BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

SEMESTER – III

Course Code	Course Name	Course Type	Hours per Week			Credits	Total Marks
			L	T	P		
BSCM301	Differential Equation and Complex Analysis	BS	4	0	0	4	100
ESCM301	Internet of Things	ES	3	0	0	3	100
ESCM302	Data Structure & Algorithms	ES	3	1	0	4	100
ESCM303	Introduction to Python Programming	ES	3	1	0	4	100
PCC-CSM301	Computer Organization & Architecture	PC	3	0	0	3	100
ESCM392	Data Structure & Algorithms Lab	ES	0	0	3	1.5	100
ESCM393	Introduction to Python Programming Lab	ES	0	0	3	1.5	100
PCC-CSM391	Computer Organization & Architecture Lab	PC	0	0	2	1	100
Total						**22**	**800**
AUM-3	Constitution of India	AU	1	0	0	0	0

Course Code: BSCM301

Course Name: Differential Equation and Complex Analysis

Contact: 4L

Credit: 4

Allotted Hour: 60L

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in ordinary differential equations and complex variables. It aims to equip the students to deal with advanced levels of mathematics andapplications that would be essential for their disciplines.

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Pre-requisite(s): Single Variable Calculus.

Course Outcome: After the completion of the course, Students would be able to:

CO1. Remember and understand the concept of differentiation of vector functions and definite integral for evaluating surface areas and volumes and solve and evaluate related problems.

CO2. Understand the concept of differentiation and solve differential equations by using variousmethods.

CO3. Illustrate the concept of limit, continuity, differentiability of complex functions and solve related problems.

CO4. Understand the concept of analytic functions and analyze the working methods of complexfunctions and evaluate related problems.

CO5. Solve problems related to complex integration and apply them to evaluate Taylor series, Laurent series and evaluation of definite integral. Understand the concept of singularities of complex functions and solve related problems.

Module I: Vector Calculus - I **[7H]**

Scalar and Vector Fields, Differentiation of Vector Functions, Gradient, Divergence, Curl and their Physical Interpretations, Line integrals, Path Independence, Potential Functions and Conservative Fields, Surface Integrals.

Module II: Vector Calculus - II **[7H]**

Green's, Stokes' and Gauss's Divergence Theorems (without proof), Simple Applications involving Cube, Sphere and Rectangular Parallelepiped.

Module III: Ordinary Differential Equation of Higher Order **[16H]**

Linear differential equation of nth order with constant coefficients, Simultaneous linear differential equations, Second order linear differential equations with variable coefficients, Method of variation of parameters, Cauchy-Euler equation.

Module IV: Complex Variable I **[14H]**

Limit, Continuity and differentiability, Functions of complex variable, Analytic functions, Cauchy- Riemann

equations (Cartesian and Polar form), Harmonic function, Method to find Analytic functions.

Module V: Complex Variable II [16H]

Contour integrals, Cauchy- Goursat theorem, Cauchy integral formula, Taylor's series, Laurent's series, Liouvilles's theorem, Singularities, Classification of Singularities, zeros of analytic functions, Residues, Methods of finding residues, Cauchy Residue theorem and related problems.

Text Books:

1. "Higher Engineering Mathematics", B. V. Ramana, Tata McGraw-Hill Publishing CompanyLtd., 2008.
2. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publisher, 2005.
3. "Advance Engineering Mathematics", R. K. Jain & S. R. K. Iyenger, Narosa Publishing -House, 2002.
4. "Foundation of Complex Analysis", S. Ponnuswamy, Alpha Science Int Ltd, Second edition, 2006.

Reference Books:

1. "Advance Engineering Mathematics", E. Kreyszig, John Wiley & Sons, 2005.
2. "Advance Engineering Mathematics", Peter V. O'Neil, Thomson (Cengage) Learning, 2007.
3. "Calculus", Maurice D. Weir, Joel Hass, Frank R.Giordano, Thomas, Eleventh Edition, Pearson.
4. "Complex Variable and Applications", James Ward Brown and Ruel V Churchill, 8th Edition,Tata McGraw-Hill.

