data Communications Character Codes (L2).

Unit IV:

Optical Fiber Transmission Media: Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

Learning Outcomes: Students will be able to:
- Understand the Optical Fiber Communications System. (L2)

- Understand   the Propagation of Light through an Optical fiber Cable. (L2)

Unit V:

Wireless Communications Systems: Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

Learning Outcomes: Students will be able to:
- Understand the Optical Properties of Radio Waves in Wireless Networks (L2)
- Understand the Satellite Communications Systems in Wireless Networks (L2)

Text Books:
1. T1 - Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH.
2. T2 - Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

Reference Books:
1. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson
2. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.TMH.
3. Data and Computer communications, 8/e, William Stallings, PHI.
4. Computer Communications and Networking Technologies, Gallow, Second Edition Thomson
5. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education.

Subject Code	Subject Name	L	T	P	C
R20CSS-HN2202	Information Security (Honors Courses 1: Track-2)	3	0	2	4

Course objectives:
- To learn the basics of Information Security.
- To know the legal, ethical and professional issues in Information Security.
- To know the aspects of risk management.
- To know the technological aspects of Information Security.
- To become aware of various standards in this area.

Course outcomes: At the end of this course, the students will be able to:
1. Understand the basics of information security.(L2).
2. Illustrate the legal, ethical and professional issues in information security.(L2).
3. Identify the aspects of risk management.(l2).
4. Analyze various technological aspects of information security system.(L3).
5. Understand various security standards and practices.(L2).

UNIT –I:
Needs For Security: Information Security: Introduction- Components of Information System - Approaches to Information Security Implementation - The Security Systems Development Life Cycle-Security professionals and organization –Needs for Security: Threats, Attacks, Secure Software development.

Learning Outcomes: At the end of the unit, student will be able to
- Understand the components of information system.(L2)
- Understand the approaches to provide security.(L2)
- Identify the organization needs for security.(L2)

UNIT-II:
Professional Issues In Information Security & Risk Management: Law & Ethics in Information Security - Risk Management: Risk Identification-Risk Assessment-Risk Control Strategies- Planning for security: Information Security planning and GovernanceInformation Security Policy, Standards, and Practices.

Learning Outcomes: At the end of the unit, student will be able to
- Identify the laws and ethics in information system.(L2)
- Identify risk assessment and control strategies.(L2)
- Understand various security policies, standards and practices.(L2)

UNIT –III:
Security Technologies: Security Technologies: Firewall and VPNs – Intrusion Detection - Prevention systems – Security tools.

Learning Outcomes: At the end of the unit, student will be able to
- Evaluate various security technologies.(L3)

UNIT–IV:
Cryptography:Cryptology Terminology - Cipher methods – Cryptographic Algorithms – Cryptographic tools – Protocol for secure communications - Attacks on cryptosystems - Physical Security.

Learning Outcomes: At the end of the unit, student will be able to
- Analyze various advanced Cryptographic Algorithms.(L3)
- Understand various protocols for secure communication.(L2)
- Identify various attacks on cryptosystem.(L2)

UNIT-V:
Implementation Of Information Security: Implementing Information Security: Information Security Project Management – Technical and Non-Technical Aspects of Implementation - Security Certification and Accreditation - Security and personnel: Credentials of Information Security Professionals – Employment Policy and Practices.

Learning Outcomes: At the end of the unit, student will be able to

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- Identify Technical and Non-Technical Aspects to implement the security systems.(L2)
- Understand the approaches of security certification and accreditation.(L2)
- Identify the important credentials of security professionals.(L2)
- Understand the Employment Policy and Practices.(L2)

Text Book:

1. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", Fourth Edition, Cengage Learning, 2012.

References:

1. William Stallings, "Cryptography and Network Security", Fourth Edition, Pearson Education, 2011. 3. ForouzanMukhopadhyay, "Cryptography and Network Security", Fourth Edition, McGraw Hill, 2010
2. C K Shyamala, N Harini, Dr T R Padmanabhan, "Cryptography and Network Security", First Edition, Wiley, India
3. Bernard Menezes, "Network Security and Cryptography", First Edition, Cengage Learning, 2010.

Subject Code	Subject Name	L	T	P	C
R20CSS-HN2203	Web UI Framework (Honors Courses 1: Track-3)	3	0	2	4

Course Objectives:
- Understand the design functionalities of static web pages
- Implement cascading features to the web pages.
- Create dynamic web pages using Jscript.
- Implement XML Processing and Parsing techniques with AJAX.
- Create responsive web pages using Web framework.

Course Outcomes:
1. Create static web pages using different tags.
2. Implement look and feel style sheets for static web pages.
3. Create dynamic web pages using objects and events.
4. Implement XML processing and traversing techniques
5. Create responsive web pages using Bootstrap web framework.

Unit I:
HTML - Introduction to WWW, HTML Tags, Hyperlinks, images, Lists, Layouts: frames, table, div; HTML forms, HTML5 Tags

Learning Outcomes: student will be able to
- Understand various singleton and paired tags.(L2)
- Create Hyperlinks and layout design. (L5)
- Understand advanced HTML5 tags. (L2)

Unit II:
CSS: Introduction to CSS, Style sheets Types, CSS Selectors, CLASS vs ID, CSS Properties, CSS 2D & 3D Transforms, CSS Animations

Learning Outcomes: Student will be able to
- Understand different types of style sheets (L2).
- Implement CSS properties and selectors. (L4).
- Implement CSS3 transforms and animations.(L4).

