Course Description

3rd Semester:

Title: Techniques for Decision Making **Code**: **18B11HS312**
L-T-P scheme: 2-1-0 **Credit: 3**

Prerequisite: None

Objectives:

1. To use basic techniques of inferential data analysis, quality control, and regression modeling;
2. To analyze a set of data, to reach a conclusion based on these analyses, and to make and defend a recommended course of action;
3. To be well-equipped to take courses in Marketing, Investments, Accounting, Finance, and Operations Management that require proficiency in statistical methods.

Learning Outcomes:

Course Outcome	Description
CO1	Outline various concepts of techniques for decision making with respect to the needs of modern business management.
CO2	Describe the real world problems using basic techniques of descriptive and inferential data analysis and business forecasting.
CO3	Identify and use various index numbers used in business decision making.
CO4	Apply decision making techniques to reach a conclusion based on the data analysis, and to make and defend a recommended course of action.
CO5	Deployment and proficiency in statistical methods.
CO6	Develop the understanding to analyze a set of data using correlation analysis and regression analysis.

Course Content:

Unit-1: Collection of data and Presentation of data: Classification of data, Secondary data, Primary data, Designing of questionnaire, Unstructured and structured questionnaire, Tabulation of data, Charting of data.

Unit-2: Business Forecasting: Introduction, steps in forecasting, good forecasting, Time series forecasting, secular trend, seasonal variations, cyclical variations.

Unit-3: Index numbers: Uses, classification, problems, Methods of constructing index numbers, unweighted index numbers, Consumer Price index numbers.

Unit-4: Statistical Decision making : Decision making under certainity, Risk , uncertainty and conflict, Zero sum game, Prisoner's dilemma , Payoff Table, Maximin and minimax strategy.

Unit-5: Correlation Analysis and Regression analysis: Significance of the study of correlation, Correlation and causation, Karl Pearson's coefficient of correlation, Rank correlation, Method of least squares, Difference between correlation and regression,

Regression lines and regression equation, Regression equation of Y on X and regression equation of X on Y.

Teaching Methodology:

The course "Techniques for Decision Making" is introduced to explain the basic concepts in statistics that have wide applicability in business decision making. As such, the focus will be more practical than theoretical. Because statistical analysis informs the judgment of the ultimate decision-maker—rather than replaces it—we will cover some key conceptual underpinnings of statistical analysis to insure that the students understand its proper usage. Statistics is about improved decision-making, which can be achieved through a thorough understanding of the data. We want to leave our pre-conceived notions at the door, and let the data tell us what is going on in a situation. The analytical techniques should provide valuable information to decision-makers. As such, it plays an important role in management decision processes. The course will be taught with the aid of lectures, tutorials, handouts, case studies, and problem-based learning.

Evaluation Scheme:

Exams	Marks	Coverage
Test-1	15 Marks	Based on Unit-1 & Unit-2
Test-2	25 Marks	Based on Unit-3 & Unit-4 and around 30% from coverage of Test-1
Test-3	35 Marks	Based on Unit-5 and around 30% from coverage of Test-2
Assignment	10 Marks	
Tutorials	5 Marks	
Quiz	5 Marks	
Attendance	5 Marks	
Total	100 Marks	

Learning Resources:

Lectures, tutorials and e-books on Techniques for Decision Making (will be added from time to time): Digital copy will be available on the JUET server.

Text Book:

1. "Business Statistics"; S.P. Gupta & M.P. Gupta, S. Chand Publishing, New Delhi, 2013.

Reference Books/Material:

1. "Statistics for Business & Economics"; Anderson, Thomson Learning, Bombay.
2. "Quantitative Methods in Business"; Anderson, Thomson Learning, Bombay.
3. "Business Statistics"; R.S. Bhardwaj, Excel Books.
4. "Statistics for Management"; Levin & Rubin, Prentice Hall of India, New Delhi.
5. "Two Person Game Theory"; A. Rapport & Anne Arbric, The University of Michigan Press, 1966.

Title of Course: Data Structures **Course Code: 18B11CI311**
L-T-P Scheme: 3-1-0 **Credits: 4**

Scope and Objectives:

This course develop problem solving ability using programming, develop ability to express solutions to problems clearly and precisely, develop ability to design and analyze algorithms, introduce with fundamental data structures, develop ability to design and evaluate abstract data types and data structures.

Learning Outcome:

The students shall acquire the generic skills to design and implement data structures and related algorithms for a broad-based set of computing problems**.**

18B11CI311: Data Structures	
Course Outcome	**Description**
CO1	List various types of data structures with respect to their requirements in different fields.
CO2	Describe the various methods to evaluate the algorithms.
CO3	Develop algorithms based on linear data structures
CO4	Identify the suitability of the data structures as per the requirements.
CO5	Apply data structures to solve the software design problems.
CO6	Demonstrate the learning on the course to solve the real life programming problems.

This course is intended to provide a thorough introduction to the use of data structures in programming. This course will cover the necessary mathematical background, but will assume the required programming experience.

Course Contents:

UNIT 1: Introduction to Data Structures, Algorithm and Complexity

Data structure overview, need of data structure and how to select relevant data structure for given problem, basic C data types and ADT.

Algorithm overview and its properties, problem analysis and construction of algorithm, difference between algorithm, program and software, algorithm analysis and complexity, asymptotic notations to represent the time complexity, Software Development Life Cycle (SDLC) phase

UNIT 2: Array

Overview, memory representation of 1D and 2D array, sparse matrix, operation supported by an array

Part 1: Searching

Linear search with illustration, analysis of linear search, binary search (iterative) and its analysis, binary search (recursive) and its analysis using recurrence relation, recurrence relation

Part 2: Sorting

Types of sorting algorithms, bubble sort, selection sort, insertion sort, quick sort, merge sort

UNIT 3: Linked List

Overview, types of linked list, linear linked list – overview, traversing, insertion, deletion, searching and reverse, doubly linked list – overview, traversing, insertion, deletion, circular linked list – overview, header linked list, applications of linked list

UNIT 4: Stack
Overview, stack implementation using stack and linked list, basic operations on stack using array and linked list – push, pop, dispose applications of stack – evaluation of mathematical expression, conversion of expression from one form to another (Polish Notation), Tower of Hanoi problem

UNIT 5: Queue
Overview, basic operations on queue – enqueue, dequeue, implementation of queue using array and linked list, types of queue - linear queue, circular queue, deque, priority queue, applications

UNIT 6: Tree
Tree definition and its terminology, representation of graph using array and linked list, tree traversals – preorder, inorder and postorder, binary search tree (BST) with insertion, deletion and searching operations, extended binary tree and its application in Huffman tree, threaded binary tree

UNIT 7: Graph
Introduction to graph, types of graph, traversal algorithms in graph – breadth first search, depth first search, spanning tree, minimum cost spanning tree - Kruskal's, Prim's.

Evaluation Scheme:

Component & Nature	Duration	Marks / Weightage
T1	1 hr	15
T2	1&1/2 hrs	25
T3	2hrs	35
Tutorials		05
Attendance		05
Quiz		05
Assignments		10
Total		**100**

Text Book::
T1: Sartaj Sahni, "Fundamentals of Data Structures", Tata Mc Graw Hill, New York
T2: Seymour Lipschutz., "Data Structures with C", Schaum's Outline Series
T3: Narasimha Karumanchi, "Data Structures and Algorithms" Made Easy

Reference Books:
R1: Corman et al: Introduction to Computer Algorithms
R2: Langsam, Augestein, Tenenbaum: Data Structures using C and C++
R3: Weiss: Data Structures and Algorithm Analysis in C/C++
R4: Samir K. Bandyopadhyay," Data Structures using C"
R5: Hopcraft, Ullman: Data Structures and Algorithms

Title of Course: Digital Systems and Microprocessor **Course Code: 18B11EC311**

L-T-P Scheme: 3-1-0 **Credits:4**

Course Objective:

Digital Systems and Microprocessor Course is the Second year's course which is totally based on study and designing Digital components, digital circuits using basic components, types of signals on which these devices works and at last the study of the Microprocessor basics in a single course. This course aims to introduce students with a fundamental understanding of digital electronics and its application, Produce digital circuit, how signals are formed and further applications of microprocessor with all conditions.These undergraduate students will be equipped to play valuable roles in the Information Technology,Electronics and Communication industries.

Learning Outcomes:

Digital Systems and Microprocessor	
Course Outcome	**Description**
CO1	Outline various number systems of Digital Electronics with respect to the requirements of the computer systems used in technical industries fulfilling the user requirement.
CO2	Solving various problems based on the number systems, complements techniques, compute simple arithmetic operations addition, subtraction, multiplication & division including ability to prove implication problems using truth table method, Boolean method etc. considering the real world examples.
CO3	Design Karnaugh map and Quine McCluskey method to get simplified form of a Boolean function.
CO4	Design combinational and sequential digital functions.
CO5	Understanding the various types of signals used for the various explained devices and getting knowledge of trans-receiving the signals using explained devices.
CO6	Introduction of Microprocessor with its interfaces and basic coding understanding utilized in it. Understand the features and architecture of 16 bit Microprocessor.
CO7	Understand the data types and addressing modes of 8086 Microprocessor. Demonstrate deployment and basic maintenance skills.

Teaching Methodology:

Lectures would be interactive and it would cover the core concepts that are explained in the text and reference materials with adequate examples. Tutorials will have conceptual and numerical questions that would aid in strengthening the Digital electronics, signals and Microprocessors principles.Keeping in view the student's background, starting from number system to Basic pulse circuits design, the student will cover the study of basic signal types and application of microprocessors. In this course a student will learn about various digital components and designing digital circuits and moreover he will study about the various

sequential and combinational circuits using basic gates and K-Map designing using the same gates. After this he will be taught combinational and sequential circuits which will make him proficient in designing any digital circuit. After this the basic knowledge of types of signals will be taught which will make them to learn how to implement these digital circuits over different types of signals and at last they will be taught about the Microprocessor basics which will guide them how Microprocessor world is more emphasizing on basics of Digital Electronics. And at the end of the course, successful students should have knowledge of and ability to apply the Mathematics and scientific concepts required by Digital Electronic engineers, basic level of knowledge of and ability to apply the concepts, principles and theories of Computing and IT, as likely to be required by a Digital Electronic engineer, detailed knowledge of and ability to apply the essential facts, concepts, principles and theories needed by Digital Electronic engineers.

Course Outline:

Unit I:
Conversion of bases, Representation of negative numbers, 9's and 1's complement, 10's and 2's complement, Binary arithmetic, BCD code, Excess-3 code, Gray Code and Alphanumeric code. Logic gates and Boolean algebra, Standard and canonical representation and minimization of Boolean expressions using Karnaugh Map and Quine – McClausky methods.

Unit II:
Half & full adder and subtractor, Parallel adder, BCD adders, Lookahead carry generator. Decoders, Encoders, Multiplexers and De-multiplexers, Code convertor, Comparator, Parity generator and Checker. Binary multiplier.

Unit III:
Flip Flops: SR, JK, Master slave JK, T and D. Shift Registers and their Applications. Synchronous and Asynchronous counters, ROM, PROM, EPROM, EEPROM.

Unit IV:
Basics of Signals and Systems, Elements of a communication system, Continuous-time and discrete-time signals, signal energy and power, Periodic signals, even-odd signals, Exponential and Sinusoidal Signals.

Unit V:
Evolution of Microprocessor, Cache Memory, 8085 Architecture and its pin descriptions.

Evaluation Scheme:

Exams	**Marks**	**Coverage**
Test-1	15 Marks	Based on Unit-1, Unit-2 (30%)
Test-2	25 Marks	Based on Unit-2 (70%), Unit-3 and around 30% from coverage of Test-1
Test-3	35 Marks	Based on Unit-4 & Unit-5 and around 30% from coverage of Test-2
Assignment	10 Marks	
Tutorials	5 Marks	
Quiz	5 Marks	
Attendance	5 Marks	
Total	**100 Marks**	

Learning Resources:

Tutorials and lecture slides on Web Development (will be added from time to time): Digital copy will be available on the JUET server.

Text Books :

1. Morris Mano, Digital Logic and Computer Design, PHI
2. Taub and Schilling, Digital Integrated Electronics, McGraw Hill, Int. Ed.
3. Signal and Systems, 2nd Edition, PHI Publications, India 1997 by Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab.
4. Fundamentals of Microprocessors and Microcontrollers, 7th edition, Dhanpat Rai Publication, India, 2010 by B. Ram.
5. Introduction to Microprocessors, Wiley Eastern (Latest Edition) R.S. Gaonkar.

Web References:

1. https://nptel.ac.in/courses/117106086/
2. http://web.iitd.ac.in/~shouri/eel201/lectures.php
3. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials
4. https://www.electrical4u.com/digital-electronics

Journals References:

1. IEEE Transactions on Circuits and Systems
2. International Journal of Electronics by Taylor and Francis
3. AEÜ - International Journal of Electronics and Communications by Elsevier

Title of Course: Database Systems **Course Code: 18B11CI312**
L-T-P Scheme: 3-0-0 **Course Credits: 3**

Objectives: To develop the ability to design, implement and manipulate databases as well as to build Database management systems

Learning Outcome:

1. Ability to build normalized data bases.
2. Ability to design systems by using ER Modeling.
3. Ability to develop skills of writing applications by using SQL.
4. Ability to understand query optimization techniques.
5. Understanding of transaction processing.
6. Ability to handle recovery and concurrency issues

Course Contents:

Introduction to Databases, Database Environment, Relational Model, Relational Algebra, SQL: Data Manipulation, Data Definition, And Commercial RDMS: MS-Access/MySQL, PL/SQL,

18B11CI312: Database Systems	
Course Outcome	**Description**
CO1	Introduction various types of database systems with respect to their features and charterstics and requirements in different fields.
CO2	Describe the various data definition, manipulation and various modifiers queries for database design.
CO3	Develop algorithms based on linear data structures
CO4	Develop the database using relational database query, Identify the suitable of the data structures as per the requirements.
CO5	Develop the normalized database with features of transaction, concurrency and recovery control
CO6	Demonstrate the learning on the course to deployed the database systems basis of the real life database problems.

ER Modeling: Entity type, Attributes, Relation types, Notations, Extended ER Features, Normalisation and building normalized databases & Data Dependencies, Case Study, Database Connectivity: Python MySQL Connectivity, Transactions, Concurrency, Recovery & Security, Query Processing & Optimization.

Text Book

1. "Database system concepts", Henry F Korth, Abraham Silberschatz, S. Sudurshan, McGraw-Hill, 4th Edition.

References

1. "An Introduction to Database Systems" Bipin. C. Desai. Revised Edition 2006.
2. "Fundamentals of Database Systems", Elmasri, Navathe, Pearson Education, IVth Edition.
3. "An Introduction to Database Systems", C. J. Date, Pearson Education.
4. "Introduction to Data Base Management", Naveen Prakash, Tata McGraw Hill.
5. "Database Management Systems" , Ramakrishna, Gehrke; McGraw-Hill.
6. "Database Systems: A Practical Approach to design, Implementation and Management", Thomas Connolly, Carolyn Begg; Third Edition, Pearson Education.

7. “A first course in Database Systems”, Jeffrey D. Ullman, Jennifer Windon, Pearson Education
8. “Data Management: databases and organization”, Richard T. Watson, Wiley Publication.
9. “Data Modeling Essentials”, Graeme C. Simxion, Dreamtech Publications.
10. MS-ACCESS Projects “Oracle 8i manuals”.

Title: Environmental Science **Code: 18B19GE399**

L-T-P Scheme: 2-0-0 **Credit: 2**

Prerequisite: The students must be aware of basic Environmental Science upto class 12^{th}. Basic knowledge of Environmental Science helps them to correlate in various division of Engineering during this course.

Objective:

The purpose behind this course is to make the students familiar with Environment (surrounding) and to understand the significance/importance of natural resource, biodiversity, environment pollution and impact of intervention of human being in the Ecosystem. This course is mandatory for all branches of the Engineering and Sciences.

Course Learning Outcomes:

Course Outcome	Description
CO1	The outline, outcomes and attributes provide students with learning experiences that help in learning the significance and importance of environment in their life.
CO2	Describe the real world problems, challenges with the suitable case study based on conservation (natural resource and biodiversity), ecosystem, socio-economic development and remedial measure of the various pollutions (air, water, soil, noise and radiation).
CO3	Develop in students the ability to apply the knowledge and skills they have acquired to the solution of specific theoretical and applied problems in their surrounding (the Environment).
CO4	Identify and use of various techniques for solving the Environmental Problems.
CO5	Apply filed visit and justification by using various analytical techniques.
CO6	Demonstrate students with the knowledge and skill base that would enable them to undertake further studies in the Environmental Science and related multidisciplinary areas that involve Environmental Science and help to develop a range of generic skills that are relevant to wage employment, self-employment and entrepreneurship.

Modules	Description	No. of lectures
Unit 1:	Introduction to Environmental Science: Multidisciplinary nature of environmental science; components of environment –atmosphere,	2

	hydrosphere, lithosphere and biosphere. Scope and importance; Concept of sustainability and sustainable development.	
Unit 2:	Ecosystems: What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	4
Unit 3:	Natural Resources: Renewable and Non-renewable Resources • Land Resources and land use change; Land degradation, soil erosion and desertification. • Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. • Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). • Heating of earth and circulation of air; air mass formation and precipitation. • Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.	5
Unit 4:	Biodiversity and its conservation: Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots. • India as a mega-biodiversity nation; Endangered and endemic species of India. • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ Conservation of biodiversity. • Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.	4
Unit 5:	Environmental Pollution: Environmental pollution: types, causes, effects and controls; Air, water, soil, chemical and noise pollution. • Nuclear hazards and human health risks. • Solid waste management: Control measures of urban and industrial waste. • Pollution case studies.	5
Unit 6:	Environmental Policies & Practices: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.• Environment Laws : Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC). • Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context.	4
Unit 7:	Human Communities and the Environment Human population and growth: Impacts on environment, human health and welfares. • Carbon foot-print. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management: floods, earthquakes, cyclones and landslides. • Environmental movements: Chipko, Silent valley, Bishnios of Rajasthan. • Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. • Environmental communication and public awareness, case studies (e.g.,	4

	CNG vehicles in Delhi).	
Unit 8:	Field Work: Visit to a local area to document assets-river / forest / grassland /hill / mountain. polluted sites(Urban, rural ,industrial, agriculture), plants, insects, bird, Ecosystem (pond, river, hill slopes etc)	4
	Total	32

Teaching Methodology:

The core module Syllabus for Environment Science includes class room teaching and Field Work. The syllabus is divided into eight units covering lectures. The first seven units will cover 28 lectures, which are class room based to enhance knowledge skills and attitude to environment. Unit eight is based on field activities which will be covered in 4 lecture hours and would provide student firsthand knowledge on various local environmental aspects. Field experience is one of the most effective learning tools for environmental concerns. This moves out of the scope of the text book mode of teaching into the realm of real learning in the field, where the teacher merely acts as a catalyst to interpret what the student observes or discovers in his/her own environment. Field studies are as essential as class work and form an irreplaceable synergistic tool in the entire learning process. Course material provided by UGC for class room teaching and field activities is utilized.

Evaluation Scheme:

Exams	Marks	Coverage
Test-1	15 Marks	Based on Unit-1 Unit 2 and Unit-3
Test-2	25 Marks	Based on Unit-4 & Unit-5 (70 %) and around 30% from coverage of Test-1
Test-3	35 Marks	Based on Unit-6 to Unit-7 and around 30% from coverage of Test-1 and Text-2
Assignment	10 Marks	
Tutorials	5 Marks	
Quiz	5 Marks	
Attendance	5 Marks	
Total	**100 Marks**	

Learning Resources:

Tutorials and lecture slides on Web Development (will be added from time to time): Digital copy will be available on the JUET server.

Text Book

1. Bharucha Erach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmadabad – 380013, India.
2. De Anil Kumar, Environmental Chemistry, Wiley Eastern Ltd, 2007.
3. Agarwal KC, 2001. Environmental Biology, Nidhi Publishers Ltd. Bikaner.

Reference Book

1. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.
2. Clark R B, Marine Pollution, Clanderson Press, Oxford (TB).2001.
3. Cunningham WP, Cooper TH, Gorhani E & Hepworth MT, 2001. Environmental Encyclopedia, Jaico Publishing House, Mumbai, 1196 pgs.
4. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, 473pgs.
5. Heywood VH, and Watson RT, 1995. Global Biodiversity Assessment. Cambridge University Press 1140pgs.
6. Jadhav H and Bhosale VM, 1995. Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs.
7. Mckinney ML and Schoch RM, 1996. Environmental Science Systems and Solutions. Web enhanced edition, 639pgs.

Title of Course: Data Structures Lab **Course Code: 18B17CI371**
L-T-P Scheme: 0-0-2 **Credits: 1**

Scope and Objectives:

This course develop problem solving ability using programming, develop ability to express solutions to problems clearly and precisely, develop ability to design and analyze algorithms, introduce with fundamental data structures, develop ability to design and evaluate abstract data types and data structures.

Learning Outcome:

The students shall acquire the generic skills to design and implement data structures and related algorithms for a broad-based set of computing problems

18B11CI371: Data Structures Lab	
CO1	Define basic operations on linear data structures
CO2	Illustrate the efficiency of a data structures in terms of time and space complexity.
CO3	Apply the data structures solve the searching and sorting problems.
CO4	Utilize the knowledge of non-linear data structures in solving programming problems.
CO5	Analyze the data structures for their suitability on a given problem.
CO6	Design the systems, from concept to executable artefact using data structures techniques.

Course Description:

This course is intended to provide a thorough introduction to the use of data structures in programming. This course will cover the necessary mathematical background, but will assume the required programming experience.

Course Contents:

UNIT 1: Introduction to Data Structures, Algorithm and Complexity
Data structure overview, need of data structure and how to select relevant data structure for given problem, basic C data types and ADT.

Algorithm overview and its properties, problem analysis and construction of algorithm, difference between algorithm, program and software, algorithm analysis and complexity, asymptotic notations to represent the time complexity, Software Development Life Cycle (SDLC) phase

UNIT 2: Array
Overview, memory representation of 1D and 2D array, sparse matrix, operation supported by an array

Part 1: Searching
Linear search with illustration, analysis of linear search, binary search (iterative) and its analysis, binary search (recursive) and its analysis using recurrence relation, recurrence relation

Part 2: Sorting
Types of sorting algorithms, bubble sort, selection sort, insertion sort, quick sort, merge sort

UNIT 3: Linked List
Overview, types of linked list, linear linked list – overview, traversing, insertion, deletion, searching and reverse, doubly linked list – overview, traversing, insertion, deletion, circular linked list – overview, header linked list, applications of linked list

UNIT 4: Stack
Overview, stack implementation using stack and linked list, basic operations on stack using array and linked list – push, pop, dispose applications of stack – evaluation of mathematical expression, conversion of expression from one form to another (Polish Notation), Tower of Hanoi problem

UNIT 5: Queue
Overview, basic operations on queue – enqueue, dequeue, implementation of queue using array and linked list, types of queue - linear queue, circular queue, deque, priority queue, applications

UNIT 6: Tree
Tree definition and its terminology, representation of graph using array and linked list, tree traversals – preorder, inorder and postorder, binary search tree (BST) with insertion, deletion and searching operations, extended binary tree and its application in Huffman tree, threaded binary tree

UNIT 7: Graph
Introduction to graph, types of graph, traversal algorithms in graph – breadth first search, depth first search, spanning tree, minimum cost spanning tree - Kruskal's, Prim's.

Text Book:

T1: Sartaj Sahni, "Fundamentals of Data Structures", Tata Mc Graw Hill, New York
T2: Seymour Lipschutz., "Data Structures with C", Schaum's Outline Series
T3: Narasimha Karumanchi, "Data Structures and Algorithms" Made Easy

Reference Books:

R1: Corman et al: Introduction to Computer Algorithms
R2: Langsam, Augestein, Tenenbaum: Data Structures using C and C++
R3: Weiss: Data Structures and Algorithm Analysis in C/C++
R4: Samir K. Bandyopadhyay," Data Structures using C"
R5: Hopcraft, Ullman: Data Structures and Algorithms

Evaluation Scheme:

Component & Nature	**Marks**
Lab work	40
Lab record	15
Mid sem lab –Viva/Test	15
End sem lab – Viva/Test	15
Attendance & discipline in lab	15
Total	**100**

Title: Digital System & Microprocessors Lab **Code: 18B17EC371**
L-T-P scheme: 0-0-1 **Credit: 1**
Prerequisite: Students must have already studied the courses, "Digital Electronics and Microprocessor

Objective:

1. To learn and be able to implement the front-end and back-end digital electronics
2. To develop the abilities to call oneself full-stack microprocessor

Course Outcome	Description
CO1	Get familiar with basic of Digital Electronics
CO2	Understanding of logic gates and flip flops
CO3	Demonstration of combinational and sequential circuits
CO4	To understand the operation of ALU
CO5	Analyze the basic operations of 8085 microprocessor

Experiment No 1: Familiarization and Verification of logic functions of the TTL ICs.
Activity 1: Verification of AND gate using 7408 IC.
Activity 2: Verification of OR gate using 7432 IC.
Activity 3: Verification of NOT gate using 7404 IC.
Activity 4: Verification of NAND gate using 7400 IC.
Activity 5: Verification of NOR gate using 7402 IC.
Activity 6: Verification of XOR gate using 7486 IC.

Experiment No 2: Implementation of Combinational digital circuits using MSI Logic.
Activity 1: Combinational circuit-1
Activity 2: Combinational circuit-2

Experiment No 3: Implementation of Binary Adders and Subtractors.
Activity 1: Implementation of the Half-Adder.
Activity 2: Implementation of the Full-Adder using two Half-Adders.
Activity 3: Implementation of the Half-Subtractor.
Activity 4: Implementation of the Full-Subtractor using two Half-Subtractors.
Activity 5: Implementation of the 4-Bit Parallel Adder using ICs 7483.
Activity 6: Implementation of the 4-Bit Parallel Subtractor using IC 7483.

Experiment No 4: K-map and Boolean function simplification
Activity 1: Simplify the given digital circuit using K-map and verify the simplified function by implementing the given circuit and its simplified one.
Activity 2: Simplify the given functions whose minterm canonical formula is given. Implement the two functions with identical inputs and only use NAND gate ICs. Verify your result from the truth table.
Activity 3: Simplify the given Boolean function using minterms and maxterms. Implement both the simplified functions and verify that the functions are complement to each other. Construct the truth table as per your input/output behavior of the circuit.

Experiment No 5: Implementation of Multiplexer
Activity 1: Implementation of 2-to-1 Multiplexer using gates.
Activity 2: Implementation of 2-to-1 Multiplexer with enable/disable control signal.

Activity 3: Implementation of 2-to-1 Multiplexer using IC 74157.
Activity 4: Implementation of 4-to-1 Multiplexer using IC 74153.
Activity 5: Implementation of 8-to-1 Multiplexer using 4-to-1 MUX (IC 74153)

Experiment No 6: Use of Flip-Flop TTL IC in digital system.
Activity 1: Design and Implement NAND gated SR Latch
Activity 2: Design and Implement clocked RS Flip-Flop
Activity 3: Design and Implement D Flip-Flop using IC 7474.
Activity 4: Design and Implement JK Flip-Flop using IC 7476.
Activity 5: Design and Implement Master-Slave JK Flip-Flop.

Experiment No 7: Implementation of 4-Bit Binary Counter.
Activity 1: Implementation of 4-Bit Binary counter using 7493 IC .The clock signal to be giventhrough the pulsar and 1 Hz clock generator, and observe the output through LED.
Activity 2: Draw the waveform of the counter outputs Q_A, Q_B, Q_C and Q_D
Activity 3: Implementation of BCD counter using 7493 IC. Observe the output through sevensegment display.
Activity 4: Implementation of Mod-5 counter using 7493 IC.
Activity 5: Implementation of Mod-7 counter using 7493 IC.

Experiment No 8: Implementation of Shift Registers
Activity 1: Implementation of 4.bit Serial load parallel out (SIPO) shift register using 7474 IC.
Activity 2: Implementation of 4.bit parallel load serial out (PISO) shift register using 7474 IC.
Activity 3: Use of universal shift register IC 74194

Experiment No.9: Familiarization with 8085 microprocessor Kit
Activity 1: Draw and describe the each block of 8085 microprocessor kit
Activity 2: Practice the different command for Assembly Language Programming (ALP) of 8085 microprocessor

Experiment No.10: To perform loading and movement related instructions
Activity 1: Move the given data from accumulator to register
Activity 2: Load the content of memory location directly to the accumulator
Activity 3: Place the content of the memory location in register

Experiment No.11: **Aim: To carry out addition & subtraction operation.**
Activity 1: Perform the addition of given numbers
Activity 2: Addition of two 8- bit hexadecimal numbers
Activity 3: Addition of two 16- bit hexadecimal numbers
Activity 4: Perform the subtraction of given numbers
Activity 5: Subtraction of 16-bit hexadecimal numbers

Experiment No.12: To observe larger and smaller from given numbers
Activity 1: Find the larger and smaller number
Activity 2: Locate the largest number among the ten numbers
Activity 3: Locate the smallest number among the five numbers

Evaluation Scheme:

Exams		Marks	Coverage
P-1		15 Marks	**Based on Lab Exercises: 1-7**
P-2		15 Marks	**Based on Lab Exercises: 8-14**
Day-to-Day Work	Viva	20 Marks	**70 Marks**
	Demonstration	20 Marks	
	Lab Record	15 Marks	
	Attendance & Discipline	15 Marks	
Total		**100 Marks**	

Learning Resources:

Study material of Digital System & Microprocessors Lab (will be added time to time): Digital copy will be available on the JUET server

Text Book:

1. Fundamental of Digital Electronics And Microprocessors
2. Digital Electronics and Microprocessors

Web References:

1. http://www.becbapatla.ac.in/uploads/BCE1555920601838.pdf
2. https://et.charlotte.edu/about-us/facilities-equipment-and-infrastructure/eet-laboratories-and-associated-equipment/digital

Journals References:

1. Microprocessors and Microsystems - Journal - Elsevier
2. Microprocessors and digital ICs for motion control - IEEE Xplore
3. Journal of Microprocessor Engineering(STM Journals)

Title of Course: Database Systems Lab **Course Code: 18B11CI372**
L-T-P Scheme: 0-0-2 **Course Credit: 1**

Objectives: To develop the ability to design, implement and manipulate databases as well as to build Database management systems.

Learning Outcome

1. Ability to design systems by using ER Modeling.
2. Ability to develop skills of writing applications by using SQL.
3. Ability to understand query optimization techniques and transaction processing.

18B11CI373: Database Systems Lab	
CO1	Define basic requirement and operations of file based and database systems.
CO2	Illustrate the relational database design using data definition, data manipulation queries.
CO3	Develop the database using relational database query, Identify the suitable of the data structures as per the requirements.
CO4	Utilize the knowledge of structured query language to develop and deploy the database for real life based problems.
CO5	Develop the normalize database for their suitability on a given problem.
CO6	Design the database systems, from concept to executable transaction, concurrency and recovery control using the real time based problems in group project based task .

Course Contents:

- SQL queries for the creation of tables and insertion of values into tables.
- SQL queries for viewing all data and specific data corresponding to a particular row or column in a table.
- SQL queries for the updation, deletion and dropping of tables.
- SQL queries for aggregation, range finding etc on the tables.
- SQL queries for renaming, truncating and destroying the tables.
- SQL queries for the use of not null, group by, having clause.
- SQL queries for the computation done on the table data.
- Exercise on nested SQL queries and sub queries.
- Use of cursors, triggers, functions and writing pl/sql block.
- A brief idea about oracle report builder.

Evaluation scheme:

Exams		**Marks**	**Coverage**
P-1		15 Marks	**Based on Lab Exercises: 1-7**
P-2		15 Marks	**Based on Lab Exercises: 8-14**
Day-to-Day Work	Viva	20 Marks	**70 Marks**
	Demonstration	20 Marks	
	Lab Record	15 Marks	
	Attendance & Discipline	15 Marks	
Total		**100 Marks**	

Text Book

1. SQL, PL/SQL the Programming Language of Oracle, Ivan Bayross, 3rd edition.

Title of Course: UI /UX Lab **Course Code: 18B17CI307**

L-T-P Scheme: 0-0-2 **Course Credit: 1**

Objectives & Learning Outcomes:

Objective is to make students aware of the concepts underlying Multimedia Technology. Students will learn behind the design thinking process with practical implementation. Ultimately, the course will use design thinking to take students through the design of the User Experience (UX) and User-Interface (UI) of a product or service of their creation.

Learning Outcomes:

Course Outcome	Description
CO1	**Understand** the definition and principles of UI/UX Design in order to design with intention.
CO2	**Achieve** a deep understanding of the entire life-cycle of design—the process, purpose, and tools.
CO3	**Learn** the basics of HCI (human-computer interaction) and the psychology behind user decision-making.
CO4	**Discover** the industry-standard tools and specific project deliverables in UI/UX.
CO5	**Explain** why you made design decisions, through presentations of assignments and your personal portfolio.

Course Contents:

Unit 1: Adobe Photoshop CS, Adobe Illustrator CS, Windows Live Movie Maker,
Unit 2: Macromedia Flash MX 2004, Flimora video editing
Unit 3:- Microsoft Front Page – Designing of Web Page, Hosting of Website created in Lab exercise on intranet.
Unit 4:- UI/ UX approaches, ideas, principles
Unit 5:- Understanding and implementation of AR/ VR projects

Text Book

1. The Design of Everyday Things – by Don Norman.
2. The Elements of User Experience: User-Centered Design for the Web- by Jesse James Garrett

Evaluation scheme:

Exams		Marks	Coverage
P-1		15 Marks	**Based on Lab Exercises: up to P1**
P-2		15 Marks	**Based on Lab Exercises: up to P2**
Day-to-Day Work	Viva	20 Marks	**70 Marks**
	Demonstration	20 Marks	
	Lab Record	15 Marks	
	Attendance & Discipline	15 Marks	
Total		**100 Marks**	

Title of Course: Advance Programming Lab-I **Course Code: 18B17CI373**

L-T-P scheme: 0-0-2 **Course Credits: 2**

Prerequisite: No explicit prerequisite course work is required, but students are expected to have a fundamental understanding of basic computer principles and previous experience using a personal computer.

Objective: To emphasize object-oriented programming concepts and the design of algorithms and related data structures. Problem decomposition and principles of software engineering are stressed throughout the course. Advance aspects of programming may be taken care off through Python.

Learning Outcomes:

Course Outcome	Description
CO1	Installation and understanding features of Python.
CO2	Describe Python data types to handle programming problems
CO3	Develop understanding looping to handle new data types
CO4	Identify appropriate methods to solve challenging problems.
CO5	Apply programming knowledge to solve real world problems in the form of Project

Course Contents:

An Introduction to Python: Introductory Remarks about Python, Strengths and Weaknesses, A Brief History of Python, Python Versions, Installing Python, Environment Variables, Executing Python from the Command Line, IDLE, Editing Python Files, Getting Help, Dynamic Types, Python Reserved Words, Naming Conventions.

Basic Python Syntax: Introduction, Basic Syntax, Comments, String Values, String Operations, The format Method, String Slices, String Operators, Numeric Data Types, Conversions, Simple Input and Output, The print Function.

Language Components: Introduction, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical Operators, True or False, Bit Wise Operators, The while Loop, break and continue, The for Loop.

Collections: Introduction, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections, Summary.

Functions: Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope Functions- "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Closures.

Exceptions: Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple, Exceptions, raise, assert, Writing Your Own Exception Classes.

Classes in Python: Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Class Documentation-pydoc.

GUI in Python: Introduction, Base window, Widgets, Functions, Lambda Functions, Geometry manager, Sqlite3 Backend Connectivity, Handling images.

Project: Based on Learning in this course with database connectivity.

Text Book

1. Programming Python /Mark Lutz.

Reference Books

1. Think Python / Allen B Downey
2. Python 101 / Dave Kuhlman

Evaluation scheme:

Exams		Marks	Coverage
P-1		15 Marks	**Based on Lab Exercises: 1-7**
P-2		15 Marks	**Based on Lab Exercises: 8-14**
Day-to-Day Work	Viva	20 Marks	**70 Marks**
	Demonstration	20 Marks	
	Lab Record	15 Marks	
	Attendance & Discipline	15 Marks	
Total		**100 Marks**	