JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Computer Science & Engineering

II B.TECH.

S.No	Course Code	Course Name	Category	Hours per week			Credits
				L	**T**	**P**	
1.	20A54304	Discrete Mathematics & Graph Theory	BS	3	0	0	3
2.	20A04304T	Digital Electronics& Microprocessors	ES	3	0	0	3
3.	20A05301T	Advanced Data Structures & Algorithms	PC	3	0	0	3
4.	20A05302T	Object Oriented Programming Through Java	PC	3	0	0	3
5.	20A05303	Computer Organization	PC	3	0	0	3
6.	20A04304P	Digital Electronics& Microprocessors Lab	ES	0	0	3	1.5
7.	20A05301P	Advanced Data Structures and Algorithms Lab	PC	0	0	3	1.5
8.	20A05302P	Object Oriented Programming Through Java Lab	PC	0	0	3	1.5
9.	20A05304	**Skill Oriented Course – I** Web application Development	SC	1	0	2	2
10.	20A99201	**Mandatory noncredit course - II** Environmental Science	MC	3	0	0	0
						Total	21.5

The title row "Semester-III" spans above S.No through Credits.

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Note:

1. Eligible and interested students can register either for Honors or for a Minor in IV Semester as per the guidelines issued by the University
2. Students shall register for NCC/NSS/NSO activities and will be required to participate in an activity for two hours in a week during fourth semester.
3. Lateral entry students shall undergo a bridge course in Mathematics during third semester

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Course Code	Discrete Mathematics & Graph theory		L	T	P	C
20A54304	(Common to CSE, IT, CSE(DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)		3	0	0	3
Pre-requisite	Basic Mathematics	Semester	III			

Course Objectives:	
Introduce the concepts of mathematical logic and gain knowledge in sets, relations and functions and Solve problems using counting techniques and combinatorics and to introduce generating functions and recurrence relations. Use Graph Theory for solving real world problems	
Course Outcomes (CO):	
After completion of the course, students will be able to	

ξ   Apply mathematical logic to solve problems.
ξ   Understand the concepts and perform the operations related to sets, relations and functions.
ξ   Gain the conceptual background needed and identify structures of algebraic nature.
ξ   Apply basic counting techniques to solve combinatorial problems.
ξ   Formulate problems and solve recurrence relations.
ξ   Apply Graph Theory in solving computer science problems

UNIT - I	**Mathematical Logic**	8 Hrs
Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.		
UNIT - II	**Set theory**	9 Hrs
Basic Concepts of Set Theory, Relations and Ordering, The Principle of Inclusion-Exclusion, Pigeon hole principle and its application,Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.		
UNIT - III	**Elementary Combinatorics**	8 Hrs
Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.		
UNIT - IV	**Recurrence Relations**	9 Hrs
Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.		
UNIT - V	**Graphs**	9 Hrs

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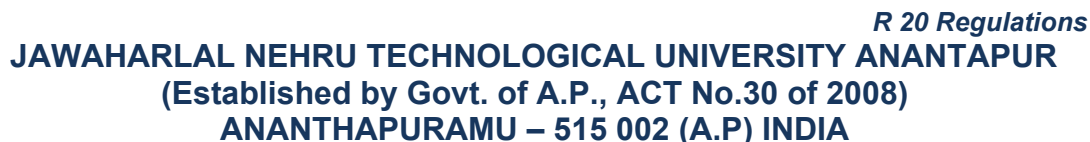| |
|---|
| Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four Color Problem |
| Textbooks: |
| 1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education.
   2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002. |
| Reference Books: |
| 1. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.
   2. Graph Theory with Applications to Engineering and Computer Science byNarsinghDeo. |
| Online Learning Resources: |
| http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf |

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Course Code	DIGITAL ELECTRONICS &	L	T	P	C
20A04304T	**MICROPROCESSORS**	**3**	**0**	**0**	**3**
Pre-requisite	**Basic Electronics**	**Semester**		**III**	

Course Objectives:
- ξ To understand all the concepts of Logic Gates and Boolean Functions.
- ξ To learn about Combinational Logic and Sequential Logic Circuits.
- ξ To design logic circuits using Programmable Logic Devices.
- ξ To understand basics of 8086 Microprocessor and 8051 Microcontroller.
- ξ To understand architecture of 8086 Microprocessor and 8051 Microcontroller.
- ξ To learn Assembly Language Programming of 8086 and 8051.

