

Artificial Intelligence & Data Science (R20)
COURSE STRUCTURE

I - SEMESTER

S.No	Course Code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE01	Professional Communication-I	2	0	0	2	30	70	100
2	20FE03	Differential Equations	2	1	0	3	30	70	100
3	20FE06	Engineering Chemistry	3	0	0	3	30	70	100
4	20AD01	Computational Programming	3	0	0	3	30	70	100
5	20CS02	Digital Logic Design	3	0	0	3	30	70	100
Laboratory Courses									
6	20FE53	Engineering Chemistry Lab	0	0	3	1.5	15	35	50
7	20AD51	Computational Programming Lab	0	0	3	1.5	15	35	50
8	20CS52	Digital Logic Design Lab	0	0	2	1	15	35	50
9	20IT51	IT Workshop	0	0	3	1.5	15	35	50
Total			13	1	11	19.5	210	490	700

II - SEMESTER

S.No	Course Code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE02	Professional Communication-II	2	0	0	2	30	70	100
2	20FE04	Linear Algebra and Transformation Techniques	2	1	0	3	30	70	100
3	20FE07	Applied Physics	2	1	0	3	30	70	100
4	20CS03	Data Structures	3	0	0	3	30	70	100
5	20CS04	Discrete Mathematical Structures	3	0	0	3	30	70	100
6	20MC01	Constitution of India	2	0	0	0	30	70	100
Laboratory Courses									
7	20FE51	Professional Communication Skills Lab	0	0	2	1	15	35	50
8	20FE54	Applied Physics Lab	0	0	3	1.5	15	35	50
9	20CS53	Data Structures Lab	0	0	3	1.5	15	35	50
10	20ME53	Computer Aided Engineering Drawing	0	0	3	1.5	15	35	50
Total			14	2	11	19.5	240	560	800

III SEMESTER

S.No	Course code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE09	Probability and Statistics	3	0	0	3	30	70	100
2	20MC02	Environmental Science	2	0	0	0	30	70	100
3	20CS06	Design and Analysis of Algorithms	3	0	0	3	30	70	100
4	20AD02	Python for Data Science	3	0	0	3	30	70	100
5	20CS07	Database Management Systems	3	0	0	3	30	70	100
6	20AD03	Computer Architecture	3	0	0	3	30	70	100
Laboratory Courses									
7	20AD52	Python for Data Science Lab	0	0	3	1.5	15	35	50
8	20CS56	Database Management Systems Lab	0	0	3	1.5	15	35	50
9	20IT53	UI / UX Design Lab	0	0	3	1.5	15	35	50
10		Skill Oriented Course – 1	0	0	4	2	-	50	50
Total			17	0	13	21.5	225	575	800

IV SEMESTER

S.No	Course code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20CS09	Object Oriented Programming	3	0	0	3	30	70	100
2	20HS01	Universal Human values 2: Understanding Harmony	3	0	0	3	30	70	100
3	20CS11	Operating Systems	3	0	0	3	30	70	100
4	20AD04	Machine Learning	3	0	0	3	30	70	100
5	20AD05	Automata and Compiler Design	3	0	0	3	30	70	100
Laboratory Courses									
6	20CS57	Object Oriented Programming Lab	0	0	3	1.5	15	35	50
7	20CS59	Operating Systems Lab	0	0	3	1.5	15	35	50
8	20AD53	Machine Learning Lab	0	0	3	1.5	15	35	50
9		Skill Oriented Course - II	1	0	2	2	-	50	50
Total			15	0	13	21.5	195	505	700

L	T	P	Cr.
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Pre-requisites: Nil

Course Educational Objectives: To improve English language proficiency of the students on various aspects like vocabulary, grammar, communication skills, listening skills, Reading & Writing skills.