Unit III:
JAVA SCRIPT: Introduction to JScript, Variables & Operators, Data Types, Conditional statements, Loops, Arrays, Functions, Jscript Objects, Event Handling, JSON & RegExp.

Learning Outcomes: Student will be able to
- Understand the structure of Jscript in various browsers (L2)
- Create dynamic web pages using Jscript Events.(L4)
- Implement jscript objects for parsing and pattern recognition.(L4)

Unit IV:
XML & AJAX: Introduction to XML, XML vs HTML, XML Document rules, Document Type Definition(DTD), Types of DTD, XSD Schema, XML Styles with XSL & CSS, XPath, XQuery, Introduction to AJAX, XMLHttp, AJAX Request and Response, GET & POST methods

Learning Outcomes: Student will be able to
- Understand XML document rules and features. (L2)
- Create and validate XML using DTD and XSD. (L4)
- Implement XML searching using XPath and XQuery. (L4)
- Understand request and response handling using AJAX calls. (L2)

Unit V:
WEB UI FRAMEWORK: Building Responsive Website, Introduction to Bootstrap, Bootstrap Grid System, Containers, Colors, Tables, Buttons, DropDowns & Navigations, Input groups, Images & Media, Pagination

Learning Outcomes: Student will be able to
- Understand responsiveness of web pages using meta tag.(L2)
- Understand Bootstrap tool and its usage. (L2)
- Create dynamic web site with plug-ins and add-ons. (L4)

Text Books:
1. Web Technologies Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) 2Ed.
2. Web Technologies by Achyut Godbole, 3Ed
3. Programming the World Wide Web, Robert. W. Sabesta, pearson Publisher
   https://getbootstrap.com/docs/5.0/getting-started/introduction/

Reference Books:
1. Web Technologies (Oxford Higher Education), Uttam. K.Roy
2. Web Technology: A Developer's Perspective, PHI, 2E, N.P.Gopalan

Subject Code	Subject Name	L	T	P	C
R20CSS-HN2204	Advanced Python Programming (Honors Courses 1: Track-4)	3	0	2	4

Course Objectives:
- Understand the pattern matching techniques in python.
- Understand the python web scraping libraries.
- Write queries for connecting database using python libraries.
- Analyse different data files using pandas libraries.
- Implement data visualization libraries for data plotting.

Course Outcomes:
1. Analyze regular expressions for matching patterns in a String sequences.
2. Analyze web data using python scraping libraries.
3. Create python scripts for database CRUD operations.
4. Apply data analysis using pandas library.
5. Create data visualizations using matplotlib library.

Unit I:

PATTERN MATCHING - Introduction to Regular Expression, Applications, re module in python, RegEx Functions, Flags, Meta Characters, Quantifiers, Character Sets, Repetitions, Rangers, Grouping, Validations.

Learning Outcomes: student will be able to
- Understand RegEx expressions and functions.(L2)
- Create new patterns for matching large sequences. (L5)
- Implement metacharacters for finding patterns. (L4)

Unit II:

WEB SCRAPING: Introduction to Web Scraping, Exploring requests, json, urllib modules, Scraping Web Services, application types (JSON/HTML/XML), Exploring Beautiful Soup: Parsing XML,HTML content.

Learning Outcomes: Student will be able to
- Understand request and urllib modules for web scraping (L2).
- Implement response application types from web services. (L4).
- Implement beautiful soup module for parsing web files (L4).

Unit III:

Python Database Connectivity: Introduction to SQLite, Create Connection, Cursor, Creating database, tables, Insert and Update data, Fetch data operation, Drop tables and databases, SQL Execute and Close, SQLite Exceptions, SQL datetime.

Learning Outcomes: Student will be able to
- Understand the structure of SQLite database. (L2)
- Create queries for updating and fetching data.(L4)
- Implement SQL Exceptions for handling errors.(L4)

Unit IV:

Data Analysis: Introduction to PANDAS, Reading and Viewing files, Data Frames & Series Data Types, Indexes, Filtering, Add/Remove/Update rows and Columns, Sorting Data, Grouping & Aggregating Data, Cleaning Data, Date and Time Series.

Learning Outcomes: Student will be able to
- Understand data frames and series data types for data analysis (L2)
- Create indexes and filters on data frames. (L4)
- Implement aggregation, grouping and sorting techniques for data frames. (L4)
- Understand date and time series data analysis. (L2)

Unit V:

Data Plotting: Introduction to matplotlib, creating and customizing plots, Bar Charts,Pie Charts, Stack Plots, Plot Fills, Histograms, Scatter Plots, Plotting Time Series, Plotting Streaming Data, Sub plots.

Learning Outcomes: Student will be able to
- Understand matplotlib library for plotting different plots.(L2)
- Implement streaming data plots for live data. (L4)
- Create sub plots for complex time series data. (L4)

Applications:
- Web search engines like Yahoo, Bing etc.
- Web Service Applications like Fixer.io, Movie Databases and NetFlix etc.
- Stock Market Analysis, Matrimonial data analysis.

Text Books:
1. Core Python Programming by Dr. R.Nageswara Rao, 2nd Edition, DreamTech Press.
2. Python Data Science Handbook: Essential Tools for Working with Data, Orielly, Jake Vanderplas
3. Orielly: Web Scraping with Python, 2nd Edition, by Ryan Mitchell
4. Orielly: Mastering Python Regular Expressions, Packt Publishing, Victor Romero

Reference Books:
1. Python for Data Science For Dummies, 2ed, Luca Massaron John Paul Mueller
2. MySQL for Python: Database Access Made Easy, by Albert Lukaszewski