CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
Kokapet (Village), Gandipet, Hyderabad, Telangana-500075. www.cbit.ac.in
ISO Certified 9001:2015

COMMITTED TO RESEARCH, INNOVATION AND EDUCATION 42 years

Scheme of Instruction and Syllabi

of
III and IV SEMESTERS

of
FOUR YEAR DEGREE COURSE

in
BE-COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

(AICTE Model Curriculum with effect from AY 2021-22)

R-20 Regulation

CHAITANYABHARATHIINSTITUTEOFTECHNOLOGY
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AffiliatedtoOsmania U niversity
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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)

SCHEME OF INSTRUCTIONS AND EXAMINATION

Model Curriculum(R-20) 2021-22

B.E. (CSE - Artificial Intelligence and Machine Learning)

SEMESTER -III

S. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per Week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	20EEC01	Basics of Electrical Engineering	3	0	0	3	40	60	3
2	20ECC35	Basic Electronics	3	0	0	3	40	60	3
3	20CSC08	Data Structures	3	0	0	3	40	60	3
4	20CSC09	Discrete Mathematics	3	1	0	3	40	60	4
5	20CSC10	Digital Logic Design	3	0	0	3	40	60	3
6	20CAC01	Fundamentals of Data Science	2	0	0	3	40	60	2
PRACTICAL									
7	20EEC02	Basics of Electrical Engineering Lab	0	0	2	3	50	50	1
8	20ECC36	Basic Electronics Lab	0	0	2	3	50	50	1
9	20CSC11	Data Structures Lab	0	0	4	3	50	50	2
10	20CAC02	Fundamentals of Data Science Lab	0	0	2	3	50	50	1
11	20CAI01	MOOCs / Training / Internship	0	0	4	-	-	-	2
12	20ACT	Activity Points	-	-	-	-	-	-	-
		TOTAL	**17**	**1**	**10+4**	**-**	**440**	**610**	**25**

L: Lecture T: Tutorial D: Drawing P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

20EEC01

BASICS OF ELECTRICAL ENGINEERING

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Objectives: The objectives of this course are

1. To understand the behaviour of different circuit elements R, L & C, and the basic concepts of electrical AC circuit analysis.
2. To understand the basic principle of operation of AC and DC machines.
3. To know about different types of electrical wires and cables, domestic and industrial wiring. safety rules and methods of earthing.

Course Outcomes: On Successful completion of the course, students will be able to

1. Understand the concepts of Kirchhoff's laws and to apply them in superposition, Thevenin's and Norton's theorems to get the solution of simple dc circuits
2. Obtain the steady state response of RLC circuits with AC input and to acquire the basics, relationship between voltage and current in three phase circuits.
3. Understand the principle of operation, the emf and torque equations and classification of AC and DC machines
4. Explain various tests and speed control methods to determine the characteristic of DC and AC machines.
5. Acquire the knowledge of electrical wiring, types of wires, cables used and Electrical safety precautions to be followed in electrical installations.
6. Recognize importance of earthing, methods of earthing and various low-tension switchgear used in electrical installations

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT-I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation, Superposition, Thevenin and Norton Theorems, Time-domain analysis of first-order RL and RC circuits.

UNIT-II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Transformers: Construction, Working principle, EMF Equation, Ideal and Practical transformer, Equivalent circuit of Transformer, OC and SC tests on a transformer, Efficiency and Regulation

UNIT-IV

DC and AC Machines: DC Generators: Construction, Principle of operation, EMF equation, Classification, Characteristics of shunt, series and compound generators.

DC Motors: Classification, Torque equation, Characteristics, Efficiency, Speed Control of Series and Shunt Motors.

Three - Phase Induction Motors: Principle of operation, Applications.

UNIT-V

Electrical Installations: Electrical Wiring: Types of wires and cables, Electrical Safety precautions in handling electrical appliances, electric shock, first aid for electric shock, safety rules. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Earthing (Elementary Treatment only), Elementary calculations for energy consumption.

Textbook:

1. L. S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011.
2. E. Hughes, Electrical and Electronics Technology, Pearson, 2010.

Suggested Reading:

1. D. P. Kothari & I. J. Nagrath, –Basic Electrical Engineering Tata McGraw Hill, 2010.
2. V. D. Toro, –Electrical Engineering Fundamentals Prentice Hall India, 1989.
3. D.C. Kulshreshtha, –Basic Electrical Engineering McGraw Hill,2009
4. P.V.Prasad, S.sivanagaraju, R.Prasad, "Basic Electrical and Electronics Engineering" Cengage Learning, 1st Edition, 2013.

20ECC35

BASIC ELECTRONICS

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Prerequisite: Concepts of Semiconductor Physics and Applied Physics.

Course Objectives: The objectives of this course are

1. Describe semiconductor devices principle and to understand the characteristics of Junction Diode.
2. Understand the concept of amplification and able to examine the BJT in more detail.
3. Understand the concept of digital electronics.
4. Understand working principle of incoherent light sources (LEDs), junction devices, operation of CRO
5. Understand the working principle of the transducers and aware the students about the advances in Instrumentation.

Course Outcomes: On Successful completion of the course, students will be able to:

1. Interpret the usage of semiconductor devices in making circuits like rectifiers, filters, regulators etc
2. Design and Analyse the characteristics of electronic circuits and systems
3. Make use of various types of small and large signal amplifiers for electronic control systems.
4. Model a prototype module using the operational amplifier for real time applications.
5. Evaluate the performance of various semiconductor devices

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	3	2	1	1	1	1	1	1	1	1	2	-	-	-	1
CO2	2	2	2	2	1	1	1	1	1	1	1	2	-	1	-	1
CO3	2	2	1	2	1	1	1	1	1	1	1	2	-	1	-	-
CO4	2	3	2	3	1	2	1	1	1	1	1	2	1	1	1	-
CO5	3	2	2	2	2	2	1	1	1	1	1	2	1	1	-	1

UNIT-I:

Semiconductor Theory: Energy levels, Intrinsic and Extrinsic Semiconductor, Mobility, Diffusion and Drift current, Hall effect, Law of mass action, Characteristics of P-N Junction diode, current equation, Parameters and Applications.

Rectifiers: Half wave and Full wave Rectifiers Bridge and center tapped with and without filters, Ripple factor, regulation and efficiency.

UNIT-II:

Transistors: Bipolar and field effect transistors with their h-parameter equivalent circuits, Basic Amplifiers classification and their circuits (Qualitative treatment only).

Regulators and Inverters: Zener Diode**,** Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator.

UNIT-III:

Feedback Amplifiers: Properties of Negative Feedback Amplifier, Types of Negative Feedback, Effect of negative feedback on Input impedance and Output impedance, Applications (Qualitative treatment only).

Oscillators: principle of oscillations, LC Type-Hartley, Colpitts and RC Type- Phase shift, Wien Bridge and Crystal Oscillator (Qualitative treatment only).

UNIT-IV:

Operational Amplifiers: Basic Principle, Ideal and practical Characteristics and Applications-Summer, Integrator, Differentiator, Instrumentation Amplifier.

Amplifiers: Operation of Class A, Class B, Class AB and Class C power amplifiers

UNIT-V:

Data Acquisition systems: Study of transducers-LVDT, Strain gauge. Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD, SCR, UJT Construction and Characteristics and their applications only.

Display Systems: Constructional details of C.R.O and Applications.