Course Outcomes: At the end of the course, the student will be able to

- CO1** : Write sentences and paragraphs using proper grammatical structures and word forms (Remember – L1)
- CO2** : Comprehend the given text by employing suitable strategies for skimming and scanning and draw inferences (Understand – L2)
- CO3** : Write summaries of reading texts using correct tense forms & appropriate structures (Remember – L1)
- CO4** : Write Formal Letters; Memos & E-Mails (Apply – L3)
- CO5** : Edit the sentences/short texts by identifying basic errors of grammar/vocabulary/syntax (Understand – L2)

Unit - I

Exploration - ‘A Proposal to Girdle the Earth – Nellie Bly’; Reading: Skimming for main idea; Scanning for specific information; Grammar & Vocabulary: Content Words; Function Words; Word Forms: verbs, nouns, adjectives and adverbs; Nouns: Countable and Uncountable, Singular and Plural forms; Wh - Questions; Word Order in Sentences; Writing: Paragraph Analysis; Paragraph Writing; Punctuation and Capital Letters

Unit – II

On Campus- ‘The District School as it Was by One Who Went to it – Warren Burton’; Reading: Identifying Sequence of Ideas; Grammar & Vocabulary: Cohesive Devices: Linkers/signposts/Transition signals, Synonyms, Meanings of Words/Phrases in the context; Writing: Memo Drafting.

Unit – III

Working Together- ‘The Future of Work’

Reading: Making basic inferences; Strategies to use text clues for comprehension; Summarizing; Grammar & Vocabulary: Verbs: Tenses; Reporting Verbs for Academic Purpose; Writing: Rephrasing what is read; Avoiding redundancies and repetitions Abstract Writing/ Summarizing.

Unit – IV

‘A.P.J.AbdulKalam’; Grammar & Vocabulary: Direct & Indirect Speech; articles and their Omission; Writing: E-Mail Drafting.

Unit – V

‘C.V.Raman’; Grammar & Vocabulary: Subject-Verb Agreement; Prepositions; Writing: Formal Letter Writing.

Text Books:

1. Prabhavati. Y & et al, “English All Round – Communication Skills for Undergraduate Learners”, Orient Black Swan, Hyderabad, 2019.
2. “Panorama – A Course on Reading”, A collection of prose selections, Oxford University Press, New Delhi, 2016.

Reference Books:

1. Swan,M., “Practical English Usage”, Oxford University Press, 2016.
2. Kumar,S and Latha, P, “Communication Skills”, Oxford University Press, 2018.
3. Rizvi Ashraf M., “Effective Technical Communication”, Tata Mc Graw Hill, New Delhi, 2008.
4. BaradwajKumkum, “Professional Communication”, I.K.International Publishing House Pvt.Lt., New Delhi, 2008.
5. Wood,F.T., “Remedial English Grammar”, Macmillan, 2007.

B.Tech.(I Sem.)

20FE03 - DIFFERENTIAL EQUATIONS

L	T	P	Cr.
2	1	0	3

Pre-requisites: Nil

Course Educational Objective: The objective of this course is to introduce the first order and higher order differential equations, functions of several variables. The students also learn solving of first order partial differential equations.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Apply first order and first-degree differential equations to find orthogonal trajectories
(Apply – L3)

CO2: Distinguish between the structure and methodology of solving higher order differential equations with constant coefficients (**Understand – L2**)

CO3: Apply various Numerical methods to solve initial value problem (**Apply – L3**)

CO4: Generate the infinite series for continuous functions and investigate the functional Dependence (**Understand – L2**)

CO5: Solve partial differential equations using Lagrange's method (**Apply – L3**)

UNIT – I**Differential Equations of First Order and First Degree**

Differential equations of first order and first degree –Exact and Non Exact differential Equations, Applications of differential equations – Orthogonal Trajectories.

UNIT – II**Linear Differential Equations of Higher Order**

Homogeneous and Non Homogeneous Linear differential equations of second and higher order with constant coefficients with R.H.S. functions e^{ax} , $\sin(ax+b)$, $\cos(ax+b)$, x^m , $e^{ax}V(x)$, $xV(x)$, Method of variation of parameters.

UNIT – III**Numerical solution of Ordinary Differential Equations**

Numerical solution of Ordinary Differential equations, Solution by Taylor's series - Picard's Method of successive approximations.

Euler's Method - Runge- Kutta Methods.

UNIT – IV**Functions of several variables**

Generalized Mean Value Theorem (without proof), Maclaurin's series, Functions of several variables, Jacobians (Cartesian and polar coordinates), Functional dependence. Maxima and Minima of function with two variables.

UNIT – V**Partial Differential Equations**

Formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions. Solution of first order and first degree linear partial differential equation – Lagrange's method.

Text Books:

1. B.S. Grewal, “*Higher Engineering Mathematics*”, 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, “*Higher Engineering Mathematics*”, 1st Edition, TMH Publications, New Delhi, 2010.

Reference Books:

1. M. D. Greenberg, “*Advanced Engineering Mathematics*”, 2nd Edition, TMH Publications, New Delhi, 2011.
2. Erwin Kreyszig, “*Advanced Engineering Mathematics*”, 8th Edition, John Wiley & sons, New Delhi, 2011.
3. W.E. Boyce and R. C. DiPrima, “*Elementary Differential Equations*”, 7th Edition, John Wiley & sons, New Delhi, 2011.
4. S. S. Sastry, “*Introductory Methods of Numerical Analysis*” 5th Edition, PHI Learning Private Limited, New Delhi, 2012.

B.Tech (I Sem.)

20FE06 - ENGINEERING CHEMISTRY

L	T	P	Cr.
3	0	0	3

Pre-requisites: Nil

Course Educational Objectives: It enables the students to understand the fundamental concepts of chemistry and to provide them with the knowledge of industrial problems and finding the solutions. It helps to strengthen the basic concepts of electrochemistry, corrosion, nanotechnology, polymers, liquid crystals and analytical techniques.

Course Outcomes: At the end of the course, students will be able to,

- CO1:** Apply Nernst Equation for calculating electrode cell potentials and compare batteries for different applications. (**Apply - L3**)
- CO2:** Apply principles of corrosion for design and effective maintenance of various equipment. (**Apply - L3**)
- CO3:** Analyse the suitability of advanced materials like nano materials in electronics and medicine. (**Understand - L2**)
- CO4:** Identify the importance of liquid crystals, polymers in advanced technologies. (**Understand - L2**)
- CO5:** Apply the principles of analytical techniques in chemical analysis. (**Apply - L3**)

UNIT – I**Electro Chemistry & Batteries**

Types of Electrodes - Calomel Electrode, Glass Electrode, Calculation of EMF of Cell, Applications of Nernst Equation & Electro chemical Series, Batteries - Lead-acid Battery, Lithium ion Battery, H₂ – O₂ Fuel Cell, Mg - Cu reserve battery.

UNIT – II**Science of Corrosion**

Dry Corrosion (Direct Chemical corrosion) - Types of dry corrosion-oxidative corrosion, Pilling Bed worth rule, corrosion by other gases and liquid metal corrosion; Wet Corrosion (Electro Chemical corrosion) - Mechanism-oxygen absorption, hydrogen evolution, types of wet corrosion, Galvanic Corrosion, Concentration Cell Corrosion, passivity and Galvanic series; Factors Influencing Corrosion - Nature of metal (Purity, position in galvanic series, relative area of cathode & anode, nature of surface film) and nature of environment (temperature, humidity, atmospheric pollution and nature of ions in the medium); Control of Corrosion: Cathodic Protection - Sacrificial anode and impressed current methods, electro plating and metal cladding.

UNIT – III**Chemistry of Engineering Materials**

Nano Materials - Extraordinary changes observed at nano size of materials and reasons, types of nano-materials, Gas-Phase Synthesis of nanomaterials, Applications; Materials in Electronic devices: Very brief note on raw materials that make IC units of CPU, GPU, RAM, PCBs, hard disks and other electronic devices with special reference to polymers;

Molecular Switches - Characteristics of Molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, molecular elevator, automated light-powered molecular motor.

UNIT – IV

Liquid Crystals & Polymers

Liquid crystals -Identification and structural aspects of molecules to form liquid crystals; Classification of liquid crystals -Thermo tropic liquid crystals and types, lyotropic liquid crystals. Mechanism of working of liquid crystals and applications; Polymers - Differences between thermoplasts and thermosets, Types of polymerization with examples; Plastics - Preparation properties and engineering applications of P.M.M.A, Teflon, Polycarbonate; Rubbers - Structure of raw rubber and vulcanized rubber, Preparation properties and engineering applications of Polyurethane, Buna-S, conducting polymers; Bio-degradable polymers - PLA & PGA (Polylactic Acid and Polyglycolic Acid).

UNIT – V

Analytical Techniques

Types of analysis; Physical analysis: Analysis of physical characteristics; Chemical analysis: Gravimetric and volumetric analysis (basic concept only);Instrumental analysis: Electro analytical techniques – Introduction; Conductometric techniques: strong acid-strong base and strong acid-weak base, weak acid -strong base and weak acid -weak base & advantages; Potentiometric techniques: Acid-base and oxidation-reduction titrations-advantages; Colorimetric techniques: Principle and determination of iron by using thiocyanate as a reagent.

TEXT BOOKS

1. Shikha Agarwal, “A Text book of Engineering Chemistry”, Cambridge University Press, New Delhi, 1st Edition, 2015.
2. Jain, Jain, “A textbook of Engineering Chemistry”, Dhanpat Rai Publishing Company, New Delhi, 16th Edition, 2015.

REFERENCE BOOKS

1. Shashi Chawla, “A Text book of Engineering Chemistry”, Dhanpat Rai Publishing Company, New Delhi, 3rd Edition, 2003.
2. S.S. Dara, S.S. Umare, “A Text book of Engineering Chemistry”, S. Chand Publications, New Delhi, 12th Edition, 2010.
3. PrasantaRath, B. Rama Devi, Ch. VenkataRamana Reddy, SubhenduChakroborty, “Engineering Chemistry”, Cengage Learning India, 1st Edition, 2019.

B.Tech. (I Sem.)

20AD01 - COMPUTATIONAL PROGRAMMING

L	T	P	Cr.
3	0	0	3

Pre-requisites: NIL**Course Educational Objective:**

The objective of this course is to provide a sound understanding of the fundamentals of C programming language and how to apply them effectively. The course is designed to acquaint the learners with the concepts such as algorithms, Looping statements, functions, pointers and files. After learning the rudiments of program writing, learners will be able to design efficient programs for solving real time problems.

Course Outcomes: At the end of the course, the student will be able to

CO1: Understand the syntax and semantics of programming language constructs. (**Understand - L2**)

CO2: Understand the text processing using strings and arrays. (**Understand - L2**)

CO3: Apply user defined functions to solve a given problem. (**Apply - L3**)

CO4: Analyze the storage representation using the derived data types such as structures and unions (**Analyze - L3**)

CO5: Create permanent storage to data processed in a program using files (**Apply - L3**)

UNIT – I

Introduction: Problem Specification, Algorithm/Pseudo Code, Flowchart, examples. Structure of a C Program, Writing the First C Program, Files Used in a C Program, Identifiers, Data Types, Variables, Constants, Input/output Statements in C, Operators in C, Type Conversion and Typecasting, Scope of Variables, Storage Classes.

Decision Control and Looping Statements: Conditional Branching Statements, Iterative Statements, Nested Loops, The Break and Continue Statements, goto Statement.

UNIT – II

Arrays: Declaration of Arrays, Accessing the Elements of an Arrays, Storing Values in Arrays, Operations on Arrays, Passing Arrays to Functions, Two-Dimensional Arrays, Operations on Two-Dimensional Arrays, Multidimensional Arrays, Sparse Matrices, Applications of Arrays.

Strings: Suppressing Input, String Taxonomy, Operations on Strings, Miscellaneous String and Character Functions, Arrays of Strings.

UNIT – III

Functions: Introduction, Function Declaration/Function Prototype, Function Definition, Function Call, Return Statement, Passing Parameters to Functions, Built-in Functions.

Recursion: Recursive Functions, Types of Recursion, Recursion versus Iteration

Pointers: Introduction to Pointers, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Null Pointers, Generic Pointers, Passing Arguments to Function Using Pointers, Pointers and Arrays, Arrays of Pointers, Pointers to Pointers, Dynamic Memory Allocation.

UNIT – IV

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, Enumerated Data Type.

UNIT – V

Files: Introduction to Files, Using Files in C, Read Data from Files, Writing Data to Files, Error Handling During File Operations, Functions for Selecting a Record Randomly.

Algorithms: Time and Space Complexity, Big O Notation, Omega Notation, Theta Notation, Searching Algorithms-Linear search, Binary Search.

TEXT BOOK

- 1 Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018

REFERENCE BOOKS

1. Herbert Schildt, C: The Complete Reference, McGraw Hill Education, 4th Edition, 2017
2. E Balagurusamy, Computer Programming, McGraw Hill Education, 8th Edition, 2019
3. Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, Pearson Publishers, 8th Edition, 2015
4. Stephen G.Kochan, Programming in C, Pearson Education, 4th Edition, 2015
5. Pradeep Dey, Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition, 2013

L	T	P	Cr.
3	0	0	3

Pre-requisite: Basic Mathematics

Course Educational Objective: The objective of the course is to learn the basic building blocks of the logic circuits of the computer system.

Course Outcomes: At the end of this course, the student will be able to:

- CO1:** Explain the digital number systems, Boolean algebra theorems, properties, and canonical forms for digital logic circuit design. **(Understand-L2)**
- CO2:** Apply Boolean algebra concepts and K-Maps for minimization of Boolean expressions. **(Apply -L3)**
- CO3:** Construct the combinational circuits using Adders, Sub tractors, Decoders, Multiplexers and Magnitude Comparators. **(Apply-L3)**
- CO4:** Demonstrate the sequential circuits using Flip-flops, Shift registers, and Counters & Memory unit. **(Understand-L2)**
- CO5:** Construct programmable logic devices (PROM, PAL, and PLA). **(Apply-L3)**

UNIT - I

Number Systems: Binary, Octal, Decimal, Hexadecimal Number Systems, Conversion of Numbers from One Radix to another Radix, r 's Complement and $(r-1)$'s Complement, Subtraction of Unsigned Binary Numbers and Signed Binary Numbers, Binary Codes,

Logic gates: Basic Gates: NOT, AND, OR Universal Gates: NAND, NOR, Special Gates: EX-OR and EX-NOR Gates. Error detection and Correction, Hamming Code. Logic families

UNIT - II

Boolean algebra: Fundamental postulates of Boolean algebra, Basic theorems, and properties, Complement, Dual of Logical Expressions, Standard forms: SOP, POS, and Minimizations of Logic Functions Using Boolean Theorems.

Karnaugh Map Method (K-Map): Minimization of Boolean Functions maximum up to Four Variables, Simplifications with Do not Care Conditions Using K-Map, Prime Implicants, Essential Prime Implicants, Quine-McCluskey Method.

UNIT - III

Arithmetic Circuits: Design of Half Adder, Full Adder, Half Subtractor, Full Subtractors, Ripple Carry Adder, Magnitude Comparator. Design of Multiplexers, Demultiplexers, Decoders, Encoders, Priority Encoder, Code Converter (including A/DC and D/AC)

UNIT - IV

Sequential Logic Circuits: Latch and Flip-Flop, RS- Latch Using NAND and NOR Gates, RS, JK, T and D Flip-flops, Truth and Excitation Tables, Conversion of Flip Flops, Master-Slave Flip-flops.

Registers and Counters: Introduction, Shift Register and its types, Bi-directional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters, Modulus Counters, Ring Counter, Johnson Counter.

UNIT - V

Memory unit: RAM and ROM, **Programmable Logic Devices:** PLA, PAL, PROM, Realization of Switching Functions Using PROM, PAL and PLA, Comparison of PLA, PAL and PROM.

Textbook:

1. Digital Design, 4/e, Morris Mano, Michael D Ciletti, PEA

Reference books:

1. Fundamentals of Logic Design, 5/e, Roth, Cengage
2. Digital Logic Design, Leach, Malvino, Saha, TMH
3. Modern Digital Electronics, R.P. Jain, TMH

L	T	P	Cr.
0	0	3	1.5

Pre-requisites: Nil

Course Educational Objectives: This course enables the students to analyze water samples and perform different types of volumetric titrations. It provides them with an overview of preparation of polymers and analytical techniques.

Course Outcomes: At the end of the course, the student shall be able to

- CO1:** Assess alkalinity of water based on the procedure given (**Understand – L2**).
- CO2:** Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus (**Understand – L2**).
- CO3:** Acquire practical knowledge related to preparation of polymers. (**Understand – L2**).
- CO4:** Exhibit skills in performing experiments based on theoretical fundamentals. (**Understand – L2**).

List of Experiments

(Any of the 10 experiments are required to be conducted)

Model Experiment

1. Determination of HCl using standard Na₂CO₃ solution.

Water Analysis

2. Determination of alkalinity of water sample.

Complexometric Titrations

3. Estimation of Mg⁺²/Zn⁺²/Ca⁺² in given solution by using standard EDTA solution.

Preparation of Polymers (only demonstration)

4. Nylon Fibers
5. Bakelite

Redox Titrations

6. Estimation of Mohr's salt by using potassium permanganate.
7. Estimation of Mohr's salt by using potassium dichromate.
8. Estimation of copper (II) ion using standard hypo solution.

Conductometric Measurements

9. Estimation of amount of HCl conductometrically using standard NaOH solution.
10. Estimation of amount of HCl conductometrically using NH₄OH solution.

Potentiometric Measurements

11. Estimation of amount of HCl potentiometrically using NaOH solution.

Estimations

12. Measuring pH of the given sample solution using pH meter (demonstration only).
13. Estimation of Vitamin C in a given sample.

Colorimetric Analysis

14. Determination of Iron (III) by colorimetric method.

REFERENCES

LAB Manual

- 10 Programs on Memory management using Pointers.
 - a. illustrate use of extern & static storage classes
 - b. illustrate the usage of command line arguments
 - c. usage of dynamic memory management functions.
- 11 Programs on Data storage using user defined data types.
 - a. To store the data of 10 Employees (Name, Designation, Company) using array of structures.
 - b. To read data of 10 Students (Name, Roll No, Branch, Year of Study, College address and Residential Address) using array of structures & Nested structures concepts. (Hint: Address is a nested structure).
- 12 Programs on Permanent Data storage using Files
 - a. Accessing content from files and writing content in to it.
 - b. Copy the contents of one file into another
- 13 Program for Library Information System using files with the following modules:
 - a. Student Registration
 - b. Book Entry
 - c. Search book
 - d. Issue book
 - e. Return book
- 14 Program for Examination System using files with the following modules:
 - a. Student Registration
 - b. Subject Entry
 - c. Marks Posting
 - d. Student wise Grades Calculation
 - e. Result Declaration

B.Tech. (I Sem.)

20CS52 - DIGITAL LOGIC DESIGN LAB

L	T	P	Cr.
0	0	2	1

Pre-requisite : Basics of Number System

Course Educational Objective: The objective of the course of this course is to learn about the use of basic gates, decoders and Multiplexers, flip-flops, Counters and Shift registers, and PLDs.

Course Outcomes: At the end of this course, the student will be able to:

- CO 1:** Implement basic logic gates and special logic gates using NAND and NOR gates.
(Apply- L3)
- CO 2:** Design combinational circuits like half-adders, full-adders, decoders, encoders, multiplexers .(Apply - L3)
- CO 3:** Design sequential digital circuits like flip-flops, Shift registers, and Counters.
(Apply- L3)
- CO 4:** Improve individual / teamwork skills, communication & report writing skills with ethical values.

List of Experiments

1. a) Basic Gates Function Verification using truth tables.
 - i) AND Gate using 7408 IC.
 - ii) OR Gate using 7432 IC.
 - iii) NOT Gate using 7404 IC.
- b) Universal Gates Functional Verification.
 - i) NAND Gate using 7400 IC.
 - ii) NOR Gate using 7402 IC.
- c) Special Gates Functional verification.
 - i) XOR Gate using 7486 IC.
 - ii) XNOR Gate using XOR followed by NOT Gate.
2. Realization of following gates using universal gates and its functional Verification. AND, OR, XOR, NOT.
3. a) Design Half-adder, Half-subtractor, Full-adder and Full-subtractor circuits and verify its functionality.
 - b) Verify the functionality of four-bit ripple carry adder for signed and unsigned integers
With the verification of overflow condition.
4. Design a four-bit comparator and verify its functionality (using logic gates or IC's)
5. Design a BCD to Excess-3 code converter and verify its functionality by using gates.
6. Design a BCD to Gray code converter and verify its functionality by using gates.
7. Design and verify the functionality of Decoders and multiplexers of Different inputs.
8. Verify the functionality of following Flip-Flops.
 - a) SR Flip-Flop
 - b) JK Flip-Flop
 - c) D Flip-Flop

d) T Flip-Flop

9. a) Design a UP-Counter & Down-Counter using JK/T Flip-Flop.
b) Design a MOD-3 Counter.
10. Design a Bi-directional Counter using JK/T Flip-Flop.

B.Tech. (I Sem.)

20IT51 - IT WORKSHOP

L	T	P	Cr.
0	0	3	1.5

Pre-requisite : NIL

Course Educational Objective:

The objective of the course is to impart knowledge about the components of PC, Assembling PC, Installation of OS, softwares like MS-Office, LaTeX and concepts related to Networking, Internet as well as antivirus.

COURSE OUTCOMES (COs): *At the end of this course, the student will be able to:*

- CO1:** Identify the basic hardware components, keyboard shortcuts, assembling and disassembling of the system (PC). (**Understand- L2**)
- CO2:** Demonstrate Operating System installation, apply various commands of Linux operating system, and networking. (**Apply - L3**)
- CO3:** Create web pages using HTML, documents using applications like LaTeX, Google forms and use application software packages: MS-Word, MS-Excel, MS-Power Point to create documents and presentation. (**Apply- L3**)
- CO4:** Improve individual / teamwork skills, communication & report writing skills with ethical values.

PC Hardware**Week 1**

Task: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

PC Assembling**Week 2**

Task: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. In addition, students need to go through the video, which shows the process of assembling a PC. A video would be given as part of the course content.

Operating System Installation**Week 3**

Task 1: Every student should individually install MS windows and Linux/ Ubuntu OS on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 2: Linux Operating System commands:

- General command syntax
- Basic help commands
- Basic File system commands
- Date and Time
- Basic Filters and Text processing
- Basic File compression commands
- Miscellaneous: apt-get, vi editor

Network & Internet**Week 4**

Task 1: Networking Commands:

ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp, wget, route

Week 5

Task 1: Internet Services:

- Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/ plugins
- Malicious Software: Virus, Worm, Logic Bomb, Trojan Horse
- Anti-virus installation, configuring a firewall, blocking pop-ups
- Mail creation and usage, Creating a Digital Profile on LinkedIn

Productivity Tools

Week 6

Task 1: Basic HTML tags, Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Preparation of a simple website/ homepage

Every student should develop your home page using HTML Consisting of your photo, name, address and education details as table and your skill set as a list.

Office Tools

Week 7

Task-1: Demonstration and Practice on Text Editors like Notepad, Sublime Text, Atom, Brackets, Visual code, etc

Week 8

Task-1: Demonstration and practice on Microsoft Word, PowerPoint, Microsoft Excel

Week 9

Task-1: Demonstration and practice on LaTeX and produce professional pdf documents.

Week 10

Task-1: Creating online documents using Google docs- Create and share Bio-data form.

References:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream Tech.
2. Introduction to Information Technology, IITL Education Solutions limited, Pearson Education.
3. Computer Fundamentals, Anita Goel, Pearson Education, 2017
4. PC Hardware Trouble Shooting Made Easy, TMH
5. <https://www.google.com/docs/about/>
6. <https://support.google.com/sites/answer/6372878?hl=en>

B.Tech.(II Sem.)

20FE02 - PROFESSIONAL COMMUNICATION - II

L	T	P	Cr.
2	0	0	2

Pre-requisites: Nil

Course Educational Objective: To improve English language proficiency of the students on various aspects like vocabulary, grammar, communication skills, listening skills, Reading & Writing skills.

Course Outcomes: At the end of the course, the student will be able to

- CO1:** Produce a coherent paragraph interpreting a figure/graph/chart/table (**Understand – L2**)
- CO2:** Comprehend the given texts thoroughly by guessing the meanings of the words contextually (**Understand – L2**)
- CO3:** Use language appropriately for describing/comparing/contrasting/giving directions & suggestions (**Remember – L1**).
- CO4:** Write formal/informal dialogues with an understanding of verbal/non-verbal features of communication. Guess meanings of the words from the context (**Understand – L2**)
- CO5:** Write well-structured essays; Reports & Résumé (**Apply – L3**)

UNIT - I

Fabric of Change- ‘H.G. Wells and the Uncertainties of Progress – Peter J. Bowler’; Reading: Studying the use of Graphic elements in texts; Grammar & Vocabulary: Quantifying Expressions; Adjectives and adverbs; Comparing and Contrasting; Degrees of Comparison
Writing: Information Transfer

UNIT - II

Tools for Life - ‘Leaves from the Mental Portfolio of a Eurasian – Sui Sin Far’; Reading: Global Comprehension; Detailed Comprehension; Grammar & Vocabulary: Active & Passive Voice; Idioms & Phrases; Writing: Structured Essays using suitable claims and evidences

UNIT - III

‘Homi Jahangir Bhabha’;

Grammar & Vocabulary: Words often confused; Common Errors; Writing: Incident & Investigation Reports.

UNIT - IV

‘Jagadish Chandra Bose’; Grammar & Vocabulary: Use of antonyms; Correction of Sentences; Writing: Dialogue Writing.

UNIT - V

‘Prafulla Chandra Ray’; Grammar & Vocabulary: Analogy; Sentence Completion; Writing: Writing a Résumé

TEXT BOOKS:

1. Prabhavati. Y & et al, “English All Round – Communication Skills for Undergraduate Learners”, Orient Black Swan, Hyderabad, 2019.
- 2 “The Great Indian Scientists” published by Cengage Learning India Pvt. Ltd., Delhi, 2017

REFERENCE BOOKS:

1. Swan,M., “Practical English Usage”, Oxford University Press, 2016.
2. Kumar,S and Latha, P, “Communication Skills”, Oxford University Press, 2018.
3. