CO201U OBJECT ORIENTED PROGRAMMING

Teaching Scheme: 03L + 00T, Total: 03 **Credit:** 03
Evaluation Scheme: 10 ISA + 30 MSE+ 60 ESE **Total Marks:**100
Duration of ESE: 03 Hrs

Course Description:

This course introduces the concept of Object Oriented Programming(OOP). This course introduces the student with the knowledge of class communication, inheritance, polymorphism and exception handling.

Desirable Awareness/skills:
Basics of C programming.

Course Objectives:
The objectives of offering this course are to:
1. Demonstrate the concepts of object oriented like data abstraction, encapsulation, etc.
2. develop programming solutions for small problems on various object OOPs concepts
3. enhance the capabilities of such programming paradigm
4. introduce standard tools and techniques for software development, using object oriented approach.

Course Outcomes:
On the successful completion of this course, students shall be able to:
1 represent and implement data structures using OOP concepts.
2 compare the benefits of static and dynamic data structures.
3 use overloading and polymorphism in programming.
4 apply template, Standard Template Library (STL), exceptions, files and streams in OOP.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	3	2	1	-	2	-	-	-	-	1
2	1	3	2	1	1	-	1	-	-	-	-	1
3	1	3	3	1	1	-	1	-	-	-	-	1
4	1	2	3	1	1	-	1	-	-	-	-	1

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course contents:

Introduction to Object Oriented Programming: Introduction to procedural, modular, object oriented and generic programming techniques, limitations of procedural programming, need of object-oriented programming.

Classes and Objects: Defining a class, data members and methods, public, private and protected members, inline member functions, static data members, static member functions, 'this' pointer, constructors, destructors, friend function, dynamic memory allocation, array of objects, pointers and classes.

Operator Overloading: Introduction, need of operator overloading, overloading the assignment, binary and unary operators, overloading using friends, rules for operator overloading, type conversions.

Inheritance and Polymorphism: Introduction, base and derived classes, friend classes, Inheritance types, access modifiers, Single inheritance, multiple and multilevel inheritance, hybrid, hierarchical inheritance, ambiguity, virtual base classes, Overriding base class members, Pointers to base and derived classes, Virtual functions, rules for virtual functions, polymorphism, pure virtual functions.Virtual base classes.

Templates: Introduction, templates: function templates and class templates, function overloading vs. function templates, member function templates and template arguments.

Exception Handling: Introduction, syntax for exception handling code: try and catch-throw, multiple exceptions, exceptions with arguments, Introduction and use of standard template library (STL)

Managing Console I/O Operations: Introduction, C++ streams, stream classes, unformatted I/O, formatted I/O and I/O manipulators.

Files and Streams: Concept of a file, file operations, streams, opening and closing a file, detecting end-of-file, file modes, file pointers, structures and files, classes and files, sequential file processing, error handling.

Text Book:

1. Object Oriented Programming with C++ by E. Balagurusamy.
2. Let Us C++, Yashavant P. Kanetkar, Second Edition, BPB Publications, 2003.

Reference Books:

1. Object-Oriented Programming in C++, Rajesh K. Shukla, Wiley India, 2008.
2. Object-Oriented Programming with ANSI and Turbo C++ , Ashok N. Kamthane, Pearson Education, 2006.

CO202U DIGITAL ELECTRONICS AND LOGIC DESIGN

Teaching Scheme:03L+ 00T; Total: 03 **Credits:** 03
Evaluation Scheme:10ISA+30MSE+60ESE **Total Marks**: 100
ESE Duration: 3Hrs.

Course Description: This course introduces the student number system, digital logic family, Combinational Logic Circuits, Sequential Circuits and Counters, Semiconductor Memory, Timing Circuits and State Machines.

Desirable awareness/skills:
Knowledge of basic electronics and basic electrical engineering.

Course Objectives:
The objectives of offering this course are to:

1. make strong foundation of number system and various codes.
2. strengthen the ability of students in the field of digital circuit analysis and design.
3. impart knowledge about digital logic and to gain the ability to design various digital circuits
4. acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

Course Outcomes:
On the successful completion of this course, students shall be able to:

1. familiar with various number systems and Boolean algebra
2. design and analyse any digital logic gate circuits and Flip flop based systems.
3. gain the capability of implementing various counters
4. convert different types of codes and number systems which are used in digital communication and computer systems.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	3	2	2	-	-		-	-	-	-	1
2	1	3	1	1	-	-	-	-	-	-	-	1
3	1	2	2	2	-	-	-	-	-	-	-	1
4	2	2	1	1	-	-	-	-	-	-	-	1

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course contents:
Number Systems and Codes: Binary, octal and hexadecimal conversions- ASCII code, excess -3

code, gray code, binary addition and subtraction, signed and unsigned numbers, 1's complement and 2's complement arithmetic, hamming codes.

Boolean Algebra: Various logic gates and their truth tables and circuits, representation in SOP and POS forms, minimization of logic expressions by algebraic method, K-map method.

Combinational Circuits: Adders: half adder and full adder, parallel adder, subtractors, half subtractor and full subtractor, carry look ahead adder, ALU, multiplexers, demultiplexers and parity generators, encoders, BCD to decimal decoders, BCD to 7-segment.

Sequential Circuits: Flip-Flops(edge triggered and level triggered), SR, JK, D and T flip-flops, JK master slave flip-flop, conversion of flip-flops. registers-shift registers: SISO,SIPO, PISO, PIPO.

Counters : Asynchronous counters: modulus of a counter: mod-n counters.
synchronous counters, ring counter, johnson counter, decade counter, up-down counter.

Memory and Programmable Logic: Expansion of memory, classification and types of memory, read write memory, random access memory (RAM), multiport RAM, DDR RAM, read only memory (ROM), programmable read only memory (PROM), erasable programmable read only memory (EPROM), flash memory, programmable logic array, programmable array logic.

Text Books:

1. Modern Digital Electronics, R.P. Jain, 4th Edition, Tata McGraw Hill, 2010.
2. Floyd T.L, "Digital Fundamentals" , 10/e, Pearson Education, 2011.

Reference Books:

1. Digital Principles and Applications,Donald P Leach, Albert Paul Malvino and Goutam Saha,8/e, by Mcgraw Hill.
2. Logic and Computer Design Fundamentals,Mano M.M, 4/e,Pearson Education.
3. Digital Design: With an Introduction to the Verilog HDL , M. Morris Mano, Michael D. Ciletti 5th edition, Prentice Hall, 2012.
4. Fundamentals of Logic Design,C.H.Roth and L.L.Kinney, 7/e, Cengage Learning, 2013

CO203U FUNDAMENTALS OF DATA STRUCTURE PROGRAMMING

Teaching Scheme: 03L + 00T, Total: 03 **Credit:** 03
Evaluation Scheme: 10ISA + 30MSE + 60ESE **Total Marks:** 100
Duration of ESE: 03 Hrs

Course Description:
This course provides knowledge of data representation and how data is allocated in memory. It demonstrates and implement the linear data structure.

Desirable awareness/skills:
Fundamentals Knowledge of C and basics of algorithm

Course Objectives:
The objectives of offering this course are to:
1. provide an introduction to basic data structures and algorithms.
2. understand the fundamentals of design analysis and implementation of basic data structures and algorithms.
3. understand analysis and evaluation of data structure.

Course Outcomes:
On the successful completion of this course, students shall be able to:
1. able to study the representation and use of primitive data types and built in data structures.
2. able to develop the ability to synthesize and analyze algorithms.
3. able to define high level of abstraction of the needed linear data structure and Algorithm.
4. able to study representation,implementation,application of linear data structure

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	1	2	2	-	-		-	-	-	-	1
2	1	3	3	3	-	-	-	-	-	-	-	1
3	1	2	2	3	-	-	-	-	-	-	-	1
4	1	2	2	3	-	-	-	-	-	-	-	1

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course contents:
Introduction to algorithms, Data structures & Analysis of algorithms: Introduction to Data Structures: Concept of data, data object, data structure, abstract data types (ADT), concept of primitive and non - primitive, linear and nonlinear, static and dynamic, persistent and ephemeral data structures, functions, structure and pointer.

Analysis of algorithm: Frequency count and its importance in analysis of an algorithm, time complexity & space complexity of an algorithm, big 'o', 'Ω' and 'ɵ' notations, best, worst and average case analysis of an algorithm.

Linear Data Structures using Sequential Organization: Concept of sequential organization, concept of linear data structure s, arrays as ADT, storage representation of array,row major and column major & their address calculation, multidimensional arrays.

Applications: Polynomial representation using array and structure, concept of sparse matrix, its usage & representation using arrays, algorithms for sparse matrix operations like addition and simple transpose. Analysis of the algorithms used.

Sorting and searching techniques: Need of sorting and searching, sorting order & stability in Sorting.

Sorting Techniques: Algorithms for bubble sort, selection sort, insertion sort, quick sort and merge sort. Analysis of each sorting technique for best, worst and average case, the concept of internal & external sorting.

Searching Techniques: Algorithms for sequential search ,binary search, analysis of each searching technique for best, worst and average case.

Stacks: Concept of stack as ADT, Representation and implementation of stack using sequential organization.