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Course Code: ESCM301

Course Name: Internet of Things

Contact: 3L

Credit: 3

Allotted Hour: 45L

Course Objective:

1. To impart knowledge on the infrastructure, sensor technologies and networking technologies of Internet of Things (IoT).
2. To analyze, design and develop IoT solutions.
3. To explore the entrepreneurial aspect of the Internet of Things
4. To apply the concept of Internet of Things in the real world scenarios.

Pre-requisite(s): Basic knowledge of the fundamentals of computers.

Course Outcome: After the completion of the course, Students would be able to:

CO1: Define and describe the fundamental of Internet of Things
CO2: Describe and identify IoT reference architecture and design
CO3: Define and discuss Internet of Things technologies
CO4: Analyze and evaluate resource management in IoT
CO5: Analysis and evaluate IoT in different environments.
CO6: Demonstrate and evaluate recent trend of IoT applications.

Module I: IoT Fundamentals **[5H]**

Definition & Characteristics of IoT - Challenges and Issues - Physical Design of IoT, Logical Design of IoT - IoT Functional Blocks, Security.

Module II: IoT Reference Architecture, Software Design **[7H]**

Control Units – Communication modules – Bluetooth – Zigbee – Wifi – GPS- IOT Protocols (IPv6, 6LoWPAN, RPL, CoAP etc..), MQTT, Wired Communication, Power Sources

Module III: Technologies behind IoT **[6H]**

Four pillars of IOT paradigm, - RFID, Wireless Sensor Networks, SCADA (Supervisory Control and Data Acquisition), M2M - IOT Enabling Technologies - BigData Analytics, Cloud Computing, Embedded Systems.

Module IV: Resource management in IoT **[6H]**

Clustering, Clustering for Scalability, Clustering for routing, Clustering Protocols for IOT

Module V: From the internet of things to the web of things **[9H]**

The Future Web of Things – Set up cloud environment –Cloud access from sensors– Data Analytics for IOT-

Rest Architectures- The web of Things, Resource Identification and Identifier-Richardson Maturity Model

Module VI: Applications of IoT **[8H]**

Business models for IoT, Green energy buildings and infrastructure, Smart farming, Smart retailing and Smart fleet management

Module VII: Recent Trends **[4H]**

Recent trends.

Text Book:

1. Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri. Internet of Things: Architectures, Protocols and Standards, 1st edition, Wiley Publications, 2019.
2. Bahga, Arshdeep, and Vijay Madisetti. Internet of Things: A hands-on approach, 1st edition, University press, 2014.

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Course Code: ESCM302

Course Name: Data Structure & Algorithms

Contact: 3L+1T

Credit: 4

Allotted Hour: 45L+15T

Course Objective:

On successful completion of this course, students should be able to understand basic data structure and algorithms. The course helps to analyze the asymptotic performance of algorithms. It also helps to impart a thorough understanding of linear data structures such as stacks, queues and their applications,non-linear data structures such as trees and their applications and also students can be familiar with various sorting, searching and hashing techniques and their performance comparison.

Pre-requisite(s): Basic Mathematics, Basic knowledge of Problem solving.

Course Outcome: After the completion of the course, students would be able to:

CO1: Define and illustrate the time and space complexities to analyze the algorithms.
CO2: Describe and explain variety of linear data structures such as stacks, queues, linked List to solve real life problems.
CO3: Differentiate and Demonstrate different kinds of searching, sorting and hashing techniques to solve critical problems.
CO4: State and Illustrate the various kinds of non linear data structure to write the program on non linear data structure.

Module I: **[5H]**

Introduction: Basic Terminologies, Types; Data Structure Operations: insertion, deletion, traversal; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off.

Module II: **[9H]**

Array: Representation of arrays, Sparse matrix and its representation.

Stacks: Basic Concept of Stack, Stack as an ADT, its operations, Applications of Stacks: Expression Conversion and evaluation.

Queues: Basic Concept of Queue, Queue as an ADT, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations.

Module III: **[7H]**

Linked Lists: Basic Concept, Memory Representation; Types of Linked List: Singly Linked List, Doubly Linked List, Circular Linked List.; Algorithms of several operations: Traversing, Searching, Insertion, Deletion; Linked representation of Stack and Queue.