Text Books:

1. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits Theory", Pearson Education, 9TH edition, LPE, Reprinted, 2006.
2. Morris Mano, "Digital Design", Pearson Education, Asia 2002.

Suggested Readings:

1. Jacob Millman and C., Halkias, "Electronic Devices", McGraw Hill, Eight Edition, Reprinted, 1985.
2. Ramakanth A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Prentice Hall of India,3rdedition,1985.
3. W. D. Cooper, A. Helfric, "Electronic Instrumentation and Measurement Techniques", PHI, 4th edition.

20CSC08

DATA STRUCTURES

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Pre-requisites: Basic knowledge of programming language such as C, C++, Java, Python is preferred (but not mandatory) and some mathematical maturity also will be expected.

Course Objectives: The objectives of this course are
1. Basic linear and non-linear data structures.
2. Analyzing the performance of operations on data structures.
3. Different balanced binary trees, which provides efficient implementation for data structures.

Course Outcomes: On Successful completion of this course, student will be able to
1. Understand the basic concepts of data structures and sorting techniques.
2. Analyze the performance of algorithms.
3. Distinguish between linear and non-linear data structures.
4. Apply linear and non-linear data structures.
5. Identify the significance of balanced search trees, graphs and hashing.
6. Establish a suitable data structure for real world applications.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT - I

Introduction: Data Types, Data structures, Types of Data Structures, Operations, ADTs, Algorithms, Comparison of Algorithms, Complexity, Time-space trade off, Asymptotic Notations. **Recursion**: Introduction, format of recursive functions, recursion Vs. Iteration, examples. **Sorting:** Quick sort, Merge Sort, Selection Sort, Radix sort, Comparison of Sorting Algorithms.

UNIT - II

Linked Lists: Introduction, Linked lists, Representation of linked list, operations on linked list, Comparison of Linked Lists with Arrays and Dynamic Arrays, Types of Linked Lists and operations-Circular Single Linked List, Double Linked List, Circular Double Linked List, Skip List-Definition and uses

UNIT- III

Stacks and Queues: Introduction to stacks, applications of stacks, implementation of stack. Introduction to queues, applications of queues and implementations, Double Ended Queues,Priority Queues and applications

UNIT - IV

Trees: Definitions and Concepts, properties of Binary Trees, types of binary trees, Representation of binary tree, Tree Traversal. **Binary Search Trees:** Representation and operations. Tries- Definition and uses
Heap Tree: Definition, Representation, Heap Sort. **Balanced Search Trees:** AVL Trees

UNIT - V

Graphs: Introduction, Applications of graphs, Graph representations, graph traversals,
Hashing: Introduction, Hashing Functions-Modulo, Middle of Square, Folding, Collision Techniques-Linear Probing, Quadratic Probing, Double Hashing, Separate Chaining.
String Algorithms: Introduction, String Matching Algorithm, Brute Force Method, Rabin-Karp String Matching Algorithm

Text Books:

1. Narasimha karumanchi, “Data Structures and Algorithms Made Easy”, Career Monk Publications, 2020
2. S. Sahni and Susan Anderson-Freed, “Fundamentals of Data structures in C”, E.Horowitz, Universities Press, 2nd Edition.
3. Reema Thareja,“Data Structures using C”, Oxford University Press.
4. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structure and Algorithms in Python”, Wiley, 2013.

Suggested Reading:

1. D.S.Kushwaha and A.K.Misra, “Data structures A Programming Approach with C”, PHI.
2. Seymour Lipschutz, “Data Structures with C”, Schaums Outlines, Kindle Edition
3. Kenneth A. Lambert, " Fundamentals of Python: Data Structures", Cengage Learning, 2018
4. D. Samantha, “Classic Data Structures”, Prentice Hall India, 2nd Edition, 2013

Online Resources:

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
2. https://www.edx.org/course/foundations-of-data-structures
3. https://sites.google.com/site/merasemester/data-structures/data-structures-#DS
4. https://www.cs.usfca.edu/~galles/visualization/Algorithms
5. https://www.coursera.org/specializations/data-structures-algorithms

20CSC09

DISCRETE MATHEMATICS

Instruction	3L+1T Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Course Objectives: The objectives of this course are
1. To introduce Propositional and Predicate Logic.
2. To introduce various proof techniques for validation of arguments.
3. To develop an understanding of counting, functions and relations.
4. Familiarize with fundamental notions and applicability of graph theory and algebraic systems

Course Outcomes: On Successful completion of the course, students will be able to
1. Describe rules of inference for Propositional and Predicate logic.
2. Demonstrate use of Set Theory, Venn Diagrams, relations, functions in Real-world scenarios.
3. Model solutions using Generating Functions and Recurrence Relations.
4. Determine the properties of graphs and trees to solve problems arising in computer science applications.
5. Distinguish between groups, semi groups and monoids in algebraic systems.
6. Formulate solutions to a variety of real world problems.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT-I

Introduction to Propositional Calculus: Basic Connectives and Truth tables, Logical Equivalence: Laws of Logic, Logical Implication; Rules of Inference.

Predicates: The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems.

UNIT–II

Sets: Sets and Subsets, Operations on sets and the Laws of Set Theory, Counting and Venn Diagrams. **Relations and Functions:** Cartesian Products and Relations. Partial ordering relations, POSET, Hasse diagrams, Lattices as Partially Ordered Sets, Equivalence relations. Pigeon hole principle.

Functions: Types of Functions, Composition of functions and Inverse of functions.

UNIT-III

Fundamental Principles of counting: The Rules of Sum and Product, permutations, Combinations, Binomial Theorem.

Generating Functions: Generating Functions, Calculating Coefficient of generating functions. **Recurrence Relations:** The First Order Linear Recurrence Relation, Second Order Linear. Homogeneous Recurrence relations with constant coefficients, Non Homogeneous Recurrence relations.

UNIT-IV

Introduction to Graphs: Graphs and their basic properties- degree, path, cycle, Sub graphs, Complements and Graph Isomorphism, Euler trails and circuits, Hamiltonian paths and cycles, planar graphs,Eulerformula, Graph Coloring and Chromatic polynomial, Matching, Applications**.**

Trees: Definitions, Properties, Rooted Trees, Spanning Trees, Minimum Spanning trees: The Algorithms of Kruskal and Prims.

UNIT–V

Algebraic Structures: Algebraic Systems, Examples and General Properties, Semi groups and Monoids. Groups: Definitions and Examples, Subgroups, Homomorphisms and cyclic groups.

Text Books:

1. Ralph P. Grimaldi, "Discrete and Combinatorial Mathematics", An Applied Introduction, 4 th edition, Pearson Education, 2003.
2. J.P. Tremblay, R.Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill Edition, 1995.
3. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 8th edition,Tata McGraw-Hill, 2005

Suggested Reading:

1. R.K.Bisht, H.S.Dhami, "Discrete Mathematics", Oxford University Press, Published in 2015.
2. Joe L.Mott, Abraham Kandel, Theodore P. Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", 8th Edition, PHI,1986.
3. David D.Railey, Kenny A. Hunt, "Computational Thinking for the Modern Problem Solving", CRC Press, 2014.

Online Resources:

1. https://nptel.ac.in/courses/111107058/
2. https://nptel-discrete-mathematics-5217

20CSC10

DIGITAL LOGIC DESIGN

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Objectives: The objectives of this course are
1. To understand the basic building blocks of digital hardware and various minimisation techniques.
2. To analyse and design the Combinational and Sequential circuits.
3. To design the circuits using verilog HDL.

Course Outcomes: On Successful completion of this course, student will be able to
1. Demonstrate the number system conversions and simplify Boolean functions.
2. Recall basic theorems and properties of Boolean algebra to represent logical functions in canonical and standard forms.
3. Analyze and simplify Boolean expressions using karnaugh-maps and tabulation method.
4. Analyze and Design various combinational circuits and Sequential circuits used in Computer Hardware.
5. Understand the designs of Combinational and Sequential circuits using Verilog HDL.
6. Develop different applications by configuring registers, counters and memories.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT - I

Digital Systems and Binary Numbers: Digital systems, Binary numbers, Number base conversions, Octal and Hexadecimal numbers, Complements of Numbers, Binary codes. **Boolean Algebra and logic Gates:** Binary logic, Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits.

UNIT - II

Minimization of Switching Functions: Introduction, the map method, minimal functions and their properties, the tabulation procedure, the prime implicant chart. **NAND and NOR Gates**: NAND Circuits, Two-level Implementation, Multilevel NAND Circuits, NOR Circuits. **Exclusive OR Gates**: Odd Function, Parity Generation and Checking.

UNIT - III

Combinational Logic Design: Combinational Circuits. **Analysis Procedure:** Derivation of Boolean Functions, Derivation of the Truth Table, Logic Simulation. **Design Procedure:** Decoders, Encoders, Multiplexers - Designing Combinational Circuits using Multiplexers, Binary Adders, Adder-Subtractor, Binary Multiplier, HDL Representations – Verilog.

UNIT - IV

Sequential Circuits: Sequential circuit definitions, Latches, Flip Flops, Sequential circuit analysis, Sequential circuit design, Design with D Flip Flops, Designing with JK Flip-Flops, HDL representation for sequential circuits - Verilog.

UNIT - V

Registers: Registers, Shift registers. **Counters**: Ripple Counters, Synchronous Binary counters, Other Counters. **Memory and Programmable Logic**: Introduction, Random-Access Memory, Memory Decoding, Error Detection and Correction, Read-Only Memory, Programmable Logic Array (PLA), Programmable Array Logic (PAL).

Text Books:

1. Morris Mano M. and Michael D.Ciletti, "Digital Design, With an Introduction to Verilog HDL", Pearson 5th edition, 2013.
2. ZVI Kohavi, "Switching and Finite Automata Theory", Tata McGraw Hill 2 edition, 1995.

Suggested Reading:

1. Ronald J Tocci, Neal Widmer,Greg Moss, "Digital Systems: Principles and Applications", Pearson 11th Edition, 2011.
2. Stephen Brown, Zvonko Vranesic, "Fundamentals of Digital Logic with VHDL design, McGraw Hill 2nd Edition, 2009.

20CAC01

FUNDAMENTALS OF DATA SCIENCE

Instruction	2 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	2

Pre-requisites: Probability and Statistics

Course Objectives: The objectives of this course are
1. Understand the significance of data science concepts and tools in the modern world.
2. Apply various data science techniques relating to pre-processing, exploring and visualizing data.
3. Apply statistical and predictive analytical methods to deal with the real time data.

Course Outcomes: On successful completion of this course, Student will be able to:
1. Understand the significance of data science tools and techniques.
2. Apply data cleaning, transformation and discretization techniques.
3. Analyze various inferential statistics and time-series methods.
4. Understand and apply data visualization techniques.
5. Understand predictive analytics and its applications.
6. Apply data science techniques to deal with the real-world problems.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT – I: Introduction

Introduction to Data Science: Evolution of Data Science, Data Science Roles, Life Cycle of Data Science Project, Applications of Data Science, Data Security Issues.

Data collection and types :primary, secondary, structured data, unstructured data.

UNIT – II: Data Pre-Processing

Data Pre-Processing Overview, **Data Cleaning:** Missing values, dealing with noisy data, Spread, outliers **Data Transformation & Discretization:** Transformation strategies overview, transformation by normalization, discretization by binning, Dimensionality Reduction.

UNIT – III: Exploratory Data Analytics

Organizing Data : Variables and data, organizing Qualitative data, organizing Quantitative data**Introduction to Frequency Tables and Graphs:** Line Graphs, Bar Graphs, Frequency Polygons, Relative Frequency Graphs, Pie Charts, Grouped Data and Histograms, Stem and leaf Plots, sets of paired data.

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UNIT – IV: Statistical Analysis

Statistical Methods for Evaluation: Random Variables, Expected Values, Variance of Random Variables, Distribution of Sampling Statistics, population mean, Testing Statistical Hypothesis: Hypothesis testsand significance levels, t-test, Wilcoxon Rank-Sum Test, ANOVA.

UNIT – V: Real-time Applications of Data Science

Introduction to predictive analytics, applications of predictive analytics, Data science for recommendation systems, data science for healthcare, data science for educational systems.

Text Books:

1. EMC Education Services “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley Publishers, 2012.

2. Neil A.Weiss, "Introductory Statistics", 10th Edition, Pearson Education Limited, 2017.
3. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd ed.

Suggested Reading:

1. JojoMoolayil, “Smarter Decisions : The Intersection of IoT and Data Science”, PACKT, 2016.
2. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013.
3. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.
4. Hastie, Trevor, et al., “The elements of statistical learning: Data Mining, Inference, and Prediction”, Vol. 2. No. 1. New York: Springer, 2009.
5. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O'Reilly, 2015.

Online Resources:

1. https://www.topcoder.com/role-of-statistics-in-data-science/
2. https://www.logianalytics.com/predictive-analytics/what-is-predictive-analytics/.
3. https://data-flair.training/blogs/
4. https://www.analyticsvidhya.com/blog/2016/02/time-series-forecasting-codes-python/
5. https://conjointly.com/kb/descriptive-statistics/
6. https://www.udemy.com/course/datascience-statistics/
7. https://www.google.co.in/books/edition/Introductory_Statistics/c838DAAAQBAJ?hl=en&gbpv=1&pg=PA2&printsec=frontcover

20EEC02

BASICS OF ELECTRICAL ENGINEERING LAB

Instruction	2 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	1

Course Objectives: The objectives of this course are

1. To acquire the knowledge of different types of electrical elements and to verify the basic electrical circuit laws and theorems.
2. To determine the parameters and power factor of a coil, calculate the time and frequency responses of RLC circuits and to familiarize with measurement of electric power &energy.
3. To determine the characteristics of Transformers, dc, ac machines and switchgear components

Course Outcomes: At the end of the course, the students are expected to

1. Get an exposure to common electrical components, their ratings and basic electrical measuring equipment.
2. Make electrical connections by wires of appropriate ratings and able to measure electric power and energy.
3. Comprehend the circuit analysis techniques using various circuital laws and theorems.
4. Determine the parameters of the given coil and calculate the time response of RL & RC series circuits.
5. Recognize the basic characteristics of transformer and components of switchgear.
6. Understand the basic characteristics of dc and ac machine by conducting different types of tests on them.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

List of Laboratory Experiments/Demonstrations:

1. Demonstration of Measuring Instruments and Electrical Lab components.
2. Verification of KCL and KVL.
3. Time response of RL and RC series circuits.
4. Determination of parameters of a choke or coil by Wattmeter Method
5. Verification of Thevenin's and Norton's theorems
6. Turns ratio /voltage ratio verification of single phase Transformers
7. Open Circuit and Short Circuit tests on a given single phase Transformer
8. Observation of Excitation Phenomenon in Transformer
9. Measurement of three phase power in a balanced system using two Wattmeter method.
10. Measurement of 3-Ph Energy by an Energy Meter (Demonstration of Principle)
11. Load test on DC Shunt motor
12. Speed control of DC Shunt motor
13. Demonstration of Low Tension Switchgear Equipment/Components
14. Demonstration of cut - out section of Machines like DC Machine, Induction Machine etc.

