Course title	Discrete Structures & Optimization
Course Code	25C1CAP-101
Scheme and Credits	L T P C Semester – Ist 4 0 0 4
Pre- requisite (if any)	Basic Mathematical Knowledge
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	solve problems using the principle of inclusion-exclusion.
CO2	classify on inference, symbolic logic and Boolean Algebra.
CO3	apply elementary counting techniques using the product and sum rules.
CO4	determine the simple or a multigraph, directed or undirected, cyclic or acyclic, and determine the connectivity of a graph.

Detailed contents:

Part A: Sets, relations, and functions: (30 hours)

Sets, relations, and functions: Introduction, Combination of Sets, ordered pairs, proofs of general identities of sets, relations, operations on relations, properties of relations and functions, Hashing Functions, equivalence relations, compatibility relations, partial order relations.

Rings and Boolean algebra: Rings, Subrings, Morphism of rings ideals and quotient rings. Euclidean domains, Integral domains and fields, Boolean Algebra, Direct product morphisms, Boolean sub-algebra, Boolean Rings, Application of Boolean algebra (Logic Implications, Logic Gates, Karnaughmap)

Combinatorial Mathematics: Basic counting principles, Permutations and combinations, Inclusion and Exclusion, Principle Recurrence relations, Generating Function, Pigeon Hole Principle, Application

Part B: Monoids and Groups (30 hours)

Monoids and Groups: Groups, Semigroups and monoids, Cyclic semigraphs and submonoids, Subgroups and Cosets. Congruence relations on semigroups. Morphisms. Normal subgroups. Dihedral groups.

Graph Theory: Graph- Directed and undirected, Eulerian chains and cycles, Hamiltonian chains and cycles Trees, Chromatic number Connectivity, Graph coloring, Plane and connected graphs, Isomorphism and Homomorphism. Applications.

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Suggested Readings/Books:

Discrete Mathematics (Schaum series), Lipschutz (McGraw Hill).

Applied Discrete Structures for Computer Science, Alan Doerr and Kenneth Levarseur (Creative Commons) 2012.

Discrete Mathematics and its Applications, Kenneth H Rosen.(McGraw Hill)

Discrete Mathematics and Graph Theory, Sartha, (Cengage Learning)

Elements of discrete mathematics. C L Liu (McGraw Hill)

Course title	Programming in Python
Course Code:	25C1CAP-102
Scheme and Credits	L T P C Semester – Ist 4 0 0 4
Pre-requisite (if any)	NA-
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	demonstrate Python environment, data types, operators used in Python.
CO2	compare and contrast Python with other programming languages.
CO3	explain the use of control structures and numerous native data types with their methods.
CO4	design user defined functions, modules, and packages and exception handling methods.
CO5	construct and handle files in Python and learn Object Oriented Programming Concepts.

Detailed contents:

Part A: Introduction to Python (30 hours)

Introduction to Python Programming Language: Programming Language, History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, Getting, Installing Python, Setting up Path and Environment Variables, Running Python, First Python Program, Python Interactive Help Feature, Python differences from other languages.
Python Data Types & Input/Output: Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command.
Operators and Expressions: Operators in Python, Expressions, Precedence, Associativity of Operators, Non Associative Operators.
Control Structures: Decision making statements, Python loops, Python control statements.
Python Native Data Types: Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods and operations).

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Part B: Python Functions (30 hours)

Python Functions: Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions, Pass by value Vs. Pass by Reference, Recursion, Scope and Lifetime of Variables.
Python Modules: Module definition, Need of modules, Creating a module, Importing module, Path Searching of a Module, Module Reloading, Standard Modules, Python Packages.
Exception Handling: Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.
File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read() &write() methods, tell() &seek() methods, renaming & deleting files in Python, directories in Python.
Classes and Objects: The concept of OOPS in Python, Designing classes, Creating objects, Accessing attributes, Editing class attributes, Built-in class attributes, Garbage collection, Destroying objects.

Suggested Readings/Books:

Programming in Python, Pooja Sharma, BPB Publications, 2017.
Core Python Programming, R. Nageswara Rao, 2nd Edition, Dreamtech.
Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.
Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.

Course title	Advanced Data Structures
Course Code:	25C1CAP-103
Scheme and Credits	**L T P C** Semester – Ist **4 0 0 4**
Pre-requisite (if any)	NA-
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	choose appropriate data structures and algorithms and design solution for a specific problem.
CO2	analyze the operations of hashing to retrieve data from data structure.
CO3	design and analyze programming problem statements.
CO4	explain with analysis of efficiency and proofs of correctness.
CO5	select algorithm design approaches in a problem specific manner.

Detailed contents:
Part A: Introduction to Data Structures: (30 hours)

Introduction to Data Structures: Data Structures and its Types, Algorithms, Time Complexity, Recurrence, Probabilistic Analysis, Amortized Analysis, Competitive Analysis.**Sorting Algorithms:** Quick Sort, Heap Sort, Counting Sort, Bucket Sort, Multi-way Merge SortHashing Techniques: Direct Address Tables, Hash Tables, Hash Functions, Open Addressing, Perfect Hashing.**Advanced Data Structures:** AVL Trees, Red-Black Trees, Splay Trees, B-trees, Binomial Heaps, Fibonacci heaps, Data Structures for Disjoint Sets.