Module IV: **[12H]**

Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Sorting: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort; Performance and Comparison among all the methods.

Hashing: Hash Function and Hash Tables, Collision Resolution Techniques.

Module V: **[12H]**

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, B Tree, B+ Tree.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms: BFS and DFS.

Text books:

1. Fundamentals of Data Structures in C, Horowitz, Sartaj Sahni, Anderson Freed, ComputerScience Press, 2nd Edition,2008.
2. Data Structures Through C Language, Yashavant Kanetkar, BPB Publication, 2nd Edition,2003.
3. Data Structures, S. Lipschutz, McGraw Hill Education, Revised First edition.

Reference books:

1. Data Structures, and Algorithm Analysis in C, Mark Allen Weiss, Pearson, 2nd Edition,1996.
2. Data Structures and Program Design in C, Robert Kruse, C.L.Tondo, “Bruce Leung, Shashi Mogalla”, Pearson, 2nd Edition.

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
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Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Course Code: ESCM303

Course Name: Introduction to Python Programming

Contact: 3L+1T

Credit: 4

Allotted Hour: 45L+15T

Course Objective:

The objective of this course is to describe the core syntax and semantics of Python programming language and discover the need for working with the strings and functions. It also highlights the process of structuring the data using lists, dictionaries, tuples and sets along with use of regular expressions andbuilt-in functions to navigate the file system. It also covers Object-oriented Programming concepts in Python.

Pre-requisite(s): Basic knowledge of computer programming language.

Course Outcome: After the completion of the course, students would be able to:

CO1: Describe the fundamental Concept of Python syntax and semantics and analyze the use control flow statements of Python Programming.

CO2: Express and measure proficiency in the handling of strings and functions.

CO3: Define the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets and compare their performance in Python Programming.

CO4: Define and evaluate the commonly used operations involving file systems, Modules and Packages.
CO5: Describe the Object-Oriented Programming concepts as used in Python and apply the concept to solve different type of program.

Module I: **[5H]**

Introduction: History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator.

Module II: **[5H]**

Conditional Statements and Control Statements: If, If- else, Nested if-else, Looping, For, While, Nested loops, Break, Continue, Pass.

Module III: **[6H]**

String Manipulation: Accessing Strings, Basic Operations, String slices, Function and Methods.

Module IV: **[4H]**

Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods.

Module V: **[4H]**

Tuple: Introduction, accessing tuples, Operations, Working, Functions and Methods.

Module VI: **[4H]**

Dictionaries: Introduction, accessing values in dictionaries, Working with dictionaries, Properties.

Module VII: **[3H]**

Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.

Module VIII: **[4H]**

Modules: Importing module, Math module, Random module, Packages, Composition, Input-Output Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions.

Module IX: **[4H]**

Exception Handling: Exception, Exception Handling, Except clause, Try? finally clause, User Defined Exceptions**.**

Module X: **[6H]**

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.

Text books:

1. Core Python Programming, 3ed Covers fundamentals to advanced topics like OOPS, Exceptions,Data structures, Files, Threads, Net, R. Nageswara Rao , Dreamtech Press, 1 September 2021.
2. Gowrishankar S, Veena A, “Introduction to Python Programming”, CRC Press/Taylor & Francis,1st Edition,2018.

Reference books:

1. Jake VanderPlas, “Python Data Science Handbook: Essential Tools for Working with Data”, 1st Edition, O'Reilly Media, 2016.
2. Aurelien Geron, “Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts,Tools, and Techniques to Build Intelligent Systems”, 2nd Edition, O’Reilly Media, 2019.
3. Wesley J Chun, “Core Python Applications Programming”, Pearson Education India, 3rd Edition,2015.
1. Miguel Grinberg, “Flask Web Development: Developing Web Applications with Python”, O'Reilly Media, 2nd Edition, 2018.

BRAINWARE UNIVERSITY
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Course Code: PCC-CSM301

Course Name: Computer Organization & Architecture

Contact: 3L

Credit: 3

Allotted Hour: 45L

Course Objective:

The objective of the course is to cover the basic concepts of computers, architecture of computer systems and electronic computers. It also helps students to design a simple computer using hardwired and micro programmed control methods along with different types of addressing modes and memory organization. It also focuses on input-output organization and different types of serial communication techniques and pipelining architecture with instruction cycle.