Applications: Arithmetic expression conversion & evaluation, reversing a string, concept of multi-stack & its representation. Analysis of the algorithms used.

Queues: Concept of queue as ADT, representation and implementation of linear queue & circular queue using sequential.

Applications: Josephus problem, Job scheduling, Queue simulation, Categorizing data, Double ended queue,Multi-queue and Priority queue. Analysis of the algorithms used. (Implementation not expected)

Text Books:

1 Fundamentals of Data Structures in C,E. Horowitz by S.Sahni,S.Anderson-Freed,Universities Press, 2008,ISBN 10:8173716056.

2 Data Structures: A pseudocode approach with C, R. Gilberg, B. Forouzan, Cengage Learning, ISBN 9788131503140.

Reference Books:

1 Data Structures and Algorithms, A. Aho, J. Hopcroft, J. Ulman, Pearson Education, 1998, ISBN - 0 - 201 - 43578 - 0

2 Data Structures using C and C++, Y. Langsam, M. Augenstein and A. Tannenbaum, 2nd Edition, Prentice Hall of India, 2002, ISBN -81-203-1177-9

3 An introduction to data structures with Applications, J. Tremblay, P. Soresan,2nd edition, Tata McGraw - Hill International Editions, 1984, ISBN-0-07-462471-7

CO204U DISCRETE STRUCTURE AND GRAPH THEORY

Teaching Scheme: 03L + 00T, Total: 03 **Credit:** 03
Evaluation Scheme: 10ISA + 30MSE + 60ESE **Total Marks:** 100
Duration of ESE: 03 Hrs

Course Description:

This course introduces the student set theory-symbolic logic. Methods of proofs including graphs, tree, groups and rings concept and its algorithm and to demonstrate how these concepts can be applied to solve non trivial real life problems.

Desirable awareness/skills:

Basics of elementary Mathematics

Course Objectives:

The objectives of offering this course are:

1. to use appropriate set, functions, or relation models to analyze practical examples, interpret the associated operations and terminology in context.
2. to determine the number of logical possibilities and probability of events.
3. to formulate problems precisely, solve problems, apply formal proof techniques, and explain their reasoning clearly.

Course Outcomes:

On the successful completion of this course, students shall be able to:

1. able to learn basic terminology, formal logic, mathematical induction, sets, relations, functions and recursion.
2. able to understand discrete objects and relationships among them
3. able to design graphs, trees, groups and rings and related algorithms.
4. able to demonstrate how these concepts can be applied to solve non trivial real life problems.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	1	1	1	-	-		-	-	-	-	1
2	1	3	2	3	-	-	-	-	-	-	-	1
3	1	2	3	2	-	-	-	-	-	-	-	1
4	1	2	2	1	-	-	2	-	-	-	-	1

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Contents:

Sets Theory and Propositions: Sets, venn diagrams, operations on sets, combination of sets, finite and infinite sets, uncountably infinite sets, power set and cartesian products, principle of inclusion and exclusion**.**propositions, conditional propositions, logical connectivity, propositional calculus, universal and existential quantifiers, mathematical induction.

Relations: Definitions, properties of binary relations, equivalence relations and partitions, partial ordering relations and lattices, chains and antichains.

Functions: Definitions, domain & range, classification of functions, inverse and composition, pigeonhole principle, discrete numeric functions and generating functions, job scheduling problem. recurrence relation, linear recurrence relations with constant coefficients, homogeneous solutions, total solutions.

Graphs: Basic terminology, multigraphs and weighted graphs, subgraphs, isomorphic graphs, complete, regular and bipartite graphs,operations on graph, paths and circuits, factors of a graph, planer graph,graph coloring, hamiltonian and euler paths and circuits, graph algorithms- dijkstra shortest path algorithm, traveling salesman problem.

Trees: Definition properties and example, rooted trees, path length in rooted trees, weighted trees and prefix codes, binary search trees, spanning trees and cut set, kruskal's and Prim's algorithms for minimum spanning tree.

Groups and Rings: Algebraic systems, groups, semi groups, monoids, subgroups, permutation groups, codes and group codes, isomorphism and automorphisms, homomorphism and normal subgroups, ring, integral domain, field, ring homomorphism, polynomial rings and cyclic codes

Text Books:

1.Elements of Discrete Mathematics ,C.L.Liu , D.P.Mohapatra, 4th Edition, Tata McGraw-Hill, 2012, ISBN 10: 1259006395 / ISBN 13: 9781259006395

2.Discrete Mathematics, R. Johnson Baugh, 6th Edition, Pearson Education, 2005.

Reference Books:

1.Discrete Mathematics, N. Biggs, 2nd Edition, Oxford,2002 ISBN-13: 978-0198507178
ISBN-10: 0198507178

2.Discrete Mathematics with Graph Theory, E. Goodaire, M. Parameter, 2nd edition, Pearson Education,2003 ISBN 81 - 7808 - 827 - 4

3.Graph theory with application to Engineering and Computer Science, N. Deo, Prentice Hall of India, 1990, 0 - 87692 - 145 – 4.

CO205U HUMANITIES AND SOCIAL SCIENCE

Teaching Scheme: 02L+ 00T Total: 02 **Credits:** 02
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

Course Description:

This course introduces the student with humanities concepts and helps to understand the concept of professional and ethical responsibility.

Desirable awareness/skills:

Basics of Humanities

Course Objectives:

The objectives of offering this course are:

1. to provide a function on multi-disciplinary teams.
2. to guide students for understanding of professional and ethical responsibility.
3. to recognize the need for, and an ability to engage in lifelong learning.

Course Outcomes:

On the successful completion of this course, students shall be able to:

1. able to function on multi-disciplinary teams.
2. able for understanding of professional and ethical responsibility.
3. recognize the need for, and an ability to engage in lifelong learning.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	1	2	1	3	2	1	1
2	-	-	-	-	-	-	-	3	2	1	-	1
3	-	-	-	-	-	-	-	1	1	1	-	3

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Contents:

Introduction: Sociological Imagination; subject matter of sociology theoretical practice: Durkheim (Foundations of the Science of Society), Weber (Economy and Society), Marx (Political Economy), Foucault (Practices and Knowledge), Butler (Gender Performativity), and Burawoy (Public Sociology).

Indian Society: eminent Indian sociologists; caste, class, and tribe; women and children; health and education; science, technology and society; media and migration; globalization and social change; diaspora; a study on BIMARU states of India.

Intellectual property law: (a) The Patents act, 2002 (b) The Copyright Act, 1957 (c) The Trade markets Act, 1999 (d) Information Technology Act, 2000 (e) Offences under act.

Principle of management: (a) Element of management, planning, organization, direction and control (b) Organizational structure – line, line and staff, functional, divisional, project & Matrix Organizational.

Human Resource Management: (a) function, Recruitment, selection, training, promotion, discipline, (b) job evolution, (c) merit rating, (d) incentive (e) management of stress; (f) spirituality at work. (g) crisis management

Various definitions of economics: Nature of economic problem, relation between science, engineering. technology and economics lecture

Meaning: of demand, law of demand, elasticity of demand, practical importance and application of the concept of elasticity of demand lecture.

Meaning of production and factor of production: Land, labor, capital, & organization –their characteristics and rewards, law of variable proportion, return to scale.

Strategic human resource management: Retrenchment strategies, meaning of retrenchment, understanding retrenchment and redundancy, selection of employees for retrenchment; meaning of downsizing, HR outsourcing, employee leasing.

Organizational culture, human side of mergers and acquisitions, three stage model of mergers and acquisitions, online recruitment, outsourcing recruitment, headhunting, assessment centers, cross-cultural training, 360 Degree feedback

Text Books:

1. Sociology Cambridge: Anthony Giddens, Polity Press, 2009 (Sixth Edition)
2. Social Change in Modern India, New Delhi: M.N.Srinivas, Orient Longman, 1985
3. Organizational behavior by L.M. Prasad-S Chand & sons
4. Modern Economics theory by K.K. Dwett, S. chand .

References Books:-

1. Indian Village London: S. C. Dube, Routledge, 1955
2. Organizational behavior by Stephen P. Robbin & Seema Sanghi- pearson
3. Organizational Behaviour, 14thEd., New Jersey, Robins, S. P. & Judge, T. A.,Prentice Hall, 2010.
4. Modern Micro Economics Theory by - H.L.Ahuja -S.Chand . Environmental Pollution Control Engineering, C.S. Rao, New Age International Pvt. Ltd. . Environmental Issues in India, Rangarajan, Pearson Education
5. Personal management & industrial relation by P.C.Tripathi-S.chand
6. Industrial relations, Trade Union & Labour Relation by G.P.Sinha & PRN Sinha, Pearson
7. What is Sociology? An Introduction to the Discipline and Profession New Delhi: Prentice Hall of India, Alex Inkeles, 1997

CO206U PROBLEM SOLVING USING PYTHON

Teaching Scheme: 03L + 00P; Total: 03 **Credit:** 03
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

Course Description:

This course introduces the student basic python programming..

Desirable awareness/skills:

Basics of C,C++ programming languages

Course Objectives:

The objectives of offering this course are:

1. comprehends basic Python programming concepts.
2. develop programming solutions for small problems using Python basics.
3. recognize and appreciate the capabilities of such programming paradigm
4. introduces standard tools and techniques for software development, using object oriented approach.

Course Outcomes:

On the successful completion of this course, students shall be able to:

1. describe the numbers,math functions,strings,tuples and lists in Python.
2. express different decision making statements and Functions.
3. interprete object oriented programming in Python.
4. demonstrate and summarize different file handling operations.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	2	3	2	1	-	-	-	-	-	-	-
2	1	2	3	1	-	-	-	-	-	-	-	-
3	1	2	3	2	1	-	-	-	-	-	-	-
4	1	2	3	1	-	-	-	-	-	-	-	-

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Contents:

Problem Solving Strategies : Problem Analysis , Algorithms, Flow Charts

Introduction to Python : Introduction, python overview, getting started with python - installing python interpreter, simple python program, comments, python identifiers, reserved keywords, variables, standard data types, operators, statements and expressions, string operations, boolean expressions, control statement, iteration, input from keyboard.

Functions: Built-in-functions, composition of functions, user defined functions, parameters and arguments, functions calls, the return statement, python recursive functions, the anonymous functions, writing python scripts.

Strings and Lists : Strings- compound data type, len function, string slices, strings are immutable, strings traversal, escape characters, string formatting operator, string formatting functions and Lists- value and accessing elements, lists are mutable, built-in list operators, built-in methods.

Tuples and Dictionaries : Tuples-creating tuples, accessing values in tuples, tuples are immutable, tuple assignment, tuples as return value, variable-length argument tuples, basic tuples operations, built-in tuple functions and Dictionaries- creating a dictionary, accessing values in a dictionary, updating dictionary, deleting elements from dictionary, properties of dictionary keys, operations in dictionary, built-in dictionary methods.

Files and Exceptions : Files- Text files, directories, exceptions- built-in exceptions, handling exceptions, exceptions with arguments, user defined exceptions.

Classes and Objects : Overview of OOP, class definition, creating objects, objects as arguments, objects as written values, built-in class attributes, inheritance, method overriding, data encapsulation, data hiding.

Graphical User Interface: Tkinter- pack(), grid() and place() methods. Widgets - button, canvas, checkbutton, entry, frame, label, listbox, menubutton, message, scale, scrollbar, text.

Text Books:

1. Introduction to computing and Problem Solving Using Python, E Balagurusamy McGraw Hill Education Pvt. Ltd, ISBN-13: 978-93-5260-258-2
2. Programming and Problem Solving with Python , Kamthane, McGraw Hill Education Pvt. Ltd, ISBN: 9789387067578

Reference books:

1. Python Programming:An introduction to Computer Science,John Zelle,Franklin,Beedle and Associates,Inc.
2. Learning Python ,Mark Lutz,O'reilly,5e
3. Python the complete reference, Brown, McGraw Hill Education Pvt. Ltd, ISBN : 9789387572942.
4. Programming in Python,Dr,Pooja Sharma,BPB publications,ISBN:978-93-8655-127-6

CO207U OBJECT ORIENTED PROGRAMMING LAB

Teaching Scheme: 02P Total: 02 **Credit:** 01

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks:** 50

Duration of ESE: 03 Hrs

Minimum 12 experiments (six from group A and six from group B) shall be performed to cover the entire curriculum of course CO201U. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A

1. Write a program for a simple class and object. Performing simple arithmetic operations using C ++ class and object like, Addition, Subtraction, Multiplication & Division.
2. Write a C++ program to calculate multiplication of two numbers; use parameterized and default constructor.
3. Create two classes DM and DB which stores the value of distances. DM stores distances in meters and centimetres and DB in feet and inches. write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results may be a DM object or DB object, depending on the units in which the results are required. The display should be in the format of feet and inches or meters and centimetres depending on the object on display.
4. Write a C++ program to overload unary operator using member function.
5. Write a C++ program to overload binary operator using friend function.
6. Write a C++ program for calculating the area of a rectangle, triangle and circle using polymorphism.
7. Consider base classes Area having function to calculate area and Perimeter having a function to calculate parameter; and derived class Rectangle. Use multiple inheritance to calculate area and perimeter of rectangles.
8. Create a simple "Shape" hierarchy. A base class called Shape and derived classes called Circle, Square and Triangle. In the base class write a virtual function "draw " and override this in derived classes.

Group B

1. Write a C++ program to perform matrix operation using Templates.
2. Write a program to perform various stack operations using Standard Template Library (STL).
3. Write a to perform various queue operations using STL.
4. Write a C++ program to demonstrate dynamic memory allocation.
5. Create a file having records of person with name, age , city and occupation. Write a C++ program to search for a particular record of a person from file.

6. Write a program to format output using different manipulators.

7. Consider a class Number having a function to accept and print a roll_no., a class Marks having function to accept and print marks of two subjects; and a class Student having function to display total of two subjects. Write a C++ program to calculate total of 2 subjects for a student using multilevel inheritance.

8. Write a program to calculate the total mark of a student using the concept of virtual base class.

9. Generate record for student containing name, age, weight, height, blood group, phone number and address. Print and store the record in the file.

10. Write a simple application (Mini - project) that covers all the concept of Object Oriented Programming (Mandatory).

Text Book:

3. Object Oriented Programming with C++ by E. Balagurusamy.
4. Let Us C++, Yashavant P. Kanetkar, Second Edition, BPB Publications, 2003.

Reference Books:

3. Object-Oriented Programming in C++, Rajesh K. Shukla, Wiley India, 2008.
4. Object-Oriented Programming with ANSI and Turbo C++ , Ashok N. Kamthane, Pearson Education, 2006.

NOTE:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (PR) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

CO208U FUNDAMENTALS OF DATA STRUCTURE PROGRAMMING LAB

Teaching Scheme: 02P Total: 02 **Credit :** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total Marks :** 50
Duration of ESE: 03 Hrs

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover the entire curriculum of course CO203U. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A

1. Write a program to perform Set operations - Union, Intersection, Difference, Symmetric Difference etc.
2. Write a program to perform various string operations such as Copy, Length, Concatenation and Reversing etc without using library functions.
3. Write a program to perform operations on matrices like addition, multiplication, saddle point & transpose etc using functions.
4. Write a program to perform following operations on any database using structure: Add, Delete, Modify, Display, Search & Sort etc.
5. Represent polynomial using structures or array and write a program to perform Addition and Evaluation given polynomial
6. Represent Circular Queue using Array and write a program to perform operations like Insert, Delete, and Display front and rear element.
7. Implement Stack as an Abstract Data Type (ADT) using Array. Use this ADT to perform expression conversions like infix to postfix, infix to prefix, prefix to infix, prefix to postfix, postfix to infix and postfix to prefix. [Any one]

Group B

1. Write a program to accept two unbounded number from user and perform addition using array.
2. Accept student information (e.g. Roll No, Name, Percentage etc.). a. Display the data in descending order of Percentage (Bubble Sort). b. Display data for Roll No specified by user (Linear Search). c. Display the number of passes and comparisons for different test cases (Worst, Average, Best case).
3. Accept Mobile user information (e.g. Mobile No, Name, BillAmount etc.). a. Display the data in descending order of Mobile No. (insertion Sort) b. Display the data in ascending order of Name (Selection Sort) c. Display details for Mobile No specified by user (Binary Search) d. Display the number of passes and comparisons for different test cases (Worst, Average, Best case)
4. Implement Sorting Methods using recursion- Merge Sort.
5. 4. Implement Sorting Methods using recursion- Quicksort.
6. Represent Sparse Matrix using array and perform Matrix Addition & Simple Transpose.
7. Write a simple application (Mini-Project) that covers all the concepts of course CO203U (Mandatory).

Text Books:

1 Fundamentals of Data Structures in C,E. Horowitz by S.Sahni,S.Anderson-Freed,Universities Press, 2008,ISBN 10:8173716056.

2 Data Structures: A pseudocode approach with C, R. Gilberg, B. Forouzan, Cengage Learning, ISBN 9788131503140.

Reference Books:

1 Data Structures and Algorithms, A. Aho, J. Hopcroft, J. Ulman, Pearson Education, 1998, ISBN - 0 - 201 - 43578 - 0

2 Data Structures using C and C++, Y. Langsam, M. Augenstein and A. Tannenbaum, 2nd Edition, Prentice Hall of India, 2002, ISBN -81-203-1177-9

3 An introduction to data structures with Applications, J. Tremblay, P. Soresan,2nd edition, Tata McGraw - Hill International Editions, 1984, ISBN-0-07-462471-7

NOTE:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (PR) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

CO209U DIGITAL ELECTRONICS AND LOGIC DESIGN LAB

Teaching Scheme: 02P ; Total: 02 **Credit:** 01

Evaluation Scheme: 50 ICA **Total Marks:** 50

Minimum 10 experiments shall be performed to cover the entire curriculum of course CO202U. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

GROUP A

1. Introduction to Digital Electronics lab-Nomenclature of digital ICs , specification, study of data sheet, concept of V_{cc} and ground, verification of truth tables of logic gates.
2. Implement Boolean expressions using universal gates.
3. Design 4 bit Gray to Binary Code Convertor.
4. Design 4 bit Binary to Gray Code Convertor.
5. Realization of IC 7483 as parallel adder /subtractor.
6. Design and Implement BCD to 7 Segment display decoder.
7. Verify the truth table of multiplexer using IC's.
8. Verify the truth table of demultiplexer using IC's.
9. Verify the truth table of JK and SR using IC's.
10. Verify the truth table of T and D Flip-Flops using IC's.
11. Design and implementation of 4 bit ripple counter using IC.
12. Design and implementation of ring counter/ shift register/shift counter.
13. Design and implementation of decade counter.
14. Design and implementation of up-down counter.
15. Implement arithmetic and logic functions using ALU.

Simulators: ESim

Text Books:

1. Modern Digital Electronics, R.P. Jain, 4th Edition, Tata McGraw Hill, 2010.
2. Floyd T.L, "Digital Fundamentals" , 10/e, Pearson Education, 2011.

Reference Books:

1. Digital Principles and Applications, Donald P Leach, Albert Paul Malvino and Goutam Saha,8/e, by Mcgraw Hill.
2. Logic and Computer Design Fundamentals,Mano M.M, 4/e,Pearson Education.
3. Digital Design: With an Introduction to the Verilog HDL , M. Morris Mano, Michael D. Ciletti 5th edition, Prentice Hall, 2012.
4. Fundamentals of Logic Design,C.H.Roth and L.L.Kinney, 7/e, Cengage Learning, 2013

NOTE:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The Performance shall be assessed experiment wise using internal continuous assessment format (S 10).

CO210U PROBLEM SOLVING USING PYTHON LAB

Teaching Scheme: 02P ; Total: 02 **Credit:** 01

Evaluation Scheme: 25 ICA + 25ESE **Total Marks:** 50

Duration of ESE: 03 Hrs

Minimum 10 experiments(five from group A and five from group B) shall be performed to cover curriculum of CO206U. The list given below is just a guideline. All assignments are to be implemented using open source technology only. Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output. Experiment

Group A:

1 a. Write a program to find a square root of a number.
b. Write a program to swap the numbers of two variables

2 a. Write a function to find HCF of some given numbers.
b. Write a function to display factorial of given numbers

3 a. Write a program to check if the input year is a leap year or not
b. Write a function to convert decimal numberintop binary, octal, hexadecimal number

4 a. Write a function to find sum of several natural numbers using recursion
b. Write a program to check whether a string is a palindrome or not

5 Write a python program to demonstrate various string functions and operations

6 a. Write a program to add two matrices
b. Write a program to transpose a matrix

7 a. Given an integer number n, write a program to generate a dictionary that contains (i,i*i) such that is an integer number between 1 and n(both included). The program should then print the dictionary.
b. Define a function that prints a dictionary where the keys are numbers between 1 and 4 (both included) and the values are cubes of the keys.

8 a. Consider the tuple (1,3,5,7,9,2,4,6,8,10). Write a program to print half its values in 1 line and the other half in the next line.
b. Consider the tuple (12,7,38,56,78). Write a program to print another tuple whose values are even number in the given tuple.

Group B:

1 a. Write a function to print the resolution of an image file in python
b. Write a function to print the hash of any given file in python (Hint: Use SHA-1 Algorithm).

2 a. Write a program to catch on divide by zero exception. Add a finally block too.
b. Write a program to write data in a file for both write and append modes

3 Write a Python program to demonstrate the file and file I/O operations.

4 Write a program that defines a class named Rectangle that takes the parameters length and breadth. The class Rectangle should also contain a method for computing its perimeter

5 a. Write a Python program to display Entry box(Text Box) and Button on the GUI window and print Hello on command window when press "Submit" Button
b. Write a Python program to display Entry box(Text Box) and Button on the GUI window and accept name of student in entry box (e.g. Vihaan) and print "Hello Vihaan" on command window when press "Submit" Button

6 a. Write a python program to display labels like Name, Branch and College along with entry boxes on the GUI window and "Submit" Button and when you press submit button display accepted information on command window.
b. Write a python program to display student information using widgets like Label,Entry,Button,Radio buttons, check buttons, listbox etc

7 Write a python program to design a simple calculator

Text Books:

1. Introduction to computing and Problem Solving Using Python, E Balagurusamy McGraw Hill Education Pvt. Ltd, ISBN-13: 978-93-5260-258-2

Reference books:

1. Python Programming:An introduction to Computer Science,John Zelle,Franklin,Beedle and Associates,Inc.
2. Learning Python ,Mark Lutz,O'reilly,5e
3. Fundamentals of Python Programming,Richard L.Halterman
4. Programming in Python,Dr,Pooja Sharma,BPB publications,ISBN:978-93-8655-127-6

NOTE:

ICA– Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE– The End Semester Examination (PR) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

SH299U EFFECTIVE TECHNICAL COMMUNICATION

Teaching Scheme: 00L+02PR **Credit:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
ESE Duration: 3Hrs

Course Objectives:
Upon completion of this course, the student will be able to:

1. identify and describe the basic communication process.
2. appreciate the value of empathic listening and effective feedback.
3. use technology appropriately to enhance communication success.
4. prepare and deliver an effective oral presentation.
5. understand the role of communication in personal & professional success.
6. develop awareness of appropriate communication strategies.
7. prepare and present messages with a specific intent.

Course Outcomes:
On the successful completion of this course, students shall be able to:
1. apply business communication strategies and principles to prepare effective communication for domestic and international business situations.
2. identify ethical, legal, cultural, and global issues affecting technical communication
3. compose and revise accurate business documents using computer technology.
4. deliver an effective oral technical presentation
5. ethically use, document, and integrate sources

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	2	2	1	-	3		2			3
2	-	-	-	-	-	2	2	1	-	3		2			3
3	-	-	-	-	-	2	2	1	-	3		2			3
4	-	-	-	-	-	2	2	1	-	3		2			3
5	-	-	-	-	-	2	2	3	-	3		2			3

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

Introduction to Technical Communication:
Definition of technical communication, Aspect of technical communication, Forms of technical communication, Importance of technical communication, Technical communication skills (listening,speaking,reading,writing),Linguistic ability, Style in technical communication.

Nature of Technical Communication
Communication as sharing, stages of communication, channels of communication, nature of technical communication, aspects of technical communication, forms of technical communication, general and technical communication, importance and need for technical communication, technical communication skills: listening, speaking, reading, writing, barriers to effective communication

Comprehension of Technical Material :(Information Design and Development)
Different kinds of technical documents, Information development life cycle, Organisation structures,Factors affecting information and document design, Strategies for organization,Information design and writing for print and online media

Technical Writing:
Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language, Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication,Usability, Human factors, Managing technical communication projects, time estimation,Single sourcing, Localization

Engineering Ethics :
Senses of Engineering Ethics, variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy, Kohlberg's theory, Consensus and Controversy, Professional ideals and virtues, Attributes of an ethical personality, Theories about right action, Self interest, Responsibilities and Rights of Engineers, Collegiality and Loyalty, Respect for authority, Collective bargaining,Confidentiality, conflicts of interest, Professional rights

Self Development and Assessment:
Self assessment, Awareness, Perception and attitude, Values and Beliefs, Personal goal setting, Career planning, Self esteem.Managing Time, Personal memory, Rapid reading, Taking Notes, Complex Problem solving, Creativity

Text Books:
1. Business Communication for Managers, Penrose, Rasberry, Myers, 5th edition, Cenage Learning
2. Business Communication, Rai and Rai, 2nd edition, Himalaya Publishing House, 2014
3. Organization Behavior, Suja R. Nair, Himalaya Publications, 2014
4. Communication skills by Dr. Nageshwar Rao and Dr. Rajendra Das, Himalaya Publishing House
5. Effective Tech Communication By M Ashraf Rizvi, The McGraw Hill Publication

Reference Books:
1. Goal Setting: How to Create an Action Plan and Achieve Your Goals By Susan Wilson, Michael Dobson
2. Business Communication, Raman and Singh, 2nd edition, Oxford Publication, 2012
3. Nonverbal Communication in Human Interaction by Mark L. Knapp, Judith A. Hall, Terrence G. Horgan
4. Business Communication Today, Bovee, Thill, 6th edition, Schatzman, Pearson Education, 2000
5. Business Communication (BCOM), Lehman Sinha, 2nd edition, Cengage Learning, 2012
6. Organization Behavior, Stephen P. Robbins, 13th edition, Pearson Education, 2009
7. Personality Development and Soft skills , Oxford University Press by Barun K. Mitra

It is a representative list of practical. The instructor may choose experiments as per his requirements (so as to cover the entire contents of the course) from the list or otherwise. Ten practical should be performed to cover the entire curriculum of course SH202U. The list given below is just a guideline.

List of practical / Assignments

1. Delivery of a speech on general topics by giving emphasis on non-verbal communication
2. Practical based on fourfold skills (Technical communication skills)
3. Delivery of a speech on technical topic
4. Role play on the importance of time management
5. Performing a corporate meeting
6. Personal goal setting with priorities
7. Resume writing along with application letter
8. Group discussion
9. Personal interview
10. Debate on recent topics
11. Practical based on reading skills
12. Writing business letter
13. Role play on engineering ethics

Guidelines for ICA:

Internal Continuous Assessment should support for regular performance of practical by student and his/her regular assessment with proper understanding practical carried out.

SH200AU ESSENCE OF INDIAN TRADITION KNOWLEDGE

Teaching Scheme: 00L: **Credit:** 00
Evaluation Scheme: 60 ESE **Total Marks:** 60

COURSE DESCRIPTION:
This course is intended to provide a basic understanding of Indian traditional knowledge. This course introduces students to the fundamental concept of basic & modern Indian knowledge system as well as Indian tradition.

Desirable Awareness:
Basic structure of Indian knowledge system & various Indian traditions

COURSE OBJECTIVES:
Upon completion of this course, the student will be able to-
1. understand Indian knowledge system
2. understand Indian perspective of modern scientific worldview
3. understand basic principles of yoga and holistic health care system
4. develop ability to understand, connect up and explain the basics of Indian traditional knowledge
5. understand Indian philosophical tradition

COURSE OUTCOMES:
On the successful completion of this course, students shall be able to:
1. remember & apply Indian knowledge system in their personal as well as academic life.
2. apply Indian perspective of modern scientific worldview.
3. analyzing basic principles of yoga and holistic health care system.
4. evaluate and explain the basics of Indian traditional knowledge.
5. understand basic knowledge about Indian philosophical tradition.

Relevance of POs and strength of correlation:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	2	-	-	-	-	-	3
2	-	-	-	-	-	2	-	-	-	-	-	3
3	-	-	-	-	-	2	-	-	-	-	-	3
4	-	-	-	-	-	2	-	-	-	3	-	3
5	-	-	-	-	-	2	-	-	-	3	-	3

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Contents:

Basic structure of Indian Knowledge System:

Ashtadashavidya –Types of vedas - rigveda, yajurveda ,samveda ,atharvveda, types of upaved-ayurveda ,dhanurveda ,gandharva veda ,stapatya veda, limbs of vedang, types of upanga

Modern Science and Indian Knowledge System: Logic, mathematics, phonetics, life sciences, physics, military science

Yoga and Holistic Care: General introduction to yoga, aims and objectives of yoga , psychological aspects and mythological concepts of yoga

Philosophical Tradition (Sarvdarshan): Various Indian Philosophical Tradition (Heterodox): jain, buddhist, ajivika, ajnana, carvaka

Indian Linguistic Tradition: phonology, morphology, syntax, semantics

Indian Artistic Tradition: Understanding key terms in art appreciation: art, craft:

Sculpture - iconography: hindu, buddhist and jaina ,modern sculpture

Architecture - temple architecture -nagara, dravida and vesara ,mosques and mausoleums -tajmahal (any one)

Painting - mural painting – ajanta , mughal and rajput- miniature styles ,modern and contemporary artists

Music - traditional music: classical, folk, bhajan, thumri, dadra, sufi, modern music : bhangra, blues, dance, jazz, rock

Dance- classical, semi-classical, folk, tribal, shiva and natraja, bharatan atyam, kathak

Text Book:

1. An Introduction to Indian Philosophy, S.C. Chaterjee & D.M. Datta, University of Calcutta, 1984.
2. Arts of India, Krishna Chaitanya, Abhinav Publications, 1987.
3. वासुदेवशरण अxzवाल, कलाएवंसंLd`त, साfहR; भवन, इलाहाबाद,1952.
4. Cultural Heritage of India-course material, Sivaramakrishnan (Ed.), Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014.

References:

1. Foundations of Indian Art, R. Nagaswamy, Tamil Arts Academy, 2002.
2. The Wave of life, Fritzof Capra.
3. Ed. RN Jha, GN Jha (Eng. Trans.),Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakashan, Delhi 2016
4. India Arts, Pramod Chandra, Howard Univ. Press, 1st Edition, 1983

SH291U: MATHEMATICS FOR COMPUTER ENGINEERING

Teaching Scheme: 03L+ 01T Total: 04 **Credits:** 04
Evaluation Scheme: 10 ISA+ 30MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

Course Description:
This course introduces the student probability and statistics concepts and to demonstrate how these concepts can be applied to solve non trivial real life problems.

Desirable awareness:
Number System and statistics

Course Objectives:
The objectives of offering this course are to-
1. familiarize the students with statistical techniques.
2. equip the students with standard concepts and tools at an intermediate
3. advanced level that will serve them well towards tackling various problems in the discipline.

Course Outcomes:
On the successful completion of this course, students shall be able to:
1. apply the ideas of probability, random variables, various discrete & continuous probability distributions and their properties.
2. demonstrate the knowledge of statistics including measures of central tendency, correlation and regression.
3. solve the statistical methods of analyzing data samples.

Relevance of POs and Strength of Correlation:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	-	-	-	-	-	-	-	-	-	2
2	2	3	-	-	-	-	-	-	-	-	-	3
3	-	1	2	-	-	-	-	-	-	-	-	3

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Contents:

Numerical Methods-I: Number system, decimal and binary numbers, error analysis, absolute, relative and percentage error. solution of algebraic and transcendental equations by Newton Raphson method, Regula-falsi method and secant method, solution of linear systems of equations by Gauss elimination method, Gauss Seidel Method.

Numerical Methods-II: Numerical methods for ordinary differential equations- Picard's Method, Runge-Kutta IVth order method, Euler's modified method.

Basic Probability: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; expectation of discrete random variables, moments, variance of a sum, correlation coefficient.

Continuous Probability Distributions: Continuous random variables and their properties, distribution functions and densities, normal, exponential.

Bivariate Distributions: Bivariate distributions and their properties, distribution of sums and quotients, conditional densities.

Basic Statistics: Measures of central tendency: moments, skewness and kurtosis, covariance, Karl Pearson coefficient of correlation, lines of regression, probability distributions: binomial, poisson and Normal - evaluation of statistical parameters for these three distributions.

Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas, exponential and power curves, Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Text Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Introduction to Probability Theory, P. G. Hoel, S. C. Port and C. J. Stone, , Universal Book Stall, 2003 (Reprint).
3. A Textbook of engineering mathematics, N. P. Bali and Manish Goyal, Laxmi publications, Reprint 2010.

Reference Books:

1. Statistical methods by Dr. S.P.Gupta, 43rd edition,.Sultan chand & Sons, Delhi, 2014.
2. A first course in probability, S. Ross, 6th Edition, pearson Education India, 2002.
3. An introduction to probability theory and its applications, W.Feller, Vol 1, 3rd Edition, Wiley 1968.
4. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publication, 35th Edition, 2000.
5. Engineering Mathematics by Veerarajan T., Tata McGraw Hill Publication, New Delhi, 2010.

CO251U OPERATING SYSTEMS AND SYSTEMS PROGRAMMING

Teaching Scheme: 03L+ 00T **Total:** 03 **Credits:** 03
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

Course Description:

This course introduces the role of operating system on the computer. It provides the knowledge of process, thread, scheduling algorithms and process synchronization and memory management concept and demonstrate how these concepts can be applied to solve non trivial real life problems..

Desirable awareness/skills:

Computer Organization and Data Structure

Course Objectives:

The objectives of offering this course are:

1. to learn and understand the fundamentals of System Software Programs as Assembler
2. to learn how to design and develop various System Software Programs.
3. to learn the concept of process, and thread management
4. to learn resource scheduling and management.
5. to learn the concepts of process synchronization and deadlock
6. to learn various Memory management techniques

Course Outcomes:

On the successful completion of this course, students shall be able to:

1. design & implement system programs as assembler, macro-processor, linker and loader
2. implement scheduling algorithms for processes and threads.
3. recognize processes synchronization, check deadlock and different ways to handle it.
4. implement various memory management techniques.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	2	2	-	-	-	-	-	-	-	-
2	1	2	3	2	-	-	-	-	-	-	-	-
3	1	2	3	2	-	-	-	-	-	-	-	-
4	1	3	3	1	-	-	-	-	-	-	-	-

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

Course Contents:

Introduction to system programming: Types of software and application software, system programming and system programs, need of system software. assemblers, loaders, compilers, interpreters, macros, operating system and formal system, translators and its types.

Assemblers: Structure of assembler, basic function, machine dependent and machine independent features of assembler, types of assemblers – single pass, multi-pass, cross assembler. c. general design procedure of assembler, design of pass-I and pass-II assembler

Operating System Overview: Operating system objectives and functions, the evolution of operating systems, operating system services and components, separating system structures: monolithic, layered, kernel, microkernel, virtual machine.

Process: Concept of a process, process states, process description, process control (process creation, waiting for the process/processes, loading programs into processes and process termination), and execution of the operating system. threads: processes and threads, concept of multithreading, types of threads. scheduling - types of scheduling, scheduling algorithms

Concurrency and Mutual Exclusion: Concurrency - process/thread synchronization and mutual exclusion principles of concurrency, requirements for mutual exclusion, mutual exclusion- hardware support, operating system support (semaphores and mutex), programming language support (monitors), classical synchronization problems readers/writers problem, producer and consumer problem.

Deadlock and Starvation: Principles of deadlock, deadlock prevention, deadlock avoidance, deadlock detection, an integrated deadlock strategy, example- dining philosophers problem

Memory Management: Memory partitioning: fixed and dynamic partitioning. memory allocation: allocation strategies (first fit, best fit and worst fit), fragmentation, swapping, paging and segmentation. virtual memory management: background, demand paging, page replacement (FIFO, LRU, optimal LRU), thrashing.

Storage Management: File organization, access methods and directory structure. allocation of disk space: contiguous allocation, non-contiguous allocation (chaining and indexing). disk scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

TextBooks:

1. Systems Programming, John J. Donovan, 1st edition, Tata McGraw-Hill, 1991, ISBN 0-07-460482-1.
2. Systems Programming and Operating Systems, D.M. Dhamdhere, 2nd Edition,Tata McGraw-Hill, ISBN:13:9780074630839.

Reference Books:

1. Operating Systems-A Concept-Based Approach, Dhananjay M. Dhamdhere, 3rd edition, TMH, 2012.
2. Modern Operating System, A. S. Tanenbaum, 2nd edition, Pearson publication", 2001.
3. Operating System Internals and Design Principles, William Stalling, 6th edition, Pearson Publication, 2013

CO252U DATA COMMUNICATION AND NETWORKING

Teaching Scheme: 03L+ 00T **Total:** 03 **Credits:** 03
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

Course Description:

This course introduces basic communication techniques and concept of data communication. Provide knowledge of networking and different topologies of network. It also provides encoding technique of data. Introduce the layered model of the internet and its components.

Desirable awareness/skills:

Data structure, discrete structure.

Course Objectives:

The objectives of offering this course are;

1. to learn and understand basic communication techniques.
2. to introduce students to the evolution of computer networks and the concepts data communication.
3. to introduce students the general principles of network design and compare the different network topologies.
4. to introduce students to the digital and analogue representations and channels.
5. to describe the mechanism and techniques of encoding.
6. to introduce students to the general principles of circuit and packet switching.
7. to provide students with in-depth knowledge of data link layer fundamental such as error detection, correction and flow control techniques; multiple access control techniques.

Course Outcomes:

On the successful completion of this course, students shall be able to:

1. introduce the concepts of data communication.
2. learn Data Communication Methods and Algorithm.
3. introduce the layered model of the internet and its components.
4. provide in-depth knowledge of physical layer and data link layer technologies.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	2	3	-	-	-	-	-	-	-	-
2	1	2	2	3	-	-	-	-	-	-	-	-
3	1	2	2	3	1	-	-	-	-	-	-	-
4	1	2	3	3	1		-	-	-	-	-	-

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

Course Contents:

Introduction: Data communication, networks, internet, protocols and standards, network models: OSI, TCP/IP, analog and digital data, periodic analog signal, digital signal, transmission impairments, data rate limits, performance. signal conversion: digital-to-digital, analog-to digital, analog-to-analog, digital-to-analog conversion.

Bandwidth Utilization and Transmission Media: Multiplexing spread spectrum, guided media and unguided media.

Switching: Circuit switched networks, datagram networks, virtual circuit networks, structure of switch.

Error Detection and Correction: Types of errors, redundancy, detection vs correction, fec vs retransmission, coding, modular arithmetic, block coding, linear block codes, cyclic codes, checksum, hamming code.

Data Link Control: Framing, flow control and error control protocols, protocols: stop-and-wait, go-back-n, selective-repeat, piggybacking, HDLC,PPP.

Medium Access, Ethernet and LAN: Random access: ALOHA, CSMA, CSMA/CD, CSMA/CA, controlled access, channelization, IEEE standards, different Ethernets, connecting devices, backbone networks, VLAN.

Multi-user digital: Modulation techniques such as frequency division multiple access (FDMA); time division multiple access (TDMA); code division multiple access (CDMA);

Text Books:

1. Data Communications and Networking, B. A. Forouzan, 4th Edition, TMH, 2009, ISBN-13-9780070634145.
2. Computer Networks, A. S. Tanenbaum, 4th Edition, Pearson Education, 2005, ISBN-8177581651.
3. Computer Networks: A Systems Approach, Larry L. Peterson, 5th Edition, Morgan Kaufmann Publishers, 2011, ISBN- 9789380501932.

Reference Books:

1. 802.11 Wireless Networks: The Definitive Guide, Matthew S. Gast, 2nd Edition, O'Reilly, 2005, ISBN-13: 978-0596100520
2. Communication networks- Fundamental concepts and key architectures, Alberto, Leon Garcia, 2nd edition, TMH, 2004, ISBN- 9780070595019.
3. Computer Networking - A Top-Down Approach featuring the Internet,James F. Kurose, 6th Edition, Pearson Education, 2009, ISBN-13: 978-0132856201.
4. Computer and Communication Networks by Nader. F. Mir, 2nd Edition, Pearson Prentice Hall publishers, 2010, ISBN-13: 978-0-13-381474-3.

CO253U ENTREPRENEURSHIP AND BUSINESS MANAGEMENT INFORMATION

Teaching Scheme: 03L+ 00T Total: 03 **Credits:** 03
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

Course Description : This course introduces students to the theory of entrepreneurship and its practical implementation. It focuses on different stages related to the entrepreneurial process, including business model innovation, monetization, small business management as well as strategies that improve performance of new business ventures. Students will develop an understanding of successes, opportunities and risks of entrepreneurship. Students will also develop skills in written business communication and oral presentations that allow students to integrate entrepreneurship concepts and interact with business experts. This course has an interdisciplinary approach and is therefore open to students from other Majors.

Desirable awareness/skills:
Demonstrate effective oral presentation skills and integrative team-work

Course learning objectives:
At the end of this course, students should be able to:
1. explore and experience the joy of creating unique solutions to market opportunities
2. create and exploit innovative business ideas and market opportunities
3. turn market opportunities into a business plan
4. build a mindset focusing on developing novel and unique approaches to market opportunities 5. Demonstrate and present successful work, collaboration and division of tasks in a multidisciplinary and multicultural team
6. demonstrate understanding and application of the tools necessary to create sustainable and viable businesses

Course Outcomes:
On the successful completion of this course, students shall be able to:
1. critical attitudes, which are necessary for "life-long learning" .
2. an attitude of open-mindedness and self-critical reflection with a view to self improvement.
3. sensibility towards the ethical dimensions of different aspects of the content of this course.
4. an open attitude towards intercultural team-work.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	2	3	-	-	-	-	-	-	-	-
2	1	2	2	3	-	-	-	-	-	-	-	-
3	1	2	2	3	1	-	-	-	-	-	-	-
4	1	2	3	3	1		-	-	-	-	-	-

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Contents:

Enterprise: Examples of 'Enterprise' Usage Narrow and Broad Meanings of Enterprise
Enterprise in Individuals : Introduction why are some individuals more enterprising than others? personality theories , behavioural theories , economic approaches, sociological approaches ,other approaches ,integrated approaches ,entrepreneurial profiling and enterprise prediction, postscript
The Culture of Enterprise: Introduction , judgements on enterprise, the influences on enterprise and economic performance ,national and social culture, political conditions, economic conditions ,other examples of influence postscript
Other Aspects of Enterprise: Some enterprise associations ,the drawbacks of enterprise the future of enterprise
Small Business Categories and Variations: Definitions ,the stages of small business development ,the variety of small business ,the implications of being small in conclusion.
Distinctive Features of Small Businesses :The nature of small business, differences among small businesses ,understanding specific small business issues ,small business statistics,in conclusion
Business Growth: Why growth? some statistics on growth ,the meanings of growth , the components of growth ,the entrepreneur - motivation and aspiration ,the business , external environment ,targeting growth
Intrapreneurship: Intrapreneurship and related problems, the barriers to entrepreneurship , facilitating intrapreneurship , postscript

TextBooks:

1. Understanding Enterprise, Entrepreneurship And Small Business, Simon Bridge, Ken O'Neill and Stan Cromie,Macmillan Press Ltd.

Reference Books:

1. Small Business Management And Entrepreneurship, David Stroke and Nick Wilson.

CO254U DATA STRUCTURES AND FILES

Teaching Scheme: 03L+ 00T Total: 03 **Credits:** 03
Evaluation Scheme: 10 ISA+ 30 MSE+ 60 ESE **Total Marks:** 100
ESE Duration: 3Hrs.

Course Description:

This course introduces to students about data structure, how to allocate data in memory. To introduce various techniques for representation of the data in the real world.

Desirable awareness/skills:

Fundamentals of Data Structures Programming

Course Objectives:

The objectives of offering this course are

1. to describe the usage of various data structures
2. to teach efficient storage mechanisms of data for easy access.
3. to design and implementation of various basic and advanced data structures.
4. to introduce various techniques for representation of the data in the real world
5. to develop application using data structures.
6. to teach the concept of protection and management of data.
7. to improve the logical ability

Course Outcomes:

On the successful completion of this course, students shall be able to:

1. learn the different ways of data representation.
2. study how the data structures are allocated and used in memory.
3. study the representation, implementation and applications of linear data structures

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	1	-	-	2	-	-	-	-	-
2	1	2	3	1	-	-	2		-	-	-	-
3	1	2	3	2	-		2	-	-	-	-	-

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Contents:

Linear data structures using linked organization: Concept of linked organization, singly linked list, doubly linked list, circular linked list. linked list as an ADT. representation of stack and queue using link list. representation and manipulation of polynomials using linked lists, comparison of a sequential and linked memory organization, concept of generalized linked list, representation polynomial using GLL.

Non-Linear Data Structures-Trees: Difference in linear and non-linear data structure, trees and binary trees-concept and terminology, expression tree. conversion of general tree to binary tree. binary tree as an ADT. recursive and non recursive algorithms for binary tree traversals, binary search trees, binary search tree as ADT, concept of threaded binary tree. preorder and inorder traversals of inorder threaded binary tree. applications of trees.

Non-Linear Data Structures-Graphs: Graph as an ADT, representation of graphs using adjacency matrices and adjacency list, depth first search and breadth first search traversal. Prim's and Kruskal's algorithms for minimum spanning tree.

Symbol Table: Notion of symbol table, AVL trees, Huffman's algorithm, heap data structure, min and max heap , heap sort implementation, applications of heap.

Hash tables : Basic concepts, hash function, characteristics of good hash function, different keyto-address transformations techniques, synonyms or collisions, collision resolution techniques linear probing, quadratic probing, rehashing, chaining without replacement and chaining with replacement.

File Organization: External storage devices, files, file types and file organization (sequential, index sequential and Direct access), primitive operations and implementations for each type and comparison

Text Books:

1. Data Structures,Seymour Lipschutz, Schaum's Outlines Tata McGraw Hill, 2006.
2. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahni, Galgotia Publication.

Reference Books:

1. Data Structures and Algorithms, A. Aho, J. Hopcroft, J. Ulman, Pearson Education, 1998, ISBN-0-201-43578-0
2. Data Structures using C and C++, Y. Langsam, M. Augenstein and A. Tannenbaum, 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
3. File organisation and processing, A. Tharp ,2008 ,Wiley India edition ,9788126518685
4. An introduction to data structures with Applications, J. Tremblay, P. Soresan, 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7.
5. ADTs' Data Structures and problems with C++, Larry Nyhoff,Pearson Publications.

CO255U OPERATING SYSTEMS AND SYSTEMS PROGRAMMING LAB

Teaching Scheme: 02P; Total: 02 **Credit**:01
Evaluation Scheme: 50 ICA **Total Marks:** 50

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover the entire curriculum of course CO251U. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output. Use of Open source tool/ technology is recommended for laboratory assignments.

Group A:

1. Implementation of Pass-I Two Pass assembler with hypothetical Instruction set.
2. Implementation of Pass-II Two Pass assembler with hypothetical Instruction set.
3. Exploring various features of debug command.
4. Write C programs to simulate UNIX commands like ls, grep, etc
5. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
6. To implement Deadlock Avoidance and Deadlock Detection Algorithms

Group B:

1. To write a C program for Dining Philosophers Program
2. Implement Memory management schemes like First fit, Best fit and Worst fit.
3. Write C programs to simulate UNIX commands like ls, grep, etc. 4. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
4. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
5. Implementation of the following Page Replacement Algorithms a) FIFO b) LRU c) LFU
6. Implementation of the following File Allocation Strategies

TextBooks:

1. Systems Programming,John J. Donovan, 1st edition, Tata McGraw-Hill, 1991, ISBN 0-07-460482-1.
2. Systems Programming and Operating Systems,D.M. Dhamdhere, 2nd Edition,Tata McGraw-Hill, ISBN:13:9780074630839.
3. Operating System Internals and Design Principles,William Stalling, 6th edition, Pearson Publication, 2013.

Reference Books:

1. Operating Systems-A Concept-Based Approach, Dhananjay M. Dhamdhere, 3rd edition, TMH, 2012.
2. Modern Operating System, A.S. Tanenbaum, , 2nd edition, Pearson publication", 2001.

NOTE:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

CO256U DATA COMMUNICATION AND NETWORKING LAB

Teaching Scheme: 02P, Total: 02 **Credit:** 01
Evaluation Scheme: 25 ICA+25 ESE **Total Marks:** 50
Duration of ESE: 03 Hrs

Minimum 10 experiments (five from Group A and five from Group B) shall be performed to cover the entire curriculum of course CO252U. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A

1) Comparative analysis of different types of network cables with Specifications
   a) Practical Study of different types of network cables –CAT-5, CAT – 6.
   b) Study of different parameters for cables like type, Bandwidth, Length, appli.
   c) Study of different cable specifications comparisons.
2) Implementation of Network performance calculator.
3) Network related commands such as ARP, IPCONFIG, PING, TRACERT, NSLOOKUP, GETMAC, NETSTAT etc.
4) I.T Infrastructure planning using Network Connecting Devices.
5) Network Connecting Devices Specifications and configurations.
   a) Define Repeater, Hub, Switch, Router
   b) Use of Repeater, Hub, Switch, Router
   c) Technical Specification and configuration of Repeater,Hub, Switch, Router
6) Implementation of Telnet / FTP.

Group B

1) Implementation of Stop and Wait Protocol
2) Write a program to check whether given IP address is valid or not?
3) Write a program to display mask of a given IP address.
2) Implementation of Internet checksum
3) Crimping of cross-wire and straight-through UTP cable to interconnect two computers
   a) Study of crimping tool.
   b) Study of color coding of Network cables.
   c) Crimping the cable using Crimping Tool
   d) Test the crimping by interconnecting two computers & using any standard software tool.
4) Interconnections of computers in Local Area Network to share resources.
   a) Configure and verify computers in LAN using control panel.
   b) Consider Printer as a shared resource.
   c) Consider any Disk Drive as a shared resource
   d) Perform Sharing operation for printer & Disk Drive.
5) Implementation of cyclic redundancy check
6) Mini Project: Setting up a laboratory using any topology and prepare documentation of it (Mandatory)

Text Books:

1. Data Communications and Networking, B. A. Forouzan, 4th Edition, TMH, 2009, ISBN-13-9780070634145.
2. Computer Networks: A Systems Approach ,Larry L. Peterson, 5 th Edition, Morgan Kaufmann Publishers, 2011, ISBN- 9789380501932.

Reference Books:

1. UNIX Network Programming, W.R. Stevens, 3rd Edition, Vol.1, Pearson Education, 2004, ISBN-13: 978-0131411555.
2. An Engineering Approach to Computer Networking, S. Keshav, Addison Wesley, 1997, ISBN: 8131711455.
3. Internetworking with TCP/IP, Comer, Vol.1, 4th Edition, Pearson Education, 2001, ISBN: 8178084449.

NOTE:

ICA-Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE–The End Semester Examination (Oral) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

CO257U DATA STRUCTURES AND FILES LAB

Teaching Scheme: 02P **Total:** 02 **Credit**:01
Evaluation Scheme: 25 ICA+25 ESE **Total Marks:**50
Duration of ESE: 03 Hrs

Minimum 10 experiments (six from Group A and six from Group B) shall be performed to cover the entire curriculum of course CO254U. The list given below is just a guideline. . All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output.

Group A

1. Create a singly linked list with options:
   a. insert (at the front, at the end, in the middle),
   b. delete (at front, at the end, in the middle),
   c. Display,
2. Implement stack as an ADT using Linked List
3. Implement Queue as an ADT using Linked List
4. Accept input as a string and construct a Doubly Linked List for the input string with each Node contains, as a data one character from the string and performs: a) Insert b) delete c) Display forward d) Display backward.
5. Create binary tree and perform recursive and non-recursive traversals.
6. Create a binary search tree of mnemonics from assembly language (e.g. add, mult, div, sub etc.) and perform following operations:
   a) Insert
   b) Display Level wise
   c) Height of the tree
   d) search a node
7. Implement In order Threaded Binary Search Tree.

Group B

1. Represent a given graph using adjacency list or matrix and perform DFS and BFS. Use the map of the area around the college as the graph. Identify the prominent landmarks as nodes and perform DFS and BFS on that
2. Represent graph using adjacency list or matrix and generate minimum spanning tree using Prim's algorithm.
3. Implementation of AVL Tree.
4. Implementation of Hash table using array and handle collisions using Linear probing with or without replacement.
5. Implement all primitive operations on Sequential file in C
6. Write a program that reads an existing file using line sequential organization.
7. Write a program to implement a small database mini project to understand persistent objects and operations on sequential files (eg library information, inventory systems, automated banking system, reservation systems etc.) For example, write a program to create a database for reservation system using information such as Name, sex, age, starting place of journey and destination. Program should have the following facilities
   a) To display entire passenger list
   b) To display particular record
   c) To update record
   d) To delete and sort record Use Exception Handling for data verification (Mandatory).

Text Books:

1. Data Structures,Seymour Lipschutz, Schaum's Outlines Tata McGraw Hill, 2006.
2. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahni, Galgotia Publication.

Reference Books:

1 Data Structures and Algorithms, A. Aho, J. Hopcroft, J. Ulman, Pearson Education, 1998, ISBN-0-201-43578-0
2 Data Structures using C and C++, Y. Langsam, M. Augenstein and A. Tannenbaum, 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
3. File organisation and processing, A. Tharp ,2008 ,Wiley India edition ,9788126518685
4 An introduction to data structures with Applications, J. Tremblay, P. Soresan, 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7.
5.ADTs' Data Structures and problems with C++ Larry Nyhoff,Pearson Publications.

NOTE:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (PR) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

CO258U SOFTWARE LAB-I

Teaching Scheme: 01L+02P; Total: 03 **Credit**:02
Evaluation Scheme: 25 ICA+25 ESE **Total Marks:**50
Duration of ESE: 03 Hrs

Minimum 10 experiments (five from Group B and five from Group C) shall be performed to cover the entire curriculum of course CO258U. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output. Use of Open source tool/ technology is recommended for laboratory assignments. The concerned faculty member must conduct group-A contents in theory lectures.

Group A

Ruby overview: features of ruby ,tools you will need,ruby – environment setup
Ruby syntax : Whitespace in ruby program,line endings in ruby program,ruby identifiers,reserved words,ruby begin statement,ruby end statement,ruby comments.
Classes and objects: Defining a class in ruby,variables in a ruby class,creating objects in ruby using new method,custom method to create ruby objects.member functions in ruby class,simple case study
Variables, constants and literals : Ruby global variables, ruby instance variables,ruby class variables,ruby local variables,ruby constants,ruby pseudo-variables,ruby basic literals ,integer numbers, floating numbers,string literals,backslash notations ,ruby arrays ruby hashes
Ruby operators,Ruby comments,
Conditional Statements :if…else, case, unless, ruby loops,
Ruby methods:ruby blocks, ruby strings,ruby arrays,ruby hashes,ruby date and time ,ruby ranges , Ruby iterators,ruby exceptions,
Ruby object oriented: Classes,objects,overloading,inheritance
Javascript Overview: Javascript placement ,variables,operators,If-else,switch-case,while loop,for loop,loop control,functions,arrays,events

Group B

1. Write a program to calculate compound interest using a while loop. The user inputs the amount deposited, the interest rate (as a percentage) per period, and the number of periods the deposit accumulates interest.
2. Create two classes to represent the following two objects: televisions and speakers. Include an initialize function and several methods to interact with your objects.
3. Define a class that compares two numbers and outputs the larger one. Test your solution.
4. Write a ruby class called Student that contains a student"s name, gender, phone number, and exam score. It should also include the initialize, accumulated_score, and display methods.
5. Create a ruby class called customer and declare two methods display_details and total_number_of_customers. Write a ruby program that create two objects cust1, cust2 and display customer details along with total number of customers.
6. Create two objects of the Customer class as cust1 and cust2 and pass the necessary parameters with the new method. The initialize method is invoked, and the necessary properties of the object are initialized. Once the objects are created, call cust1.display_details(), cust1.total_no_of_customers() the methods of the class by using the two objects
7. Write a program that create one global variable that can be accessed by two ruby classes called Class1 and Class2.

Group C:

1. Design a web page using Javascript to demonstrate if, if-else and switch statements.
2. Design a web page using javascript to demonstrate call a function with an argument, function that returns a value.
3. Design a web page using javascript to demonstrate for loop, while loop, do-while, break and continue a loop.
4. Design a web page using javascript to demonstrate sort an array(alphabetically and ascending), sort numbers numerically and ascending and descending.
5. Design and host a website with the help of HTML and Javascript (Commercial institute, portal or decided by the student and teacher)
6. Mini Project that covers the syllabus of the group-A (Mandatory).

Text Books:

1. Ruby programming for the Absolute beginner,Jerry L. Ford, ,Thomson Publications
2. Learning Ruby,Michael Fitzgerald,O'Reilly

Reference Books:

1. Beginning HTML, XHTML, CSS, and JavaScript,John Duckett, Wiley India publications.
2. Ruby Pocket Reference,Michael Fitzgerald,O'Reilly.

NOTE :

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (PR) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

CO259U ADVANCED PROGRAMMING LAB

Teaching Scheme: 00L + 02P; Total: 02 **Credit**:01
Evaluation Scheme: 25 ICA+25ESE **Total Marks:**50
Duration of ESE: 03 Hrs

Minimum 08 experiments (four from Group B and four from Group C) shall be performed to cover the entire curriculum from Group A of course CO259U. The list given below is just a guideline. All assignments are to be implemented using open source technology (preferably). Every assignment should include use of syntax, use of command/function used for coding and printout of code with proper comment and output. Use of Open source tool/ technology is recommended for laboratory assignments. The concerned faculty member must conduct group-A contents in first few practical turns.

Group A

Handling Files, Cameras and GUI: basic IO scripts, Reading/writing Images Files, Reading/writing Video Files, Capturing Camera frames, Abstracting video stream-managers. CaptureManager

Filtering Images : creating Modules, Channel Mixing, Simulating RC, RGV, CMV color space, Curves- bending color space

Tracking faces with haar cascades: conceptualizing Haar Cascades, creating module, define face as hierarchy of rectangles, Tracing, cutting, pasting rectangles, tracking faces, swap face, copying face

Detecting Foreground and Background Regions and Depth: Capturing frames, creating masking copy operation, integrating with pygame, generating Haar cascade

Detecting Edges and Applying Image filter: 2D convolution,Blurring, edge detection, motion blur, sharpening, embossing, erosion and dilation

Detecting and tracking different body parts: detecting face, detecting eyes, detecting ears, detecting nose, detecting pupils

Group B

1. Write a program to perform following operation on Images
    a. Retrieve size of image
    b. Save changes in image
    c. Rotating an Image
    d. Cropping an Image
    e. Resizing an Image
2. Write a program to perform following operation on Images
    a. Pasting an image on another image
    b. Getting a Histogram of an Image
    c. Transposing an Image
    d. Split an image into individual bands
    e. Convert image to bitmap
    f. Creating a thumbnail
3. Python program to demonstrate erosion and dilation of image
4. Write a program for cartooning an Image using OpenCV
5. Python program to create RGB color palette with trackbars
6. Denoising of colored images using opencv

Group C

1. OpenCV Python Program to analyze an image using Histogram
2. Write a program to download Google Images using Python
3. Write a Opencv Python program for Face Detection
4. Foreground Extraction in an Image using Grabcut Algorithm
5. Write a program Program for Extracting images from video in Python
6. Program for Playing a video in reverse mode using OpenCV
7. Write a Python script to analyze emotion of image

Textbooks:

1. Joseph Howse, Prateek Joshi, OpenCV: Computer Vision Projects with Python 1st Edition,Kindle Edition
2. OpenCV with python blueprints,Michael Beyeler, Packt Publishing Ltd., 2015

Reference Books:

1. Machine Learning for OpenCV, Michael Beyeler, Kindle Edition 2017

NOTE :

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skills acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Examination (PR) for this laboratory course shall be based on performance in one of the experiments performed by students in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of the institute.

SH 250AU INTRODUCTION TO THE CONSTITUTION OF INDIA

Teaching Scheme: 00L: **Credit: 00**
Evaluation Scheme: 60 ESE **Total Marks: 60**

Course Description:
The course provides knowledge about constitution of India, state and central policies, fundamental rights, fundamental duties, powers and functions of municipalities, panchayats and co-operative societies, electoral process and judiciary system.

Desirable Awareness:
Basic knowledge of Indian Constitution

Course Objectives:
The objectives of the course are to-
1. provide knowledge about legal literacy, state and central policies, fundamental rights, fundamental duties, powers and functions of municipalities, panchayats and co-operative societies, electoral process
2. enable the students to take up competitive examinations and also demonstrate the qualities of a responsible citizen.

Course Outcomes:
On the successful completion of this course, students shall be able to:
1. understand & remember the knowledge of basic information about Indian constitution.
2. analyse individual role and ethical responsibility towards society.
3. apply the knowledge of human rights and its implications while behaving with other citizens.

Relevance of POs and strength of correlation:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	3	2	3	1	-	-	2
2	-	-	-	-	-	2	2	3	3	-	-	3
3	-	-	-	-	-	3	2	3	3	-	-	3

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course content:
Introduction to the constitution of India: the making of the constitution and salient features of the constitution., preamble to the constitution, fundamental rights and its limitations.

Directive principles of state policy and relevance of directive principles, state policy fundamental duties, union executives – president, prime minister, parliament, supreme court

State executives: governor, chief minister, state legislature, high courts of state, electoral process in India, procedures for amendment in constitution

Human rights – meaning and definitions, emergency provisions, working of national human rights commission in India, powers and functions of municipalities, panchyats and co-operative societies

Text Books

1. Introduction to the Constitution of India, (Students Edn.) Durga Das Basu, Prentice –Hall EEE, 19th / 20th Edition., 2001
2. Introduction to the Constitution of India", Brij Kishore Sharma, PHI Learning Pvt. Ltd., New Delhi, 2011

Reference Books

1. An Introduction to the Constitution of India, M.V.Pylee, Vikas Publishing, 2002
2. Constitution of India, Dr. B. R. Ambedkar, Government of India Publication
3. Latest Publications of Indian Institute of Human Rights, New Delhi