Part B: Graphs &Algorithms: (30 hours)
Graphs & Algorithms: Graphs Representation, Minimum Spanning Tree (MST), Single Source Shortest Paths, All Pairs Shortest Paths, Maximum Flow.

String Matching: String, String Length, String Concatenation, String Copy, String-Matching, Brute Force algorithm, Rabin Karp algorithm, Knuth-Morris-Pratt (KMP) algorithm, Boyer–Moore algorithm

Suggested Readings/Books:

Thomas Coremen, "Introduction to Algorithms", Third edition, Prentice Hall of India, 2009.
Kleinberg J., Tardos E., "Algorithm Design", 1st Edition, Pearson, 2012.
Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms", Addison Wesley, 2001.
Seymour Lipschutz, "Data structure", Indian Adapted Edition, Tata McGraw Hill, 2000

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Course title	Advanced Database Management System
Course Code:	25C1CAP-104
Scheme and Credits	L T P C Semester – Ist 4 0 0 4
Pre-requisite (if any)	Understanding of Core Java concepts.
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	explain the basic concepts of DBMS and RDBMS.
CO2	apply normalization theory to the normalization of a database.
CO3	analyze the concept of Transaction Management & Recovery techniques in RDBMS.
CO4	summarize the concept of Transaction Management & Recovery techniques in RDBMS.
CO5	develop and implement No SQL databases (Open Source).

Detailed contents:

Part A: Need of DBMS (30 hours)

Need of DBMS over traditional Data storage mechanisms, Basic DBMS terminologies; Architecture of a DBMS: Data Independence, DBMS Component Structure, DBMS USERS, various DBMS Data Models, **Conceptual Model:** Entity Relationship Model, Importance of ERD, Symbols (Entity:Types of Entities, week Entity, Composite Entity, Strong Entity, Attribute: Types of Attribute, Relationship: Type of relationship, Connectivity, Cardinality).
Normalization and its various forms, Functional Dependencies, Multi-valued Dependencies, Join

Dependencies Database Integrity: Domain, Entity, Referential Integrity Constraints
Relational Languages: Relational Algebra, Relational Calculus, Query Execution, optimization and evaluation Plans.
Transaction Management and Concurrency Control techniques, Database Recovery Management Concepts and methods.
Introduction and Need of Database Administration and activities of Database administration.

Part B: Parallel Databases(30 hours)

Parallel Databases : Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems-Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism

Distributed Database Concepts : Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing Multidimensional Databases and their uses in data analytics.

Temporal Databases : Introduction to Temporality, Temporal relationships, temporal hierarchies.

Spatial Databases: Spatial data types, spatial relationships, Topological Relationships, Spatial Data Structures and methods of storage.

Big Data : introduction: introduction to NOSQL Databases (Open Source only).

Need and usage of XML Databases: XML Data Model – DTD – XML Schema

Suggested Readings/Books:

Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concept", Sixth Edition, 2013, McGraw-Hill
Bipin C. Desai, "An Introduction to Database System" , Revised Edition, 2012, Galgotia Publications Pvt Ltd-New Delhi
Ivan Bayross, "SQL, PL/SQL The Programming Language of Oracle", 4th Revised Edition,2009, BPB Publications
Peter Rob Carlos Coronel, "Database Systems", Cengage Learning, 8th ed.
C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, 2006, Pearson Education.

Course title	Technical Communication
Course Code:	25C1CAP-105
Scheme and Credits	**L T P C**　　　　　　　Semester – Ist **3 0 0 3**
Pre-requisite (if any)	NA-
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	demonstrate the Basics of Technical Communication.
CO2	develop the basic proficiency in reading & listening.
CO3	select various techniques to enhance verbal communication.
CO4	make use of various software's for Technical communication.

Detailed contents:

Part A: Basics of Technical Communication (20 hours)
Basics of Technical Communication: Functions of Communication-Internal & External Functions, Models-Shannon & Weaver's model of communication, Flow, Networks and importance, Barriers to Communication, Essential of effective communication (7C's and other principles), Non-verbal Communication.
Basic Technical Writing: Paragraph writing (descriptive, Imaginative etc.), Precise writing, reading and comprehension, Letters– Format & various types.

Part B: Advanced Technical Writing(25 hours)
Advanced Technical Writing: Memos, Reports, E-Mails & Net etiquettes, Circulars, Press Release, Newsletters, Notices. Resume Writing, Technical Proposals, Research Papers, Dissertation and Thesis, Technical Reports, Instruction Manuals and Technical Descriptions, Creating Indexes, List of References and Bibliography.
Verbal Communication: Presentation Techniques, Interviews, Group
Discussions, Extempore, Meetings and Conferences.
Technical Communication:MS-Word, Adobe Frame maker and ROBO Help
* Lab Exercises based on Listening and Speaking skills

Suggested Readings/Books:

Vandana R Singh, The Written Word, Oxford University Press, New Delhi.
K KRamchandran, et al Business Communication, Macmillan, New Delhi.
Swati Samantaray, Business Commnication and Commnicative English, Sultan Chand, New Delhi.
S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD).

Course title	Data Structures using Python Laboratory
Course Code:	25C1CAP-111
Scheme and Credits	L T P C Semester – I 0 0 4 2
Pre-requisite (if any)	Understanding of concepts of Data Structures
Internal Marks	70
External Marks	30
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	demonstrate the concept of data structures, python and apply algorithm for solving problems
CO2	make use of linear and non-linear data structures for processing of ordered or unordered data.
CO3	analyze various algorithms based on their time and space complexity.
CO4	construct the trees with linear and non linear

List of Experiments:

S.No.	Name of the Experiment
1	Write a Python program to create an array of 5 elements and display the array items. Access each individual element through indexes.
2	Python program to reverse the order of the items in the array.
3	Write a Python program to append a new item to the end of the array.
4	Write a Python program to remove a specified item using the index from an array.
5	Write a Python program to get the length of an array.
6	Write a Python program for binary search
7	Write a Python program for sequential or linear search.
8	Write a Python program to sort a list of elements using the bubble sort algorithm.
9	Write a Python program to sort a list of elements using the selection sort algorithm.

10 Write a Python program to sort a list of elements using the insertion sort algorithm

11 Write a Python program to sort a list of elements using the quick sort algorithm

12 Write a Python program to create a singly linked list, append some items and iterate through the list.

13 Write a Python program to find the size of a singly linked list.

14 Write a Python program to search a specific item in a singly linked list and return true if the item is found otherwise return false.

15 Write a Python program to delete the first item from a singly linked list.

16 Write a Python program to create circular single linked lists.

17 Write Python programs to implement stack and its operations using list.

18 Write Python programs to implement queue and its operations using list

19 Write a Python program to create a Balanced Binary Search Tree (BST) using an array (given) elements where array elements are sorted in ascending order.

20 Write a Python program to find the kth smallest element in a given a binary search tree.

21 Write a Python program to traverse the binary tree using pre-order, post-order and in-order traversals

22 Write a Python program to count the number of nodes in binary search tree.

23 Write a Python program to traverse the graph using Depth First Search and Breadth First Search

24 Write a Python program to create Red Black Tree and perform operations of Insertion and Deletion in it.

25 Write a Python program to implement AVL Trees as well as various operations of searching, insertion and deletion on AVL Trees

Suggested References/Books:

Benjamin Baka, David Julian, "Python Data Structures and Algorithms",Packt Publishers, 2017.
Y Daniel Liang, "Introduction to Programming using Python", Pearson.
Rance D. Necaise, "Data Structures and Algorithms using Python", Wiley Student Edition
Hemant Jain, "Problem Solving in Data Structures and Algorithms using Python: programming interview guide", 2016.
Zed A. Shaw, "Learn Python the Hard Way: a very simple introduction to the terrifyingly beautiful world of computers and code", 3e, Addison-Wesley, 2014

Course title	Advanced Database Management System Laboratory
Course Code:	25C1CAP-112
Scheme and Credits	L T P C Semester – I 0 0 4 2
Pre-requisite (if any)	NA
Internal Marks	70
External Marks	30
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	construct query a database using SQL DML/DDL commands
CO2	analyze integrity constraints on a database.
CO3	develop PL/SQL programs including stored procedures, stored functions, cursors
CO4	design new database and modify existing ones for new applications
CO5	inspect various DBA roles/techniques

List of Experiments:

S.No.   Name of the Experiment

1   Database design using E-R model and Normalization (Any 3 systems).

2   Implementation of DDL Commands to perform creation of table, alter, modify and drop column operations.

3   Implementation of Constraint

   - Check Constraint
   - Entity Integrity Constraint
   - Referential Integrity Constraint

   - Unique Constraint
   - Null Value Constraint

4   Implementation of DML and DCL Commands.

Implementation of Data and Built in Functions in SQL.

5

6   Implementation of Nested Queries and Join Queries.

7   Implementation of Cursors..

8   Implementation of Procedures and Functions.

9   Implementation of Triggers.

10   Implementation of Embedded SQL.

11   Consider a Database applications, Design and Develop Conceptual Data Model (E-R Diagram) with all the necessary entities, attributes, constraints and relationships. Design and build Relational Data Model for application specifying all possible constraints.

12   Implementation of various DBA roles/techniques

- Creation of user
- Granting of privileges to the users
- Creation of roles
- Loading of privileges into user defined roles.
- Import/Export data between various databases and flat files

Suggested References/Books:

Ivan Bayross, "SQL, PL/SQL The Programming Language of Oracle", 4th Revised Edition,2009, BPB Publications.
Steven Feuerstein and Bill Pribyl, "Oracle PL/SQL Programming", 5th Edition, 2009, O'Reilly Media

Chandigarh Engineering College-CGC, Landran, Mohali

An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Course title	Technical Communication Laboratory
Course Code:	25C1CAP-113
Scheme and Credits	L T P C Semester – I 0 0 2 1
Pre-requisite (if any)	NA
Internal Marks	30
External Marks	20
Total Marks	50

Course Outcomes:

At the end of this course, students will be able to

CO1	demonstrate the Basics of Technical Communication
CO2	develop the basic proficiency in reading & listening, comprehension,writing and speaking skills among students
CO3	formulate in order to comprehend spoken and written English language,particularly the language of their chosen technical field
CO4	select various techniques to enhance verbal communication
CO5	make use of various softwares for Technical communication

List of Experiments:

S.No.   Name of the Experiment

1   Listening Comprehension

2   Self-Introduction, Group Discussion and Role Play

3   Common Everyday Situations: Conversations and Dialogues

4   Communication at Workplace

5   Interviews

6   Formal Presentations

Suggested References/Books:

Practical English Usage. Michael Swan. OUP. 1995.
Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Course title	Computer Programming using C
Course Code:	25C1CAP-B1
Scheme and Credits	L T P C Semester – Ist 2 0 0 S/US
Pre-requisite (if any)	NA
Internal Marks	50
External Marks	--
Total Marks	50

Course Outcomes:

At the end of this course, students will be able to

CO1	explain the logic building concepts used in Programming.
CO2	develop algorithms to solve various real life problems
CO3	implement algorithms as C programs to solve defined problems
CO4	compare different methods for converting algorithms into C code

Detailed contents:

Unit-I: Logic Development (6 hours)
Data Representation, Flowcharts, Problem Analysis, Decision Trees/Tables, Pseudo code and algorithms. Fundamentals: Character set, Identifiers and Key Words, Data types, Constants, Variables, Expressions, Statements, Symbolic Constants.
Operations and Expressions: Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators, Library functions.

Unit-II Data Input and Output (8 hours)
formatted & unformatted input output. Control Statements: While, Do–while and For statements, Nested loops, If–else, Switch, Break – Continue statements.
Program Structure Storage Class: Automatic, external and static variables.

Functions: Brief overview, defining, accessing functions, passing arguments to function, specifying argument data types, function prototypes, recursion.

Objects and Classes: Introduction to Object Oriented Concepts, Features of OOP, Basic of classes and Objects.

Unit-III Arrays (8 hours)

Defining, processing arrays, passing arrays to a function, multi–dimensional arrays.

Strings: String declaration, string functions and string manipulation

Suggested Readings/Books:

Programming in ANSIC, E. Balaguru sami, Fourth Edition, Tata McGraw Hill

Programming in C, Third Edition, Stephen G Kochan, Pearson.

The C Programming Language, Kernighan & Richie, Second Edition, PHI Publication.

Object Oriented Programming, Lafore R, Third Edition, Galgotia Publications

Let us C, Yashvant P Kanetkar, Seventh Edition, BPB Publications, New Delhi.

Programming in C, Byron S.Gottfried, Second Edition, McGraw Hills.

Problem Solving and Programming in C, R.S.Salaria, Second Edition

Programming in C, Atul Kahate

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Course title	Computer Science Essentials
Course Code:	25C1CAP-B2
Scheme and Credits	L T P C Semester – Ist 2 0 0 S/US
Pre-requisite (if any)	NA
Internal Marks	50
External Marks	--
Total Marks	50

Course Outcomes:

At the end of this course, students will be able to

CO1	list common input and output devices of Computers
CO2	use the basic features of an Operating Systems and Database Systems
CO3	access the suitability of different software applications
CO4	create different types of reports using basic word processing, Spreadsheet and Presentation Graphics Software tools.

Detailed contents:

UNIT I: Human Computer Interface (7 hours)
Concepts of Hardware and Software; Data and Information.
Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter. (Brief introduction of all.
Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.
Data Representation: Bit, Byte, Binary, Decimal, Hexadecimal, and Octal Systems, Conversions and Binary Arithmetic (Addition/ Subtraction/ Multiplication) Applications of IT

UNIT II: Word processing: (7 hours)
Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.
Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs.
Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation,

using special features, presenting slide shows.

UNIT III: DBMS (8 hours)

DBMS: Introduction of DBMS, Data Modeling for a Database, Three level Architecture of DBMS, Components of a DBMS..

Fundamentals of Operating system: Introduction to Operating system, Functions of an operating system. Operating system as a resource manager. Structure of operating system (Role of kernel and Shell). Views of operating system. Evolution and types of operating systems..

Data communications concepts: Digital and analog transmissions-Modem, parallel and serial transmission, synchronous and asynchronous communication. Modes of communication: Simplex, half duplex, full duplex.

Types of Networks: LAN, MAN, WAN, Topologies.

Suggested Readings/Books:

Fundamentals of Computers, V Rajaraman,NAdabala, PHI.

Computer Fundamentals and Programming in C, Reema Thareja, Oxford University Press, 2016.

Introduction to Information Technology, ITL Education Solutions limited, Pearson Education

Computer Fundamentals, A. Goel, 2010, Pearson Education.

Computer Course Windows 10 with MS Office 2016, Satish Jain (Author), BPB Publications.

"Introduction to Computers", Peter Norton

Course title	Web Technologies
Course Code:	25C1CAP-201
Scheme and Credits	L T P C Semester – 2nd 4 0 0 4
Pre-requisite (if any)	Student must have the basic knowledge of any text editor like Notepad, Notepad++ and Edit plus etc.
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	demonstrate the basics of Internet and Web Services.
CO2	explain and Distinguish Programming Language and Markup Language
CO3	construct various web pages and web sites together
CO4	show user input from the remote users
CO5	discuss connectivity concepts of Front End and Back End.

Detailed contents:

Part A: Internet Basics (30 hours)

Internet Basics: Basic concepts, communicating on the internet, internet domains, internet server identities, establishing connectivity on the internet client IP address, How IP addressing came into existence? A brief overview TCP/IP and its services, transmission control protocol.

Introduction To HTML: Information Files Creation, Web Server, Web Client/Browser, Hyper Text Markup Language (HTML Tags, Paired Tags, Singular Tags), Commonly Used HTML Commands (Document Head, Document Body), Title and Footer, Text Formatting (Paragraph Breaks, Line Breaks), Emphasizing Material in a Web Page (Heading Styles, Drawing Lines).

Basic Formatting Tags: HTML Basic Tags, Text Formatting (Paragraph Breaks, Line Breaks), Emphasizing Material in a Web Page (Heading Styles, Drawing Lines), Text Styles (Bold, Italics, Underline), Other Text Effects (Centering (Text, Images etc.), Spacing (Indenting Text), HTML Color Coding.

Basic Formatting Tags: HTML Basic Tags, Text Formatting (Paragraph Breaks, Line Breaks), Emphasizing Material in a Web Page (Heading Styles, Drawing Lines), Text Styles (Bold, Italics, Underline), Other Text Effects (Centering (Text, Images etc.), Spacing (Indenting Text), HTML Color Coding.

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Type of Lists (Unordered List (Bullets), Ordered Lists (Numbering), Definition Lists.

Adding Graphics To HTML Documents: Using The Border Attribute, Using The Width And Height Attribute, Using The Align Attribute, Using The Alt Attribute.

Tables: Introduction (Header, Data rows, The Caption Tag), Using the Width and Border Attribute, Using the Cell padding Attribute, Using the Cell spacing Attribute, Using the BGCOLOR Attribute, Using the COLSPAN and ROWSPAN Attributes
Tag.

Part B: Linking Documents: (30 hours)

Linking Documents: Links (External Document References, Internal Document References), Image As Hyperlinks.

Frames: Introduction to Frames: The<FRAMESET> tag, The <FRAME> tag, Targeting Named Frames. DHTML: Cascading Style Sheets, Style

Introduction to JavaScript: Introduction to JavaScript: JavaScript in Web Pages (Netscape and JavaScript, Database Connectivity, Client side JavaScript, Capturing User Input); The Advantages of JavaScript (an Interpreted Language, Embedded within HTML, Minimal Syntax -Easy to Learn, Quick Development, Designed for Simple, Small Programs, Performance, Procedural Capabilities, Designed for Programming User Events, Easy Debugging and Testing, Platform Independence/Architecture Neutral); Writing JavaScript into HTML.

Forms Used by a Web Site: The Form Object, The Form Object's Methods (The Text Element, The Password Element, The Button Element, The Submit (Button) Element, The Reset (Button) Element, The Checkbox Element, The Radio Element, The Text Area Element, The Select and Option Element, The Multi Choice Select Lists Element) Other Built-In Objects in JavaScript (The String Object, The Math Object, The Date Object), User Defined Objects (Creating a User Defined Object, Instances, Objects within Objects)

Suggested Readings/Books:

Internet for Every One: Alexis Leon, 1st Edition, Leon Techworld, Publication, 2009.
Greenlaw R; Heppe, "Fundamentals of Internet and WWW", 2nd Edition, Tata McGraw-Hill, 2007.
RajKamal, "Internet& Web Technologies", edition Tata McGraw-Hill Education 2009.
Chris Payne, "Asp in 21 Days", 2nd Edition, Sams Publishing, 2003 PDCA.
A Beginner's Guide to Html Http://www.Ncsa.Nine.Edit/General/Internet/W ww/Html.Prmter
https://www.tutorialspoint.com/html/html_tutorial.pdf
https://www.w3schools.com/js/
 https://www.w3schools.com/html/
https://www.cs.uct.ac.za/mit_note/web_programming.html

Course title	Design & Analysis of Algorithms
Course Code:	25C1CAP-202
Scheme and Credits	L T P C Semester – 2nd 4 0 0 4
Pre-requisite (if any)	Student must have knowledge about Data Structures.
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	choose problems based on their characteristics and practical importance.
CO2	develop Algorithms using iterative/recursive approach
CO3	design algorithm using an appropriate design paradigm for solving a given problem
CO4	classify P, NP or NP Complete problems

Detailed contents:

Part A: Algorithms (30 hours)

Algorithms: Analyzing algorithms, order arithmetic, Time and space complexity of an algorithm, comparing the performance of different algorithms for the same problem. Different orders of growth. Asymptotic notation. Polynomial vs. Exponential running time. Principles of Algorithm Design. Mathematical analysis of Recursive and Non-recursive algorithms.

Basic Algorithm Design Techniques: Divide-and-conquer, Greedy approach, Randomization and dynamic programming. Example problems on Backtracking: n-Queens problem, Hamiltonian Circuit Problem, Subset – Sum Problem. Branch-and- Bound: Assignment Problem, Knapsack Problem, Traveling Salesperson Problem

Part B: Sorting and searching (30 hours)

Sorting and searching: Insertion and selection sort, Binary search in an ordered array. Sorting algorithms such as Merge sort, Quick sort, Heap sort, Radix Sort, and Bubble sort with analysis of their running times. Lower bound on sorting. Exhaustive search and String Matching. Graphs and NP-completeness: Graph traversal: Breadth-First Search(BFS) and Depth-First Search (DFS). Applications of BFS and DFS. Shortest paths in graphs: Dijkstra algorithm. Definition of class NP, P, NP-hard and NP-complete problems.

Suggested Readings/Books:

Horowitz E., Sahani S., Rajasekharan S.: Computer Algorithms, Galgotia Publication
A.V.Aho, J.E.Hopcroft, and J.D.Ullman, The Design and Analysis of Computer Algorithms, Pearson Education India
J.Kleinberg and E.Tardos, Algorithm Design by, Pearson Education India
Coremen T.H., Leiserson C.E., and Rivest R.L.: Introduction to Algorithms, PHI
Anany Levitin: Introduction to the Design and Analysis of Algorithms, Pearson Education, 2nd Edition.
Michael T Goodrich and Roberto Tamassia : Algorithm Design, Wiley India
R C T Lee, S S Tseng, R C Chang, Y T Tsai : Introduction to Design and Analysis of Algorithms: A Strategic Approach, Tata McGraw Hill

Course title	Advanced Java
Course Code:	25C1CAP-203
Scheme and Credits	L T P C Semester – 2nd 4 0 0 4
Pre-requisite (if any)	Understanding of Core Java concepts.
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	explain the features of advanced Java and write various programs.
CO2	construct API and implement Serialization concept of Java.
CO3	analyze Java Generics and develop Projects.
CO4	develop effective digital and social media strategies.

Detailed contents:

Part A: Servlets (30 hours)

Servlets: The life cycle of Servlet, Java Servlet Development kit, Servlet API, Reading the servlet parameters, Reading initialization parameters, Handling HTTP requests and responses, Using cookies, Session tracking and security issues.

Java Server Pages (JSP): JSP Architecture, Life cycle of JSP, JSP syntax basics– Directives,Declarations, Scripting, Standard actions, Custom tag libraries, Implicit objects, Object scope. Synchronization issues, Session management.

Struts : Introduction to struts framework, understanding basic architecture of Model, view, controller. Deploying the application in struts with database connectivity.

Part B: Hibernate (30 hours)

Hibernate : Introduction to hibernate framework, understanding basic architecture of Model, view, controller. Basic concepts of creating pojo files, reverse mapping, object creation in hibernate ,databaseconnectivity .

Enterprise Java Bean: The bean developer kit (BDK), Use of JAR files, The java beans API,Creating a

JavaBean, Types of beans, Stateful session bean, Stateless session bean, Entity bean.

Remote Method Invocation: Defining the remote interface, Implementing the remote interface, Compiling and executing the server and the client.

Common Object Request Broker Architecture (CORBA): Overview of technical architecture, CORBA basics, CORBA services

Suggested Readings/Books:

Herbert Schildt , "The Complete Reference Java 2" , Tata McGraw -Hill.
H.M. Deital, P.J. Dietal and S.E. Santry, "Advanced Java Platform HOW TO PROGRAM", Prentice Hall.
Grey Cornell and Hortsmann Cay S., "Core Java", Sun Microsystems Press.
Philip Hanna, "JSP: The Complete Reference", Tata McGraw –Hill

Course title	Linux Administration
Course Code:	25C1CAP-204
Scheme and Credits	**L T P C** **Semester – 2nd** **4 0 0 4**
Pre-requisite (if any)	NA-
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	demonstrate the technical details of Linux operating system.
CO2	experiment with various Linux command and Implement file hierarchical structuring.
CO3	create user, manage and configure packages in Linux.
CO4	classify and configure the various internet services.

Detailed contents:

Part A: Introduction (30 hours)

Introduction: Linux: The Operating System: Linux Distributions, Difference Between Linux and Windows, Separation of the GUI and the Kernel, Understanding Linux Kernel, Installing Linux in a Server Configuration, Booting and Shutting Down Process, Concept of Root, Basic commands, working with vi Editor,

Understanding files and File System: Understanding Files and Directories in Linux, File Structure and hierarchy, File Permissions, File Management and Manipulation, Managing File System

Managing Packages & Users: Installing and removing Software in Linux, Getting and Unpacking the Package, Configuring the Package, Compiling the Package, Installing the Package, Managing Users and Groups

Part B: DNS (30 hours)

DNS: Installing a DNS Server, Configuring a DNS Server, DNS Records Types, Setting Up BIND Database Files, The DNS Toolbox, Configuring DNS Clients.

Web Server: Understanding the HTTP Protocol, Installing the Apache HTTP Server, Starting Up and Shutting Down Apache, Configuring Apache

E-Mail Server: Understanding SMTP, Installing the Postfix Server, Configuring the Postfix Server, Running the Server, POP and IMAP Basics, Installing the UW-IMAP and POP3 Server

Samba Server: The Mechanics of SMB, Samba Administration, Using SWAT, Creating a Share, Mounting Remote Samba Shares, Creating Samba Users, Using Samba to Authenticate Against a Windows Server

Suggested Readings/Books:

Linux Administration: A Beginner's Guide, Wale Soyinka, McGraw Hill
UNIX and Linux system administration Handbook Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, Dan Mackin, Pearson Education
Linux: The Complete Reference, Sixth Edition, Richard Petersen McGrawHill
Linux All-In-One for Dummies, Emmett Dulaney, Wiley India

Course title	Information Security and Cyber Law
Course Code:	25C1CAP-205
Scheme and Credits	L T P C Semester – 2nd 4 0 0 4
Pre-requisite (if any)	NA-
Internal Marks	30
External Marks	70
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	Identify issues involved in the field of information security.
CO2	Explain the key security requirements of Confidentiality, Integrity & Availability
CO3	Demonstrate the concept of Intrusion Detection & Intrusion Prevention.
CO4	Define the concept of Security policies and Cyber Laws.

Detailed contents:

Part A: Introduction (30 hours)

Introduction to Information System, classification and components of information system, Computer Security Concepts, CIA (Confidentiality, integrity and availability),Security Functional Requirements.

User Authentication: Means of Authentication, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, Remote User Authentication, Security Issues for User Authentication.

Access Control: Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control, File Access Control, Role-Based Access Control.

Database Security: The Need for Database Security, Database Access Control, Database Encryption.

Malicious Software: Types of Malicious Software (Malware)-Viruses, Worms,SPAM E-mail, Trojans, Zombie, Bots, Keyloggers, Phishing, Spyware, Backdoors, Rootkits, Preventive Measures.Denial-of-Service Attacks: Types of DoS attacks, Defenses Against Denial-of-Service Attacks.

Part B: Intrusion Detection(30 hours)

I**ntrusion Detection**: Intruders, Intrusion Detection, Host-Based Intrusion Detection, Distributed

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Host-Based Intrusion Detection, Network-Based Intrusion Detection, Honeypots.

Firewalls & Intrusion Prevention Systems: The Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewall Basing, Intrusion Prevention Systems.

Cryptographic Algorithms: Symmetric Encryption Principles, Data Encryption Standards (DES)

Introduction to Internet Security Protocols & Standards: SSL, TLS, HTTPS, IPv4 and IPv6 Security protocols.

Security Policies and Cyber Laws: Concept of Information Security Policy, ISO Standards, various Indian Cyber Laws, Information Technology Act 2000, Electronic Record and E-Governance, Classification and Provisions of Cyber Crimes, Regulation of Certifying Authorities, Patent, Copyright, Digital signature, Introduction to Cyberspace.

Suggested Readings/Books:

William Stallings, Lawrie Brown, "Computer Security: Principles & Practice", 3rd Edition, Pearson, 2015.

Surya Prakash Tripathi, RitendraGoel, Praveen Kumar Shukla, "Introduction to Information Security and Cyber Laws", Wiley India,2014.

Christof Paar , Jan Pelzl, "Understanding Cryptography: A Textbook for Students and Practitioners", 1st Edition, Springer, 2010

William Stallings, "Cryptography and Network Security Principles and Practices", 4th Edition, Prentice Hall, 2006.

Darren Death, "Information Security Handbook",Packt Publishing, 2017.

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Course title	Web Technologies Laboratory
Course Code:	25C1CAP-211
Scheme and Credits	L T P C Semester – II 0 0 4 2
Pre- requisite (if any)	Students must have the knowledge of editors like Notepad etc. and basic understanding of Scripting Language/s.
Internal Marks	70
External Marks	30
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	Explain Static and Dynamic concepts of web designing.
CO2	Develop ability to retrieve data from a database and present it online.
CO3	Construct web pages that apply various dynamic effects on the web site.
CO4	Classify complex and large problems using Scripting Language & Markup Language.

List of Experiments:

S.No.   Name of the Experiment

1   Design index page of a book Titled Web Designing.

2   Create a simple HTML page to demonstrate the use of different tags.

3   Display Letter Head of your college on a web page & it must be scrolling Right to Left.

4   Create a link to move within a single page rather than to load another page

5   Display "Name of University" using different Text formatting Tags.

6   Design Time Table of your department and highlight most important periods.

7   Use Tables to provide layout to your web page.

8   Embed Audio and Video into your web page.

9   Divide a web page vertically and display logo of your college in left pane and logo of university in right pane.

10   Create Bio- Data of an employee.

11   Design front page of a hospital with different styles

12   Design a web page and display horizontally two different web pages at a time.

13   Write a program to create a login form. On clicking the submit button, the user should get navigated to a profile page.

14   Write a HTML code to create a Registration Form. On submitting the form, the user should be asked to login with the new credentials.

15   Write a HTML code to create website in your college or department and create link for Tutorial of specific subject.

16   Write a program to perform following operations on two numbers input by the user: Addition 2) Subtraction 3) Multiplication 4) Division.

17   Design a program to solve quadratic equations.

18   Write a program to determine greatest number of three numbers.

19   Write a script to compute, the Average and Grade of students marks.

20   Design a scientific calculator and make event for each button using scripting language.

21   Write a script to check whether a number is even or odd?

22   Write a program to show whether a number is prime or not?

23   Write a program to show multiplication table of any number.

24   Write a program to find the factorial of any number

25   Write a program to show Fibonacci Series between 0 to 74.

Suggested References/Books:

Greenlaw R; Hepp E, "Fundamentals of Internet and www", 2nd Edition, Tata. McGraw-Hill, 2007.
A Beginner's Guide to HTML Http://www.Ncsa.Nine.Edit/General/Internet/www/ html.prmter
https://www.w3schools.com/html/html_examples.asp
https://www.cs.uct.ac.za/mit_notes/web_programming.html

Chandigarh Engineering College-CGC, Landran, Mohali
An Autonomous College u/s (2f) of the UGC Act 1956
Affiliated to IKGPTU, Approved by AICTE

Course title	Advanced Java Laboratory
Course Code:	25C1CAP-212
Scheme and Credits	L T P C Semester – II 0 0 4 2
Pre-requisite (if any)	NA-
Internal Marks	70
External Marks	30
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	Classify problems as P, NP or NP Complete
CO2	Explain the advanced features of Java and write the programs.
CO3	Construct API and implement Serialization concept of Java.
CO4	Analyze Java Generics and develop Projects.

List of Experiments:

S.No.   Name of the Experiment

1   Create a Servlet to handle HTTP Requests and Responses.

2   Implementation of the concept of Cookies and Session Tracking.

3   Illustrate the concept of JavaServer Pages (JSP).

4   Create a JavaBean by using Bean Developer Kit (BDK).

5   Implementation of various types of beans like Session Bean and Entity Bean.

6   Introduction to Struts platform with basic connectivity.

7   Deploying first sample program using MVC architecture in struts.

8   Implementing database connectivity in struts.

9   Creating one sample application in struts.

10   Introduction to Hibernate framework.

11   Introduction to Hibernate framework.

Practical Assignments (SEO)

12   Take a web site and prepare the SEO report of the website including status of following factors:

Title tag, meta-description tag, header tags, keyword consistency, number of back links, robots.txt and xml sitemaps then after going through the steps of SEO prepare the report.

13   Discuss any five tools to prepare the list of ten organic key words for SEO purpose.

14   Optimize the images in the website using suitable methods and compare the reports before and after the SEO steps.

15   Write the robot and sitemap file of a website under consideration

Suggested References/Books:

Herbert Schildt , "The Complete Reference Java 2" , Tata McGraw -Hill.
H.M. Deital, P.J. Dietal and S.E. Santry, "Advanced Java 2 Platform How To Program", Prentice Hall.
Laudon and Traver, "E-Commerce: Business, Technology & Society", Pearson Education
Shivani Karwal, "Digital Marketing Handbook: A Guide to search Engine Optimization, Pay Per Click Marketing, Email Marketing and Content Marketing", CreateSpace Independent Publishing Platform, 1st edition.
Grey Cornell and Hortsmann Cay S., "Core Java", Sun Microsystems Press.
Philip Hanna, "JSP: The Complete Reference", Tata McGraw –Hill..

Course title	Linux Administration Laboratory
Course Code:	25C1CAP-213
Scheme and Credits	L T P C Semester – II 0 0 4 2
Pre-requisite (if any)	NA-
Internal Marks	70
External Marks	30
Total Marks	100

Course Outcomes:

At the end of this course, students will be able to

CO1	Make use of digital marketing for developing effective digital and social media strategies
CO2	Experiment with various commands for performing different operation
CO3	Apply various Linux administration commands
CO4	Build and configure various servers in Linux environment

List of Experiments:

S.No.   Name of the Experiment

1   Installation of Linux operating system.

    a. Partitioning drives

    b. Configuring boot loader (GRUB/LILO)

    c. Network configuration

    d. Setting time zones

    e. Creating password and user accounts

    f. Installing and removing packages

    g. Shutting down

2   Working with basic commands

3   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

4   Configuring NICs with Network Device Configuration Utilities (ip and ifconfig)

5   Install and configuring a DNS Server with a domain name of your choice

6   Install and configuring DHCP server and client

7   Install and configuring Mail Server

8   Install and configuring Apache Web Server for hosting websites

9   Securing a simple network with Linux firewall (Netfilter/iptables)

10   Setting up Samba Server to share files and printers with Windows-based and other operating systems

Suggested References/Books:

Linux Administration: A Beginner's Guide, Wale Soyinka, McGrawHill
UNIX and Linux system administration Handbook Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, Dan Mackin, Pearson Education
Linux Command Line and Shell Scripting Bible, 3rd Edition Richard Blum, Christine Bresnahan, Wiley
Linux: The Complete Reference, Sixth Edition, Richard Petersen McGrawHill
Linux All-In-One for Dummies, Emmett Dulaney, Wiley India.