Pre-requisite(s): Fundamental of computers.

Course Outcome: After the completion of the course, students would be able to:

CO1: Define and Explaining the functional blocks of a computer, pipeline & memory.

CO2: Identify and design data representation in digital computers.

CO3: Express the concept of memory system and design pipeline architecture.

CO4: Applying data representation, instructions & evaluate memory system application.

CO5: State and Illustrate the pipeline architecture, memory and building blocks for various domains.

Module I: **[9H]**

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Module II: **[9H]**

Data representation: Signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, multiplication – shift-and add, Booth multiplier, carry save multiplier, Division restoring and non-restoring techniques, floating point arithmetic.

Module III: **[9H]**

Memory system design: Semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB.

Module IV: **[9H]**

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

Module V: **[9H]**

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Text books:

1. Computer Organization and Design: The Hardware/Software Interface, David A. Patterson and John L. Hennessy, 5th edition, Elsevier.
2. Computer Organization, Carl Hamacher, 6th Edition by, McGraw Hill Higher Education.

Reference books:

1. Computer Organization and Architecture: Designing for Performance ,William Stallings, John Dean, 10th edition, Pearson Education.

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Course Code: ESCM392

Course Name: Data Structure & Algorithms Lab

Contact: 3P

Credit: 1.5

Allotted Hour: 45L

Course Objective:

The course is designed to develop skills to design and analyze simple linear and nonlinear data structures. It strengthens the ability of the students to identify and apply the suitable data structure for the given problem. It enables students to gain knowledge in practical applications of data structures.

Pre-requisite(s): Basic concept of Computer Programming Language.

Course Outcome: After the completion of the course, students would be able to:

CO1: Apply the knowledge of 1D and 2D arrays to execute the program to solve real life problem.

CO2: Establish the concept of Stack and Queue and develop program to solve critical problem.

CO3: Illustrate the algorithm of sorting, searching and develop programs to solve critical problems.

CO4: Explain and execute the algorithm of non linear data structure.

CO5: Apply the knowledge of hashing algorithm to solve the real life problems.

Module I: **[15H]**

Adding & deleting elements Merging Problem in Circular Queue, Evaluation of expressions operations on multiple stacks & queues, Inserting, deleting, inverting a linked list , Implementation of stacks & queues using linked lists, Polynomial addition, Polynomial multiplication.

Module II: **[15H]**

Multiplication, addition of Sparse Matrices, Recursive and Non Recursive traversal of Trees, Threaded binary tree traversal, AVL tree implementation, Application of Trees. Application of sorting and searching algorithms, Hash tables implementation: searching.

Module III: [15H]

Graphs – BFS, DFS, Trees – Binary search tree, Dijkstra‟s Shortest Path Algorithm, Hash tables implementation: inserting and deleting, Hash tables implementation: searching & sorting techniques.

Text books:

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company.
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Course Code: ESCM393

Course Name: Introduction to Python Programming Lab

Contact: 3P

Credit: 1.5

Allotted Hour: 45L

Course Objective:

The objective of this course is to solve problems using Python programming language with proper syntax and logic.

Pre-requisite(s): Basic knowledge of computer programming language.

Course Outcome: After the completion of the course, students would be able to:

CO1: Analyze the Concept of Python syntax and semantics and apply the knowledge to solve the flow control of Python Programming.

CO2: Apply the concept of strings and functions to solve the python programming.

CO3: Apply the concept of lists, tuples, dictionaries and sets to solve the Python Program.

CO4: Apply and evaluate the commonly used operations involving File systems, Modules and Packages.

CO5: Illustrate OOPs concepts to solve the python program.

Module I: Variable in a Data Type **[3H]**

- A Basic Introduction to Python Installation.
- WRITE A PROGRAM to Reverse the two-digit number.
- WRITE A PROGRAM to write a program two numbers without using third Variables.
- WRITE A PROGRAM in Python to print Palindrome or not.

Module II: Conditional Statements **[3H]**

- WRITE A PROGRAM in Python that will check for the case of a character from the user and write a program accordingly.

- WRITE A PROGRAM in Python to find the maximum between three numbers.
- WRITE A PROGRAM in Python to enter marks in 5 subjects out of 100 Calculate the average marks and provide the grades accordingly.

Module III: Loop **[3H]**

- WRITE A PROGRAM in Python to find the factorial of a number.
- WRITE A PROGRAM in Python to find the GCD of two numbers.
- WRITE A PROGRAM in Python to check whether a given number is a Prime number or a Composite number.
- WRITE A PROGRAM in Python to print Prime Numbers between 1 to 100.

Module IV: Pattern **[3H]**

- Write a program in Python to print the following pattern

```
    1
  2 1 2
3 2 1 2 3
```

- Write a program in Python to print following pattern

```
AAAA
BBB
CC
D
```

- Write a program in Python to print the following pattern

```
    1
  2 2 2
3 3 3 3 3
```

- Write a program in Python to print the following pattern

```
* * * * *
*       *
*       *
*       *
 * * * * *
```

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Module V: String [3H]

- Write a program in Python to reverse a string using a for loop.
- Write a program in Python to remove the vowels from a string.
- Write a program in Python to find the count of a given character.

Module VI: List [3H]

- Write a program in python to remove the duplicate all values from the list
- Write a program in python to find the second max value in the list.
- Write a program in python to create a list of squares of the first 20 numbers.

Module VII: [3H]

- Write a program in python to check whether a matrix is symmetric, skew-symmetric, or not.
- Write a program in python to find the sum of row-wise elements in a matrix.
- Write a program in python in which a list is provided with positive and negative numbers and create a tuple from the list by taking positive numbers only.

Module VIII: Dictionary [3H]

- Enter a string in python and create a dictionary with alphabets as keys and occurrences as values
- Write a program in python to enter names as keys and marks as values for students. print the names according to marks in descending order.
- Write a program in python to make a dictionary with name as key and date of birth as value and encode a menu-driven program for insert, delete, update etc.

Module IX: Function Calling [3H]

- write a program in python to check if the string has all the alphabets “the quick brown fox jumps over the lazy dog”.
- write a program in python to write a function to find the number of lowercase and uppercase characters in string.
- write a program in python to write a function to check if palindrome or not without using string.

Module X: Function Arguments, Local and Global Variable [3H]

- Write a program to show the use of local and global variables and lambda function.
- Write a program in python to perform liner search in a list.
- Write a program in python to perform bubble sort in a list.
- Write a program in python sum of the positive number passing them as arguments.

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Module XI: Exception Handling [3H]

- Write a program in python to find the square root of a number using math.
- Write a program in python to search a value by index is list.
- Write a program in python to print 1+1/2+1/3+…..+1/n.
- Write a program in python to open the text file.

Module XII: File Handling [6H]

- Write a program in python to perform read-write operations on the file.
- Write a program in python to copy the content of one file to another file.
- Write a program in python to count number of lines and words in a file.
- Write a program in python to print frequency of each character in file.

Module XIII: Object Oriented Programming [6H]

- Write a program in python to create a class student with the attribute name, age, and grade. use the constructor to initialize the default value and method print_info() to print the value for three objects.
- Write a program in python to demonstrate inheritance create a class called cse student from class student that has the extra attribute of graduation year. override the function print info to print the details of derived class.
- Write a program in python to demonstrate polymorphism define a function to register objects of both class student and CSE student.

Text books:

1. Python Programming: Using Problem Solving Approach, Reema Thareja , Oxford University Press, 10 June 2017.
2. “Introduction to Python Programming”, Gowrishankar S, Veena A, CRC Press/Taylor & Francis, 1st Edition,2018.

Reference books:

1. “Python Data Science Handbook: Essential Tools for Working with Data”, Jake VanderPlas, O’Reilly Media, 1st Edition, 2016.

2. "Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", Aurelien Geron,O'Reilly Media, 2nd Edition, 2019.
3. "Core Python Applications Programming",Wesley J Chun,Pearson Education India, 3rd Edition, 2015.

BRAINWARE UNIVERSITY
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Course Code: PCC-CSM391

Course Name: Computer Organization & Architecture Lab

Contact: 2P

Credit: 1

Allotted Hour: 30L

Course Objective:

The objective of this course is to learn HDL and apply the logic to design a simple or combinational gate using HDL.

Pre-requisite(s): Fundamental of computers.

Course Outcome: After the completion of the course, students would be able to:

CO1: Define the HDL and apply it to real life problems.

CO2: Apply the knowledge of HDL & its various logic gates to solve critical problems.

CO3: Categorise different types of memory system & register. to solve critical computational and logical problems.

CO4: Compare the concept of data representation & memory system. to solve difficult and complex problems.

CO5: Illustrate the concepts of CPU, ALU and building blocks for its various domains for solving real life problems.

Module I: **[10H]**

HDL introduction: Basic digital logic based programming with HDL, 8-bit Addition, Multiplication, Division.

Module II: **[10H]**

Register & Memory: 8-bit Register design, Memory unit design and perform memory operations.

Module III: **[10H]**

CPU & ALU: 8-bit simple ALU design, 8-bit simple CPU design, Interfacing of CPU and Memory.

Text books:

1. Computer Organization and Design: The Hardware/Software Interface, David A. Patterson and John L. Hennessy, 5th edition, Elsevier.
2. Computer Organization, Carl Hamacher, 6th Edition by, McGraw Hill Higher Education.

Reference books:

1. Computer Organization and Architecture: Designing for Performance ,William Stallings, John Dean, 10th edition, Pearson Education

BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
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Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

Course Name: Constitution of India

Course Code: AUM-3

Contact: 1L

Credit: 0

Allotted Hour: 15L

Course Objective:

The objective of the course is to inculcate the foundational principle of Constitution and examine the different aspects of constitution and constitutionalism in the context of Indian Legal system. Moreover, the aim of the course is to bring out the normative presuppositions of the Indian Constitution as revealed in the Indian Constitution and the ways in which it has been interpreted by the judiciary from time to time and familiarize the students with the concept and working of Indian federalism and the legislative and executive relationship between the center and the states under the Constitution.

Pre-requisite(s): Students are expected to have a general understanding of the Indian Constitution, basic rights and duties of common people.

Course Outcome: After the completion of the course, students would be able to:

CO1: Underline and identify the foundational provisions under Indian Constitution such as preamble, fundamental Rights, Directive Principles of State Policy by acquiring disciplinary knowledge with the help of traditional and modern tools.

CO2: Recognize and demonstrate the distinctiveness of the Constitution of India relating to the powers of the Legislature, Executive and Judiciary separately to enable analytical skills.

CO3: Appraise the core fundamentals in the Constitutional provisions and infer the viable realization of professional ethics, morality and principles of sustainable development for participating in the civic life and attain lifelong learning in all possible manner.

CO4: Relate and estimate different interpretation tools relating to the Indian Constitution through analyzing different case laws in order to develop research based learning and scope of employability in administrative services in India.

Module I: Introduction to Indian Constitution [4H]

Significance of the Constitution, Making of the Constitution, Salient Features, Preamble, Citizenship.

Module II: Fundamental Rights [3H]

Fundamental Rights and its kinds, Right to Constitutional Remedies.

Module III: Directive Principles [3H]

Directive Principles of State Policy, Differences between Fundamental Rights and Directive Principles of State Policy.

Module IV: Union Government [3H]

President, Vice President, Prime Minister and Council of Ministers, Parliament, Organization and Jurisdiction of Supreme Court.

Module V: State Government [2H]

Governor, Chief Minister and Council of Ministers, State Legislature, Organization and Jurisdiction of High Court.

Reference books:

1. An Introduction to the Constitution of India, M.V. Pylee, Vikas Publishing, 1st Edition. 2005.
2. Introduction to the Constitution of India, Durga Das Basu, Lexis Nexis, 21st edition, 2021.
3. Indian Government and Politics, D.C. Gupta, Vikas Publishing, VIII Edition, 1994.
4. Constitutional Development and National Movement in India, V.D.Mahajan, S.Chand and Company, 1st Edition, 2005.
5. The Constitutional Law of India, Dr. J. N. Pandey, Central Law Agency, 57th Edition, 2020
6. Indian Constitutional Law, M P Jain, LexisNexis, 8th Edition.