Course Outcomes (CO):
After Completion of this course, the student will be able to:
- ξ Design any Logic circuit using basic concepts of Boolean Algebra.
- ξ Design any Logic circuit using basic concepts of PLDs.
- ξ Design and develop any application using 8086 Microprocessor.
- ξ Design and develop any application using 8051 Microcontroller.

UNIT - I	Number Systems & Code Conversion

Number Systems & Code conversion, Boolean Algebra & Logic Gates, Truth Tables, Universal Gates, Simplification of Boolean functions, SOP and POS methods – Simplification of Boolean functions using K-maps,Signed and Unsigned Binary Numbers.

UNIT - II	Combinational Circuits

Combinational Logic Circuits: Adders &Subtractors, Multiplexers, Demultiplexers, Encoders, Decoders, Programmable Logic Devices.

UNIT - III	Sequential Circuits

Sequential Logic Circuits: RS, Clocked RS, D, JK, Master Slave JK, T Flip-Flops, Shift Registers, Types of Shift Registers, Counters, Ripple Counter, Synchronous Counters, Asynchronous Counters, Up-Down Counter.

UNIT - IV	Microprocessors - I

8085 microprocessor Review (brief details only), 8086 microprocessor, Functional Diagram, register organization 8086, Flag register of 8086 and its functions, Addressing modes of 8086, Pin diagram of 8086, Minimum mode & Maximum mode operation of 8086, Interrupts in 8086.

UNIT – V	Microprocessors - II

Instruction set of 8086, Assembler directives, Procedures and Macros, Simple programs involving arithmetic, logical, branch instructions, Ascending, Descending and Block move programs, String Manipulation Instructions. Overview of 8051 microcontroller, Architecture, I/O ports and Memory organization, addressing modes and instruction set of 8051(Brief details only), Simple Programs.

Text Books:

1.M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5th Edition, 2013
2. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, John Wiley & Sons, Ltd., 2007.
3. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Microprocessor and Microcontrollers,Oxford Publishers, 2010.
4. Advanced microprocessors and peripherals-A.K Ray and K.M.Bhurchandani, TMH, 2nd edition, 2006.

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Reference Books:
1. Thomas L. Floyd, Digital Fundamentals – A Systems Approach, Pearson, 2013.
2. Charles H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th, Edition, 2004.
3. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition, 2006.
4. Kenneth.J.Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning,2010.
Online Learning Resources:
NPTEL, SWAYAM

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Course Code	Advanced Data Structures & Algorithms		L	T	P	C
20A05301T	**(Common to CSE, IT, CSE(DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)**		**3**	**0**	**0**	**3**
Pre-requisite	**Data Structures**	**Semester**	**III**			

Course Objectives:

ξ   Learn asymptotic notations, and analyze the performance of different algorithms.
ξ   Understand and implement various data structures.
ξ   Learn and implement greedy, divide and conquer, dynamic programming and backtracking algorithms using relevant data structures.
ξ   Understand non-deterministic algorithms, polynomial and non-polynomial problems.

Course Outcomes (CO):

After completion of the course, students will be able to
  ξ   Analyze the complexity of algorithms and apply asymptotic notations.
  ξ   Apply non-linear data structures and their operations.
  ξ   Understand and apply greedy, divide and conquer algorithms.
  ξ   Develop dynamic programming algorithms for various real-time applications.
  ξ   Illustrate Backtracking algorithms for various applications.

UNIT - I	**Introduction to Algorithms**	9 Hrs

Introduction to Algorithms:
Algorithms, Pseudocode for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh, Omega, Theta notation and Little oh notation, Polynomial Vs Exponential Algorithms, Average, Best and Worst Case Complexities, Analysing Recursive Programs.

UNIT - II	**Trees Part-I**	8 Hrs

Trees Part-I
Binary Search Trees: Definition and Operations, AVL Trees: Definition and Operations, Applications.
B Trees: Definition and Operations.

UNIT - III	**Trees Part-II**	8 Hrs

Trees Part-II
Red-Black Trees, Splay Trees, Applications.
Hash Tables: Introduction, Hash Structure, Hash functions, Linear Open Addressing, Chaining and Applications.

UNIT - IV	**Divide and conquer, Greedy method**	9 Hrs

Divide and conquer: General method, applications-Binary search, Finding Maximum and minimum, Quick sort, Merge sort, Strassen's matrix multiplication.
Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT - V	**Dynamic Programming & Backtracking**	9 Hrs

Dynamic Programming: General method, applications- 0/1 knapsack problem, All pairs shortest path problem, Travelling salesperson problem, Reliability design.
Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.
Introduction to NP-Hard and NP-Complete problems: Basic Concepts.

Textbooks:

1. Data Structures and algorithms: Concepts, Techniques and Applications, G A V Pai.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia publications Pvt. Ltd.

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Reference Books:
1. Classic Data Structures by D. Samanta, 2005, PHI
2. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
3. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG.
Online Learning Resources:
https://www.tutorialspoint.com/advanced_data_structures/index.asp http://peterindia.net/Algorithms.html

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Course Code	Object Oriented Programming Through Java		L	T	P	C
20A05302T	(Common to CSE, IT, CSE (AI), CSE (AI & ML) and AI& DS)		3	0	0	3
Pre-requisite	Fundamental Programming	Semester		III		

Course Objectives:
- ξ To understand object oriented concepts and problem solving techniques
- ξ To obtain knowledge about the principles of inheritance and polymorphism
- ξ To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- ξ To design the GUIs using applets and swing controls.
- ξ To understand the Java Database Connectivity Architecture

Course Outcomes (CO):

After completion of the course, students will be able to
- ξ Solve real-world problems using OOP techniques.
- ξ Apply code reusability through inheritance, packages and interfaces
- ξ Solve problems using java collection framework and I/O classes.
- ξ Develop applications by using parallel streams for better performance.
- ξ Develop applets for web applications.
- ξ Build GUIs and handle events generated by user interactions.
- ξ Use the JDBC API to access the database

UNIT - I	**Introduction**	8Hrs

Introduction: Introduction to Object Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

UNIT - II	**Inheritance, Packages, Interfaces**	9Hrs

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class,
Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.
Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

UNIT - III	**Exception handling, Stream based I/O** (java.io)	9Hrs

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception subclasses.
Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and Writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.

UNIT - IV	**Multithreading, The Collections Framework** (java.util)	8Hrs

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.
The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collectionclasses- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

UNIT - V	**Applet, GUI Programming with Swings, Accessing Databases with JDBC**	8Hrs

Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets
GUI Programming with Swings – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons,

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jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar, jmenu and jmenuitem, creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, create a modeless dialog.

Accessing Databases with JDBC:
Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

Textbooks:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
2. Core Java Volume – 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for core and advanced learners, Sagayaraj, Dennis, Karthik andGajalakshmi, University Press
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, University Press.
6. Programming in Java, S. Malhotra, S. Chaudhary, 2nd edition, Oxford Univ. Press.
7. Java Programming and Object-oriented Application Development, R.A. Johnson, Cengage Learning.

Online Learning Resources:

https://www.w3schools.com/java/java_oop.asp
http://peterindia.net/JavaFiles.html

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Course Code	Computer Organization	L	T	P	C
20A05303	(Common to CSE, IT, CSE(DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)	3	0	0	3
Pre-requisite	Digital Electronics	Semester		III	

Course Objectives:
- ξ To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- ξ To understand the structure and behavior of various functional modules of a computer.
- ξ To learn the techniques that computers use to communicate with I/O devices
- ξ To acquire the concept of pipelining and exploitation of processing speed.
- ξ To learn the basic characteristics of multiprocessors

Course Outcomes (CO):

After completion of the course, students will be able to
- ξ Understand computer architecture concepts related to the design of modern processors, memories and I/Os
- ξ Identify the hardware requirements for cache memory and virtual memory
- ξ Design algorithms to exploit pipelining and multiprocessors
- ξ Understand the importance and trade-offs of different types of memories.
- ξ Identify pipeline hazards and possible solutions to those hazards

UNIT - I	Basic Structure of Computer, Machine Instructions and Programs	8Hrs

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.
Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

UNIT - II	Arithmetic, Basic Processing Unit	9Hrs

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.
Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, and Multi programmed Control.

UNIT - III	The Memory System	8Hrs

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

UNIT - IV	Input/Output Organization	8Hrs

Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

UNIT - V	Pipelining, Large Computer Systems	9 Hrs

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.
Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General-Purpose multiprocessors, Interconnection Networks.

Textbooks:

Computer Science & Engineering

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.

Reference Books:
1. M.Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Education.
2. Themes and Variations, Alan Clements, "Computer Organization and Architecture", CENGAGE Learning.
3. SmrutiRanjanSarangi, "Computer Organization and Architecture", McGraw Hill Education.
4. John P.Hayes, "Computer Architecture and Organization", McGraw Hill Education

Online Learning Resources:
https://nptel.ac.in/courses/106/103/106103068/

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Course Code	DIGITAL ELECTRONICS &		L	T	P	C
20a04304P	**MICROPROCESSORS LAB**		**0**	**0**	**3**	**1.5**
Pre-requisite		**Semester**		**III**		

Basic Electronics Engineering,
Course Objectives:

ξ   To understand all the concepts of Logic Gates and Boolean Functions.
ξ   To learn about Combinational Logic and Sequential Logic Circuits.
ξ   To design logic circuits using Programmable Logic Devices.
ξ   To understand basics of 8086 Microprocessor and 8051 Microcontroller.
ξ   To understand architecture of 8086 Microprocessor and 8051 Microcontroller.
ξ   To learn Assembly Language Programming of 8086 and 8051.

Course Outcomes (CO):

After Completion of this course, the student will be able to:

ξ   Design any Logic circuit using basic concepts of Boolean Algebra.
ξ   Design any Logic circuit using basic concepts of PLDs.
ξ   Design and develop any application using 8086 Microprocessor.
ξ   Design and develop any application using 8051 Microcontroller.

List of Experiments:

Note: Minimum of 12 (6+6) experiments shall be conducted from both the sections given below:

DIGITAL ELECTRONICS:

1. Verification of Truth Table for AND, OR, NOT, NAND, NOR and EX-OR gates.
2. Realisation of NOT, AND, OR, EX-OR gates with only NAND and only NOR gates.
3. Karnaughmap Reduction and Logic Circuit Implementation.
4. Verification of DeMorgan's Laws.
5. Implementation of Half-Adder and Half-Subtractor.
6. Implementation of Full-Adder and Full-Subtractor.
7. Four Bit Binary Adder
8. Four Bit Binary Subtractor using 1's and 2's Complement.

MICROPROCESSORS (8086 Assembly Language Programming)

1. 8 Bit Addition and Subtraction.
2. 16 Bit Addition.
3. BCD Addition .
4. BCD Subtraction.
5. 8 Bit Multiplication.
6. 8 Bit Division.
7. Searching for an Element in an Array.
8. Sorting in Ascending and Descending Orders.
9. Finding Largest and Smallest Elements from an Array.
10. Block Move

Text Books:

1.M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5^h Edition, 2013.

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2. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, John Wiley & Sons, Ltd., 2007.
3. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Microprocessor and Microcontrollers,Oxford Publishers, 2010.
4. Advanced microprocessors and peripherals-A.K ray and K.M.Bhurchandani, TMH, 2nd edition, 2006.

Reference Books:

1. Thomas L. Floyd, Digital Fundamentals – A Systems Approach, Pearson, 2013.
2. Charles H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th, Edition, 2004.
3. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition, 2006.
4. Kenneth. J. Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning, 2010.

Online Learning Resources/Virtual Labs:

https://www.vlab.co.in/

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Course Code	Advanced Data Structures and Algorithms Lab		L	T	P	C
20A05301P	**(Common to CSE, IT, CSE(DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)**		**0**	**0**	**3**	**1.5**
Pre-requisite	**Basics of Data Structures**	**Semester**	**III**			

Course Objectives:

ξ   Learn data structures for various applications.
    ξ   Implement different operations of data structures by optimizing the performance.
    ξ   Develop applications using Greedy, Divide and Conquer, dynamic programming.
    ξ   Implement applications for backtracking algorithms using relevant data structures.

Course Outcomes (CO):

After completion of the course, students will be able to
    ξ   Understand and apply data structure operations.
    ξ   Understand and apply non-linear data structure operations.
    ξ   Apply Greedy, divide and conquer algorithms.
    ξ   Develop dynamic programming algorithms for various real-time applications.
    ξ   Illustrate and apply backtracking algorithms, further able to understand non-   deterministic algorithms.

List of Experiments:
1.   Write a program to implement the following operations on Binary Search Tree: a) Insert   b) Delete   c) Search   d) Display 2.   Write a program to perform a Binary Search for a given set of integer values. 3.   Write a program to implement Splay trees. 4.   Write a program to implement Merge sort for the given list of integer values. 5.   Write a program to implement Quicksort for the given list of integer values. 6.   Write a program to find the solution for the knapsack problem using the greedy method. 7.   Write a program to find minimum cost spanning tree using Prim's algorithm 8.   Write a program to find minimum cost spanning tree using Kruskal's algorithm 9.   Write a program to find a single source shortest path for a given graph. 10.   Write a program to find the solution for job sequencing with deadlines problems. 11.   Write a program to find the solution for a 0-1 knapsack problem using dynamic programming. 12.   Write a program to solve Sum of subsets problem for a given set of distinct numbers using backtracking. 13.   Implement N Queen's problem using Back Tracking.
References:
1. Y Daniel Liang, "Introduction to Programming using Python", Pearson. 2. Benjamin Baka, David Julian, "Python Data Structures and Algorithms", Packt Publishers,2017. 3. Rance D. Necaise, "Data Structures and Algorithms using Python", Wiley Student Edition.
Online Learning Resources/Virtual Labs:
http://cse01-iiith.vlabs.ac.in/ http://peterindia.net/Algorithms.html

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Course Code	Object Oriented Programming Through Java Lab (Common to CSE, IT, CSE (AI), CSE (AI & ML) and AI& DS)		L	T	P	C
20A05302P			**0**	**0**	**3**	**1.5**
Pre-requisite	**Fundamental Programming**	**Semester**		**III**		

Course Objectives:
- ξ   To introduce the concepts of Java.
- ξ   To Practice object-oriented programs and build java applications.
- ξ   To implement java programs for establishing interfaces.
- ξ   To implement sample programs for developing reusable software components.
- ξ   To establish database connectivity in java and implement GUI applications.

Course Outcomes (CO):

After completion of the course, students will be able to
- ξ   Recognize the Java programming environment.
- ξ   Develop efficient programs using multithreading.
- ξ   Design reliable programs using Java exception handling features.
- ξ   Extend the programming functionality supported by Java.
- ξ   Select appropriate programming constructs to solve a problem.

List of Experiments:

Week-1
a. Installation of Java software, study of any Integrated development environment, Use Eclipse or Netbeans platform and acquaint with the various menus. Create a test project, add a test class and run it.
   See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.
b. Write a Java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.
c. Develop a Java application to generate Electricity bills. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Commute the bill amount using the following tariff.
 If the type of the EB connection is domestic, calculate the amount to be paid as follows:
- ξ   First 100 units - Rs. 1 per unit
- ξ   101-200 units   - Rs. 2.50 per unit
- ξ   201 -500 units - Rs. 4   per unit
- ξ   > 501 units   - Rs. 6 per unit
 If the type of the EB connection is commercial, calculate the amount to be paid as follows:
- ξ   First 100 units - Rs. 2 per unit
- ξ   101-200 units   - Rs. 4.50 per unit
- ξ   201 -500 units - Rs. 6 per unit
- ξ   > 501 units   - Rs. 7 per unit
d. Write a Java program to multiply two given matrices.

Week-2
a. Write Java program on use of inheritance, preventing inheritance using final, abstract classes.
b. Write Java program on dynamic binding, differentiating method overloading and overriding.
c. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen) using
   Interfaces.

Week-3
 a. Write Java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read, display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.

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b. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

c. Write a Java program to read the time intervals (HH:MM) and to compare system time if the system Time between your time intervals print correct time and exit else try again to repute the same thing.   By using StringToknizer class.

Week-4

a. Write a Java program to implement user defined exception handling.

b. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.

Week-5

a. Write a Java program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

b. Write a Java program that creates three threads. First thread displays ―Good Morning‖ every one second, the second thread displays ―Hello‖ every two seconds and the third thread displays ―Welcome‖ every three seconds.

Week-6

a. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part where n is the sequence number of the part file.

b. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

Week-7

a. Write a java program that displays the number of characters, lines and words in a text file.

b. Write a java program that reads a file and displays the file on the screen with line number before each line.

Week-8

a. Write a Java program that correctly implements the producer-consumer problem using the concept of inter thread communication.

b. Develop a Java application for stack operation using Buttons and JOptionPane input and Message dialog box.

c. Develop a Java application to perform Addition, Division, Multiplication and subtraction using the JOptionPane dialog Box and Textfields.

Week-9

a. Develop a Java application for the blinking eyes and mouth should open while blinking.

b. Develop a Java application that simulates a traffic light. The program lets the user select one of the three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with ―STOP‖ or ―READY‖ or ‖GO‖ should appear above the buttons in the selected color. Initially, there is no message shown.

Week-10

a. Develop a Java application to implement the opening of a door while opening man should present before hut and closing man should disappear.

b. Develop a Java application by using JtextField to read decimal values and converting a decimal number into a binary number then print the binary value in another JtextField.

Week-11

a. Develop a Java application that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.

b. Develop a Java application to demonstrate the key event handlers.

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Week-12

a. Develop a Java application to find the maximum value from the given type of elements using a generic function.

b. Develop a Java application that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.

c . Develop a Java application for handling mouse events.

Week-13

a. Develop a Java application to establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using java and display the information of the students at front end.

References:

1. P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.

2. P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007

3. Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.

4. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010.

Online Learning Resources/Virtual Labs:

https://java-iitd.vlabs.ac.in/

http://peterindia.net/JavaFiles.html

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Course Code	Web Application Development	L	T	P	C
20A05304	**(Common to CSE, CSE (AI), CSE (AI & ML) and AI& DS)**	**1**	**0**	**2**	**2**
Pre-requisite		**Semester**		**III**	

Course Objectives:	

  ξ Learn website development using HTML, CSS, JavaScript.
  ξ Understand the concepts of responsive web development using the bootstrap framework
  ξ Make use of the JQueryjavascript library to provide interactiveness to the websites.
  ξ Discover how to use Google Charts to provide a better way to visualize data on a website
  ξ 5. Learn Content Management Systems to speed the development process

Course Outcomes (CO):

After completion of the course, students will be able to
  ξ Construct web sites with valid HTML, CSS, JavaScript
  ξ Create responsive Web designs that work on phones, tablets, or traditional laptops and wide-screen monitors.
  ξ Develop websites using jQuery to provide interactivity and engaging user experiences
  ξ Embed Google chart tools in a website for better visualization of data.
  ξ Design and develop web applications using Content Management Systems like WordPress

Activities:

Module - 1:
HTML: What is a browser?, What is HTML?, Elements and Tags, Basic HTML5 structure, Metadata, <title>, Adding favicon, Comments, headings
Task: Create a Basic HTML document

Module - 2:
HTML (continued): Block-Level Elements & Inline Elements, Links (Understand Absolute vs Relative paths), Lists, Images, iframe (embed youtube video)
Task: Create your Profile Page

Module - 3:
HTML (continued): Tables: <table>, <tr>, <th>, <td>, Attributes for each Table element
Task: Create a Class Timetable (to merge rows/columns, use rowspan/colspan)

Module - 4:
HTML (continued): Form Elements: <input>, <select>, <textarea>, <button>, Attributes for each Form element
Task: Create a Student Hostel Application Form

Module - 5:
Cascading Style Sheets (CSS): CSS Properties, Types of CSS, Selectors, box model, Pseudo-elements, z-index
Task: Make the Hostel Application Form designed in Module -4 beautiful using CSS (add colors, backgrounds, change font properties, borders, etc.)

Module - 6:
Bootstrap - CSS Framework: Layouts (Containers, Grid system), Forms, Other Components
Task: Style the Hostel Application Form designed in Module-5still more beautiful using Bootstrap CSS (Re-size browser and check how the webpage displays in mobile resolution)

Module - 7:
HTTP & Browser Developer Tools: Understand HTTP Headers (Request & Response Headers), URL & its Anatomy, Developer Tools: Elements/Inspector, Console, Network, Sources, performance, Application Storage.

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Task:Analyse various HTTP requests (initiators, timing diagrams, responses) and identify problems if any.

Module - 8:
Javascript: Variables, Data Types, Operators, Statements, Objects, Functions, Events & Event Listeners, DOM.
Task: Design a simple calculator using JavaScript to perform sum, product, difference, and quotient operations:

Module - 9:
Dynamic HTML with JavaScript: Manipulate DOM, Error Handling, Promises, async/await, Modules.
Task:Design& develop a Shopping Cart Application with features including Add Products, Update Quantity, Display Price(Sub-Total & Total), Remove items/products from the cart.

Module - 10:
JQuery - A Javascript Library: Interactions, Widgets, Effects, Utilities, Ajax using JQuery.
Task: Validate all Fields and Submit the Hostel Application Form designed in Module-6 using JQuery

Module - 11:
Google Charts: Understand the Usage of Pie chart, Bar Chart, Histogram, Area & Line Charts, Gantt Charts.
Task: Develop an HTML document to illustrate each chart with real-time examples.

Module - 12:
Open Source CMS (Content Management System): What is a CMS?, Install CMS, Themes, Plugins.
Task: Develop an E-learning website using any CMS(for example WordPress)

References:

1. Deitel and Deitel and Nieto, ―Internet and World Wide Web - How to Program‖, Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education.,1st edition, 10th impression, 2015.
3. Stephen Wynkoop and John Burke ―Running a Perfect Website‖, QUE, 2nd Edition,1999.
4. Jeffrey C and Jackson, ―Web Technologies A Computer Science PerspectivePearsonEducation, 2011.
5. Gopalan N.P. and Akilandeswari J., ―Web Technology, Prentice Hall of India, 2011.

Online Learning Resources/Virtual Labs:

a. HTML: https://html.spec.whatwg.org/multipage/
b. HTML: https://developer.mozilla.org/en-US/docs/Glossary/HTML5
c. CSS: https://www.w3.org/Style/CSS/
d. Bootstrap - CSS Framework: https://getbootstrap.com/
e. Browser Developer Tools: https://developer.mozilla.org/en-US/docs/Learn/Common_questions/What_are_browser_developer_tools
f. Javascript: https://developer.mozilla.org/en-US/docs/Web/JavaScript
g. JQuery: https://jquery.com
h. Google Charts: https://developers.google.com/chart
i. Wordpress: https://wordpress.com

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Course Code	ENVIRONMENTAL SCIENCE		L	T	P	C
	(Common to All Branches of Engineering)					
20A99201			3	0	0	0
Pre-requisite	NIL	Semester	III			

Course Objectives:

ξ To make the students to get awareness on environment
ξ To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
ξ To save earth from the inventions by the engineers.

Course Outcomes (CO):

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

ξ Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
ξ Understand flow and bio-geo- chemical cycles and ecological pyramids.
ξ Understand various causes of pollution and solid waste management and related preventive measures.
ξ About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
ξ Casus of population explosion, value education and welfare programmes.

UNIT - I		8 Hrs

Multidisciplinary Nature Of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT - II		12 Hrs

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

   a. Forest ecosystem.
   b. Grassland ecosystem
   c. Desert ecosystem
   d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - III		8 Hrs

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Environmental Pollution: Definition, Cause, effects and control measures of :
- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid Waste Management: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT - IV		10 Hrs

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT - V		8 Hrs

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Textbooks:

1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.AzeemUnnisa, "Environmental Studies" Academic Publishing Company
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.