Note: TEN experiments to be conducted from the above list.

20ECC36

BASIC ELECTRONICS LAB

Instruction	2 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	1

Prerequisite: Students should have prior knowledge of Applied Physics and Semiconductor Physics.

Course Objectives: The objectives of this course are

1. Learn about various electronic components, devices and systems.
2. Study the operation of CRO.
3. Study the transistor characteristics in different modes.
4. Analyze application of diodes and transistors.
5. Learn about analog circuits and digital circuits operation.

Course Outcomes: On Successful completion of the course, students will be able to

1. Demonstrate the concepts of basic electronic components, devices, and systems.
2. Analyze the measurements of time period, amplitude and phase of different waveforms.
3. Design and analyze the behavior of the diode and transistor circuits
4. Develop various types of feedback and power amplifiers
5. Examine the functionality of various analog and digital circuits

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

PO/PSO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO	PSO
CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	2	1	2	1	2	2	2	1	2	2	1	-	1	1
CO2	3	1	1	1	2	2	2	1	1	2	2	1	1	-	1	1
CO3	3	1	1	1	2	2	2	1	1	2	2	1	1	1	1	1
CO4	2	3	3	3	2	2	1	2	2	2	2	2	1	1	1	-
CO5	2	1	2	2	2	1	1	1	1	2	2	1	1	-	1	-

List of Experiments

1. Study of Electronic components.
2. Characteristics of Semiconductor diodes (Ge, Si and Zener).
3. CRO and its Applications.
4. Half, Full wave rectifiers with and without filters.
5. Voltage Regulator using Zener diode.
6. Characteristics of BJT in CE Configuration.
7. Characteristics of FET in CS Configuration.
8. Amplifier with and without feedback.
9. RC Phase shift oscillator
10. Operational Amplifier and its applications.
11. Power Amplifier Characteristics.
12. Realization of Half and Full adder
13. Structured Enquiry: Design a switching circuit using BJT and analyse its operation.
14. Open ended Enquiry: Design a suitable 10watt audio amplifier.

Text Books:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, *Basic Electronics*, A Text - Lab Manual, 7th Edition, TMH, 1994
2. Paul B. Zbar, Industrial Electronics, A Text - Lab Manual, 3rd Edition.

20CSC11

DATA STRUCTURES LAB

Instruction	4 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Pre-requisites: Any Programming Language

Course Objectives: The objectives of this course are
1. Understand basic concepts data structures and abstract data types.
2. Differentiate between linear and non-linear data structures.
3. Analyze various searching, sorting and hashing techniques.

Course Outcomes: On Successful completion of the course, students will be able to
1. Implement the abstract data type.
2. Implement linear data structures such as stacks, queues using array and linked list.
3. Implement non-linear data structures such as trees, graphs.
4. Analyze various sorting techniques.
5. Analyze various algorithms of linear and nonlinear data structures.
6. Design and develop real world problem using suitable data structures.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

List of Experiments
1. Implementation of Quick Sort, Merge Sort, Selection Sort, Radix Sort.
2. Implementation of Insert, Delete and Search operations on Single Linked List.
3. Implementation of Insert, Delete and Search operations on doubly Linked List.
4. Implementation of skip list.
5. Implementation of Stack using array and linked list.
6. Converting of Infix Expression to Postfix.
7. Implement the algorithm for Evaluation of Postfix.
8. Implementation of Queue using array and linked list.
9. Implement application of queue.
10. Implementation of Binary Tree Traversals.
11. Implementation of Binary Search Tree.
12. Implementation of Heap Sort.
13. Implementation of Graph Traversal Techniques.
14. Implementation of Hashing.
15. Implementation of string matching algorithm.
16. **Case study-** Given a page of text from a textbook, break each sentences into words, remove whitespaces, punctuations, special symbols from it. Convert all words into unique case(ie either lower or upper case). Perform the following task on those words- find the frequency of each word, find the top k words which are frequent and construct word cloud on those top k words. (Similar type of case studies can be given by the faculty)

Text Books:
1. Brian W Kernighan, Dennis Ritchie, "C Programming Language", PH PTR, 2nd Edition.
2. Richard M Reese, "Understanding and Using C Pointers", O`Reily, 2013.
3. Narasimha karumanchi, "Data Structures and Algorithms Thinking with Python ", Career Monk Publications, 2020

Online Resources:

1. https://nptel.ac.in/courses/106102064/
2. https://www.udemy.com/algorithms-and-data-structures-in-python/

20CAC02

FUNDAMENTALS OF DATA SCIENCE LAB

Instruction	2 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	1

Pre-Requisites: Probability and Statistics

Course Objectives: The objectives of this course are
1. Understand the significance of data science tools.
2. Apply statistical methods to implement various functionalities.
3. Apply exploratory data analytical techniques to deal with single and multiple variables.

Course Outcomes: On successful completion of this course, Student will be able to:
1. Understand the significance of data science tools.
2. Apply statistical methods to implement functionalities in Numpy, Scipy, Pandas packages.
3. Analyze the significance of Inferential Statistics.
4. Apply Exploratory Data Analytical Techniques to visualize Single variable.
5. Apply Exploratory Data Analytical Techniques to visualize Multiple variables.
6. Analyze the significance of Time Series Forecasting.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

List of Experiments
1. Identification and Installation of required softwares/Technologies (python/modules).
2. Implementation of statistical methods in Numpy.
3. Implementation of statistical methods in Scipy.
4. Implementation of statistical methods in Pandas.
5. Demonstration of Inferential Statistics-sampling.
6. Demonstration of Hypothesis testing-variants of t-test.
7. Demonstration of statistical methods Anova.
8. Time Series Forecasting with ARIMA model.

Text Books:
1. EMC Education Services "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley Publishers, 2012.
2. Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.
3. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd ed.

Suggested Readings:
1. JojoMoolayil, "Smarter Decisions: The Intersection of IoT and Data Science", PACKT, 2016.
2. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013.
3. Raj, Pethuru, "Handbook of Research on Cloud Infrastructures for Big Data Analytics", IGI Global.
4. Hastie, Trevor, et al., "The elements of statistical learning: Data Mining, Inference, and Prediction", Vol. 2. No. 1. New York: Springer, 2009.

Online Resources:
1. https://www.topcoder.com/role-of-statistics-in-data-science/
2. https://www.logianalytics.com/predictive-analytics/what-is-predictive-analytics/.
3. https://data-flair.training/blogs/

4. https://www.analyticsvidhya.com/blog/2016/02/time-series-forecasting-codes-python/
5. https://conjointly.com/kb/descriptive-statistics/

20CAI01

MOOCS / TRAINING / INTERNSHIP

Instruction	4 Hours per week
Duration of End Examination	-
Semester End Examination	-
Continuous Internal Evaluation	-
Credits	2

Course Objectives: The objectives of this course are

Course Outcomes: On successful completion of this course, Student will be able to:

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)

SCHEME OF INSTRUCTIONS AND EXAMINATION

Model Curriculum(R-20) 2021-22

B.E. (CSE - Artificial Intelligence and Machine Learning)

SEMESTER –IV

S. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per Week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	20MTC13	Mathematical Foundation for Data Science & Security	3	0	0	3	40	60	3
2	20CSC13	Computer Architecture and Microprocessor	3	0	0	3	40	60	3
3	20CSC14	Data Base Management Systems	3	0	0	3	40	60	3
4	20CSC15	Internet and Web Technologies	2	0	0	3	40	60	2
5	20CAC03	Artificial Intelligence	3	1	0	3	40	60	4
6	20MBC01	Engineering Economics & Accountancy	3	0	0	3	40	60	3
PRACTICAL									
7	20MTC14	Mathematical Foundation for Data Science & Security Lab	0	0	2	3	50	50	1
8	20CSC17	Data Base Management Systems Lab	0	0	2	3	50	50	1
9	20CSC18	Internet and Web Technologies Lab	0	0	4	3	50	50	2
10	20ACT	Activity Points	-	-	-	-	-	-	-
		TOTAL	**17**	**1**	**8**	**-**	**390**	**510**	**22**

L: Lecture T: Tutorial D: Drawing P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

20MTC13

MATHEMATICAL FOUNDATION FOR DATA SCIENCE & SECURITY

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Objectives: The objectives of this course are

1. Able to learn and Analyzing data in Linear and Non-Linear form.
2. Able to fit the hypothetical data using probability distribution.
3. To know the characteristic of various continuous probability distributions
4. To know the impact of number theory before computer age.
5. To know the security issues of Cryptography

Course outcomes: On Successful completion of the course, students will be able to

1. Analyze the coefficient of skewness and fitting of the data by various methods
2. Apply properties of Mathematical Expectations and analyse the various distributions.
3. Evaluate areas of curves by using various distributions.
4. Apply various technics of Number Theory for solving problems
5. Apply RSA –PKC for solving security issues.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT-I: Curve Fitting

Measures of Central Tendency, Measures of Dispersion, Moments (Moments about the mean and moments about a point).Skewness, Karl Pearson's coefficient of skewness and Bowley's coefficient of skewness for frequency distribution, Kurtosis. Correlation, coefficient of correlation, limits of correlation coefficient. Linear Regression, Regression coefficients, Properties of Regression Coefficients. Curve fitting by the Method of Least Squares, Fitting of Straight lines, Second degree parabola and Growth curve ($y = ae^{bx},\ y = ax^{b} and y = ab^{x}$).

UNIT-II: Mathematical Expectation and Discrete Probability Distribution

Basic Probability, Conditional Probability, Baye's theorem. Random variable, discrete random variable, Probability Mass Function, continuous random variable, probability density function.Mathematical expectation, properties of Expectation, properties of variance and co-variance. Poisson distribution, MGF and Cumulates of the Poisson distribution, Recurrence formula for the probabilities of Poisson distribution (Fitting of Poisson distribution)

UNIT-III: Continuous Probability Distributions

Normal distribution, Characteristics of normal distribution and Normal probability Curve, MGF and CGF of Normal distribution, Areas under normal curve. Uniform distribution, moment generating function, mean and variance of uniform distribution. Exponential distribution, MGF, CGF, Mean and Variance of Exponential distribution.

UNIT-IV: Number Theory

Division Algorithm, Greatest Common Divisor, Euclidean Algorithm, Diophantine Equation ax+by=c, Fundamental Theorem of Arithmetic, Little Fermat's Theorem, Wilson's Theorem, Euler's Phi-Function, Euler's Theorem, Some Properties of the Phi-Function.

UNIT-V: Cryptography (RSA – PKC)

The RSA public key cryptosystem, Implementation and security issues, Pollard's p−1 factorization algorithm, Quadratic Residues and quadratic reciprocity

Text books:

1. S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 2014.
2. Burton, David M. (2007) Elementary Number Theory (7^{th}edu.). Tata McGraw Hill Edition, Indian Reprint
3. Mathematical Cryptography by Jeffrey Hoffstein, Jill Pipher, Joseph H. Silverman Springer Science+ Business Media LLC.

Suggested Reading:

1. W. Feller, "An Introduction to Probability Theory and its Applications", Vol. 1, 3rd Ed., Wiley, 1968.
2. Sheldon Ross, "A First Course in Probability", 9th Edition, Pearson publications, 2014.
3. Koshy, T. Elementary Number Theory with Applications, Elsevier Publications, New Delhi, 2002.
4. G.A.Jones & J.M.Jones "Elementary Number Theory", Springer UTM,2007

20CSC13

COMPUTER ARCHITECTURE AND MICROPROCESSOR

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Pre-requisites: Digital Logic Design.

Course Objectives: The objectives of this course are

1. To understand the basic principles of Instruction Level Architecture and Instruction Execution, Memory System Design.
2. To learn various I/O devices and its operations, knowledge on Instruction Level Parallelism.
3. To impart the knowledge on Micro Programming and Pipelining techniques.

Course Outcomes: On Successful completion of this course, student will be able to

1. Understand the functional block diagram of single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
2. Design assembly language program for specified computing 16 bit multiplication, division and I/O device interface.
3. Derive flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4. Design a memory module and analyze its operation by interfacing with the CPU.
5. Apply design techniques to enhance performance using pipelining, parallelism and RISC methodology.
6. Develop testing and experimental procedures on Microprocessor and analyze their operation under different cases.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	-	1	-	-	-	-	-	2	1	-	1	-		1
CO2	2	1	1	2	3	-	-	-	3	1	2	-	2		1	1
CO3	1	2	-	1	-	-	-	-	-	2	-	1	-		1	1
CO4	-	2	2	1	-	-	-	-	3	1	-	1	-		1	1
CO5	-	3	2	1	1	-	-	-	-	1	-	1	-	1	2	3
CO6	-	1	1	1	1	2	2	-	3	1	-	3	2	1	2	3

UNIT - I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi-computers. **Arithmetic:** Addition and Subtraction of Signed numbers, Design of fast adders, Multiplication of positive numbers, Signed-Operand Multiplication, Integer Division.

UNIT - II

Basic Processing Unit: Fundamental concepts, Execution of a complete instruction, Multiple-Bus organization, Hardwired control, Microprogrammed control. **8086 Architecture:** CPU Architecture, Internal operation, Machine language instructions, Addressing modes, Instruction formats, Instruction execution timing.

UNIT- III

Assembly Language Programming: Instruction format, Data transfer instructions, Arithmetic instructions. **Assembly Language Programming:** Branch instructions, Loop instructions, NOP and HLT, Flag manipulation instructions, Logical instructions, Shift and Rotate instructions, Directives and Operators. **Modular Programming:** Linking and Relocation, Stacks, Procedures, Interrupts and Interrupt routines, Macros and String instructions, REP prefix.

UNIT - IV

Peripheral devices and their characteristics: Input-output subsystems, I/O deviceinterface,I/Otransfers– ProgramControlled,InterruptDrivenandDMA, privileged and non-privileged instructions, software interrupts

and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces– SCSI,USB.

Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Superscalar operation, Performance considerations.

UNIT – V

The Memory System: Memory hierarchy ,Semiconductor RAM Memories, Cache Memories, Performance considerations, Virtual Memories, Memory Management requirements, Secondary Storage. **Large Computer Systems:** Forms of Parallel Processing, Array Processors, Structure of general purpose multiprocessors, Program parallelism and shared variables.

Text Books:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization",5thEdition, McGraw Hill Education Edition2011.
2. Yu-chengLiu, Glenn A.Gibson, "Microcomputer Systems: The 8086/ 8088 Family", 2nd Edition, PHI Learning 2011.

Suggested Reading:

1. M. M. Mano, "Computer System Architecture", 3rd edition, Prentice Hall,1994.
2. William Stallings, "Computer Organisation and Architecture, Design for Performance", Pearson, 9th Edition, 2013.
3. Douglas Hall. "Microprocessor and Interfacing programming and Hardware", Tata McGraw Hill, Revised 2nd Edition, 2007.
4. Brey B. Brey, "The Intel Microprocessor, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro-Processors-Architecture, Programming and Interfacing", 4thEdition, Prentice Hall.

20CSC14

DATA BASE MANAGEMENT SYSTEMS

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Pre-requisites: Discrete mathematics of computer science, Programming and data structures.

Course Objectives: The objectives of this course are

1. To become familiar with fundamental concepts of database management. These concepts include aspects of database design, database languages and database-system implementation.
2. To understand about data storage techniques and indexing.
3. To impart knowledge in transaction management, concurrency control techniques and recovery procedures.

Course Outcomes: On Successful completion of the course, students will be able to

1. Classify the difference between FMS and DBMS; describe the roles of different users and the structure of the DBMS .Design the database logically using ER modeling.
2. Outline the schema of the relational database and key constraints. Develop queries using fundamental ,extended operators of relational algebra and DDL, DML and DCL of SQL.
3. Explore the inference rules for functional dependencies and apply the principles of normal forms to decompose the relations in a database.
4. Summarize the concepts of dense, sparse, ISAM and B+ tree indexing and get familiar with static and extendable techniques of hashing .
5. Explain the states and properties of transaction. Interpret the locking, time stamp, graph and validation based protocols for concurrency control.
6. Relate log based, ARIES recovery techniques to increase the robustness of the database, identify to resolve the deadlocks in the transaction .

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT - I

Introduction : Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Users and Administrators, Database System Architecture, Application Architectures. **Database Design and E-R Model:** Overview of the Design Process, Data Models, The E-R Model, Constraints, E-R Diagrams, E-R Design Issues, Extended E-R Features, Reduction to Relation Schemas.

UNIT - II

Relational Model: Structure of Relational Databases, Database Schema, Keys, Relational Algebra, Fundamental Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations. **Structured Query Language:** Overviews, SQL Data Types, Basic Structure of SQL Queries, Modification of the Database, Set Operations, Aggregate Functions, Data-Definition Language, Integrity Constraints, Null Values, Views, Join Expression. Index Definition in SQL.

UNIT- III

Relational Database Design: Undesirable Properties in Relational Database Design, Functional Dependencies, Trivial and Nontrivial Dependencies, Closure of Set of Functional Dependencies, Closure of Set of Attributes, Irreducible Set of Functional Dependencies, Normalization–1NF,2NFand 3NF,Dependency Preservation,

BCNF, Comparison of BCNF and 3NF.Indexing: Basic Concepts, Primary Index, Dense and Sparse Indices, Secondary Indices, Tree-Structured Indexing, Indexed Sequential Access Method (ISAM), B+Tree Index Files.

UNIT - IV

Hash based Indexing: Static Hashing, Extendible Hashing. **Transaction Management and Concurrency Control:** Transaction Concept – ACID Properties, States of Transaction, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity.

UNIT - V

Deadlocks: Deadlock Prevention, Deadlock Detection and Recovery. **Recovery System:** Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery, Recovery with Concurrent Transactions, Buffer Management, Failure with Loss of Non-volatile Storage, ARIES Recovery Method, Remote Backup Systems.

Text Books:

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, "Database System Concepts",Sixth Edition, McGraw-Hill International Edition, 2011.
2. Date CJ, Kannan A, Swamynathan S, "An Introduction to Database Systems", Eight Editions, Pearson Education, 2006.
3. Raghu Ramakrishnan, Johnnes Gehrke, "Database Management Systems",Third Edition,McGrawHill, 2003.
4. Ramez Elmasri, Durvasul VLN Somayazulu, Shamkant B Navathe, Shyam K Gupta, "Fundamentals of Database Systems", Fourth Edition, Pearson Education,2006.

Suggested Reading:

1. J.D.Ullman, "Principles of Database Systems", Galgotia.

Online Resources:

1. http://www.nptelvideos.in/2012/11/database-managementsystem.html

20CSC15

INTERNET AND WEB TECHNOLOGIES

Instruction	2Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	2

Pre-requisites: Programming and Problem Solving, Object Oriented Programming concepts.

Course Objectives: The objectives of this course are
1. Acquire knowledge on XHTML, Java Script and XML to develop client side web applications.
2. Acquire knowledge on web frameworks to develop server side web applications
3. Develop dynamic web content using Django.

Course Outcomes: On Successful completion of this course, student will be able to
1. Understand the technologies required for developing web application.
2. Identify and choose XHTML tags, CSS and java scripts to develop well structured and easily maintained web pages.
3. Design and Develop interactive and innovative web pages using various platforms/technologies like XHTML, CSS, XML, JAVASCRIPT.
4. Create and deploy web applications in web server by using server-side programming concepts like Python.
5. Build a data driven web site using different frameworks and Databases.
6. Evaluate different web applications to implement optimal solutions for real time problems.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	1	1	-	-	-	-	1	-	-	-	-	-	-	-
CO2	2	1	1	1	-	-	-	-	1	-	-	-	-	-	-	-
CO3	2	2	2	2	3	-	-	-	1	-	-	-	-	-	2	2
CO4	2	2	2	2	3	-	-	-	1	3	1	3	-	-	-	-
CO5	2	2	2	2	3	3	-	-	1	-	1	3	-	-	2	2
CO6	2	2	2	2	3	3	-	3	3	3	3	3	-	-	3	3

UNIT – I

Web Basics and Overview: Introduction to Internet, World Wide Web, URL, MIME,HTTP Transactions**,** Enterprise Application Architecture styles, containers, Client-Side Scripting, Server-Side Scripting, Accessing Web Servers, Apache and MySQL, IDE's.

UNIT – II

XHTML: Introduction to basics of XHTML, Cascading Style Sheets.
XML: Introduction to XML, XML document structure, DTD, Namespaces and XML Schemas.

UNIT - III

The Basics of Java script: Primitive operations and Expressions, Arrays, Functions, Pattern Matching Using Regular Expressions, Document Object Model, Element Access in JavaScript, Events and Event Handling, Handling Events from Body, Button, Text Box and Password Elements.
Dynamic Documents with Java Script: Positioning Elements, Moving Elements, Changing Colors and Fonts, Dynamic Content.

UNIT – IV

Django: Introduction, Models, Templates, supported data bases, URL configuration. Templates, Modifying and Improving the Templates , Creating a Form, Connecting Django with databases, enable Django sessions.

UNIT – V

Applications: Introduction to Ajax, Node.js and JSON.
Bootstrap: Introduction to Bootstrap, bootstrap grid, bootstrap components.
Web Application Frameworks: AngularJS, JQuery, Flask, Web2py, FuelPhP**.**

Text Books

1. Nigel George, "Build a Website with Django 3", GNW Independent Publishing, Hamilton NSW, Australia,2019
2. HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Dreamtech,2017.
3. Robert W Sebesta, "Programming the World Wide Web", Pearson Education, 8th Edition-2013
4. Adrian Holovaty and Jacob Kaplan-Moss "The Definitive Guide to Django Web Development Done Right", après- 2009
5. P.J.Deitel – Deitel, H.M.Deitel – Deitel, "Internet & World Wide Web How To Program", 5th Edition, Prentice Hall, 2007.
6. Miguel Grinberg ,"Flask Web Development", First edition-2014

Suggested Reading

1. Web Technologies, Uttam K Roy, Oxford University Press
2. Chris Bates, "Web Programming, building internet applications", 2nd edition, John Wiley & Sons, 2010.
3. JavaScript for Modern Web Development: Building a Web Application Using HTML, CSS, and Java Script, by Alok Ranjan , Abhilasha Sinha , Ranjit Battwad,bpb,2020.

Online Resources

1. https://www.w3.org/standards/webdesign/
2. https://www.w3schools.com/angular/
3. https://www.w3schools.com/jquery/default.asp
4. https://www.tutorialspoint.com/flask/index.htm
5. https://www.tutorialspoint.com/web2py/index.htm
6. https://www.tutorialspoint.com/fuelphp/index.htm

20CAC03

ARTIFICIAL INTELLIGENCE

Instruction	3 Hours per week
Tutorial	1 Hour
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	4

Pre-requisites: Data structures, Discrete Mathematics, Probability Theory.

Course Objectives: The objectives of this course are
1. To list the significance of AI.
2. To discuss the various components that is involved in solving an AI problem.
3. To analyze the various knowledge representation schemes, reasoning and learning techniques of AI.

Course Outcomes: On Successful completion of the course, students will be able to
1. Explain the role of agents and interaction with the environment to establish goals.
2. Identify and formulate search strategies to solve problems by applying suitable search strategy.
3. Compare and contrast the various knowledge representation schemes of AI.
4. Appraise probabilistic reasoning and Markov decision process to solve real world problems.
5. Apply the AI concepts to build an expert system to solve the real-world problems.
6. Describe learning paradigms in machine learning.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT - I

Introduction: Foundations of AI, History, State of the Art, Risks and Benefits.
Intelligent agents: Agents and Environment, The Concept of Rationality, Structure of an Agent.
Solving problems by Search- Problem-Solving Agents, State space representation, Search graph and Search tree Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Best first search, A* algorithm, Iterative deepening Depth-first search, Bidirectional search.

UNIT - II

Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Hill-climbing search, Simulated annealing search.
Adversarial Search: Game Theory, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions. Constraint Satisfaction Problems.

UNIT - III

Logic Concepts and Logic Programming: Introduction, Propositional Calculus Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Table, A System in Propositional Logic, Resolution, Refutation in Propositional Logic, Predicate Logic, Logic Programming.
Knowledge Representation: Introduction, approaches to knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT - IV

Probabilistic Reasoning: Probability, inference using full joint distributions, Bayes rule, Bayesian networks-representation, construction, exact and approximate inference, temporal model, hidden Markov model.
Markov Decision process: MDP formulation, utility theory, multi attribute utility functions, decision networks, value iteration, policy iteration and partially observable MDPs.

UNIT - V

Expert System and Applications: Introduction, Phases in Building Expert Systems Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells, and tools.

Machine - Learning Paradigms: Introduction, Machine learning System, Supervised and Unsupervised Learning, Inductive Learning, Learning Decision Trees, Deductive Learning, Clustering.

Textbooks:

1. Russell, Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education, 4th Edition, 2020.
2. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, First Edition, 2011.

Suggested Reading:

1. Rich, Knight, Nair, "Artificial Intelligence", Tata McGraw Hill, 3rd Edition 2009.
2. Trivedi. M.C., "A classical approach to Artificial Intelligence", Khanna Publishing House, Delhi.

Online Resources:

1. http://nptel.ac.in/courses/106106126/
2. http://nptel.ac.in/courses/106105077/

20MBC01

ENGINEERING ECONOMICS AND ACCOUNTANCY

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

Course Objectives: The Objectives of the Course are:
1. To demonstrate the importance of Managerial Economics in Decision Making.
2. To explain the concept of Accountancy and provide basic knowledge on preparation of Final accounts.
3. To understand the importance of Project Evaluation in achieving a firm's Objective.

Course Outcomes: After Completion of the Course, Student will be able to:
1. Apply fundamental knowledge of Managerial Economics concepts and tools.
2. Analyze various aspects of Demand Analysis, Supply and Demand Forecasting.
3. Understand Production and Cost relationships to make best use of resources available.
4. Apply Accountancy Concepts and Conventions and preparation of Final Accounts.
5. Evaluate Capital and Capital Budgeting decision based on any technique.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

UNIT-I: Introduction to Managerial Economics

Introduction to Economics and its evolution - Managerial Economics - its Nature and Scope, Importance; Relationship with other Subjects. Its usefulness to Engineers; Basic concepts of Managerial economics - Incremental, Time perspective, Discounting Principle, Opportunity Cost, Equi marginal Principle, Contribution, Negotiation Principle.

UNIT-II: Demand and Supply Analysis

Demand Analysis - Concept of Demand, Determinants, Law of demand - Assumptions and Exceptions; Elasticity of demand - Price, Income and Cross elasticity - simple numerical problems; Concept of Supply - Determinants of Supply, Law of Supply; Demand Forecasting - Methods.

Unit-III: Production and Cost Analysis

Theory of Production - Production function - Isoquants and Isocosts, MRTS, Input-Output Relations; Laws of returns; Internal and External Economies of Scale.

Cost Analysis: Cost concepts – Types of Costs, Cost-Output Relationship – Short Run and Long Run; Market structures – Types of Competition, Features, Price Output Determination under Perfect Competition, Monopoly and Monopolistic Competition; Break-even Analysis – Concepts, Assumptions, Limitations, Numerical problems.

UNIT-IV: Accountancy

Book-keeping, Principles and Significance of Double Entry Book Keeping, Accounting Concepts and Conventions, Accounting Cycle, Journalization, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments. Ratio Analysis.

UNIT-V: Capital and Capital Budgeting: Capital and its Significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Capital Budgeting, Methods: Traditional and Discounted Cash Flow Methods - Numerical problems.

Text Books:

1. Mehta P.L., "Managerial Economics: Analysis, Problems and Cases", Sultan Chand & Son's Educational publishers, 2016.

2. Maheswari S.N. “Introduction to Accountancy”, Vikas Publishing House, 11th Edition, 2013.

Suggested Readings:

1. Panday I.M. “Financial Management”, 11th edition, Vikas Publishing House, 2015.
2. Varshney and K L Maheswari, Managerial Economics, Sultan Chand, 2014.
3. M. Kasi Reddy and S. Saraswathi, Managerial Economics and Financial Accounting, Prentice Hall of India Pvt Ltd, 2007.
4. A. R. Aryasri, Managerial Economics and Financial Analysis, McGraw-Hill, 2013.

20MTC14

MATHEMATICAL FOUNDATION FOR DATA SCIENCE & SECURITY LAB

Instruction	2 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	1

Course Objectives: The objectives of this course are

1. Able to learn and Analyzing data in Linear and Non-Linear form.
2. Able to fit the hypothetical data using probability distribution.
3. To know the characteristic of various continuous probability distributions
4. To know the impact of number theory before computer age.
5. To know the security issues of Cryptography

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

1. Analyze the coefficient of skewness and fitting of the data by various methods
2. Apply properties of Mathematical Expectations and analyze the various distributions.
3. Evaluate areas of curves by using various distributions.
4. Apply various techniques of Number Theory for solving problems
5. Apply RSA –PKC for solving security issues.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

List of Programs

1. Write a Program for Create Graphs and Charts
2. Write a Program for Calculate measures of Central Tendency for the data
3. Write a Program for Standard Deviation for the data
4. Write a Program for Correlation and Covariance using Pearson method
5. Write a Program for simple linear Regression and Logistic regression
6. Write a Program for Compute probabilities using Binomial Distribution
7. Write a Program for Compute Probabilities using Poisson Distribution
8. Write a Program for Compute Probabilities using Normal Distribution

Text books:

1. S.R.Mani Sekhar, Dr. T.V. Suresh Kumar, “Programming with R” CENGAGE Publishers, 2017.
2. K.G.Srinivasa, G.M.Siddesh, “Statistical Programming in R”, Oxford University Press, 2017.
3. Jared P Lander, “R for Everyone” Pearson.2018.
4. http://www.cyclismo.org/tutorial/R/

20CSC17

DATA BASE MANAGEMENT SYSTEMS LAB

Instruction	2 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	1

Course Objectives: The objectives of this course are

1. To become familiar with the concepts of structured query language.
2. To understand about programming language / structured query language (PL/SQL).
3. To become familiar with generation of form and open database connectivity.
4. Add constraints on Databases implement DCL, TCL and advanced SQL commands.
5. Develop programs using cursors, triggers, exceptions, procedures and functions in PL/SQL.

Course Outcomes: On Successful completion of the course, students will be able to

1. Outline the built-in functions of SQL and apply these functions to write simple and complex queries using SQL operators .
2. Demonstrate Queries to Retrieve and Change Data using Select, Insert, Delete and Update. Construct Queries using Group By, Order By and Having Clauses.
3. Demonstrate Commit, Rollback , Save point commands , SQL Plus Reports and formulate the Queries for Creating, Dropping and Altering Tables, Views, constraints.
4. Develop queries using Joins, Sub-Queries and Working with Index, Sequence, Synonym, Controlling Access and Locking Rows for Update, Creating Password and Security features.
5. Demonstrate the usage of data types , Bind and Substitution Variables , Anchored, Declarations , Assignment Operation and PL/SQL code using Control Structures .
6. Develop PL/SQL code using Cursors, Exception, Composite Data Types and Procedures, Functions and Packages.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

SQL:

1. Queries using Built-In functions, like aggregate functions, String Functions, Numeric Functions, Data Functions, Conversion Functions and other miscellaneous.
2. Queries using operators in SQL.
3. Queries to Retrieve and Change Data: Select, Insert, Delete and Update.
4. Queries using Group By, Order By and Having Clauses.
5. Queries on Controlling Data: Commit, Rollback and Save point.
6. Queries to Build Report in SQL *PLUS.
7. Queries for Creating, Dropping and Altering Tables, Views and Constraints.
8. Queries on Joins and Correlated Sub-Queries.
9. Queries on Working with Index, Sequence, Synonym, Controlling Access and Locking Rows for Update,
10. Creating Password and Security features.

PL/SQL:

11. Write a PL/SQL code using Basic Variable, Anchored Declarations and Usage of Assignment Operation.
12. Write a PL/SQL code Bind and Substitution Variables, Printing in PL/SQL.
13. Write a PL/SQL block using SQL and Control Structure sin PL/SQL.
14. Write a PL/SQL code using Cursors, Exception and Composite Data Types.
15. Write a PL/SQL code using Procedures, Functions and Packages.

Note: The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

Text Books / Suggested Reading:

1. "Oracle: The complete Reference", by Oracle Press.
2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007.
3. Rick FVander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007.

20CSC18

INTERNET AND WEBTECHNOLOGIES LAB

Instruction	4 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation	50 Marks
Credits	2

Pre-requisites: Programming and Problem Solving, Object Oriented Programming concepts.

Course Objectives: The objectives of this course are
1. To acquire knowledge on XHTML, Java Script, Ajax, Node.js, JSON, Bootstrap and XML to develop web applications.
2. Ability to develop dynamic web content using web frameworks.
3. To understand the design and development process of a complete web application.

Course Outcomes: On Successful completion of this course, student will be able to
1. Identify and install web development tools.
2. Develop client side web pages using XHTML , CSS and XML.
3. Create dynamic, interactive web applications using java script.
4. Develop server side web application using Django Frame work.
5. Understanding working of Ajax, Node.js and JSON.
6. Identify and explore different frame works for web applications.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	-	-	1	3	-	-	-	1	-	-	2	-	-	-	-
CO2	1	2	2	2	-	-	-	3	2	1	2	2	-	-	2	2
CO3	1	2	2	2	3	-	-	3	2	1	2	2	-	-	-	-
CO4	1	2	2	2	2	-	-	3	2	1	2	2	-	-	2	2
CO5	1	2	2	2	2	-	-	3	2	1	2	2	-	-	-	-
CO6	1	2	2	2	2	-	-	3	2	1	2	2	-	-	-	-

LIST OF PROGRAMS
1. Creation of development environment (IDE, Web Server)
2. Design simple web pages using XHTML and CSS.
3. Create well-formed document using DTD and XML schema.
4. Develop an application to validate form fields using java script.
5. Installation of Django and creation of web pages.
6. Create a form validation and session handling in Django.
7. Develop a data driven web application using databases (MySQL/SQLite).
8. Create a responsive web site using bootstrap.
9. Build an application on Ajax, Node.js and JSON.
10. Exploration of web frame works (AngularJS, JQuery, Flask, Web2py, Fuel PhP).

Text Books:
1. Nigel George, "Build a Website with Django 3", GNW Independent Publishing, Hamilton NSW, Australia,2019
2. HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, JQuery), Dreamtech,2017.
3. Robert W Sebesta, "Programming the World Wide Web", Pearson Education, 8th Edition-2013
4. Adrian Holovaty and Jacob Kaplan-Moss "The Definitive Guide to Django Web Development Done Right", aprèss- 2009
5. P.J.Deitel – Deitel, H.M.Deitel – Deitel, "Internet & World Wide Web How To Program", 5th Edition, Prentice Hall, 2007.
6. Miguel Grinberg ,"Flask Web Development", First edition-2014

Suggested Reading:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. Chris Bates, "Web Programming, building internet applications", 2nd edition, John Wiley & Sons, 2010.
3. JavaScript for Modern Web Development: Building a Web Application Using HTML, CSS, and Java Script, by Alok Ranjan ,Abhilasha Sinha , Ranjit Battwad,bpb,2020.

Online Resources:

1. https://websitesetup.org/bootstrap-tutorial-for-beginners/
2. https://www.guru99.com/node-js-tutorial.html.
3. https://www.w3.org/standards/webdesign/
4. https://www.w3schools.com/angular/
5. https://www.w3schools.com/jquery/default.asp
6. https://www.tutorialspoint.com/flask/index.htm
7. https://www.tutorialspoint.com/web2py/index.htm
8. https://www.tutorialspoint.com/fuelphp/index.htm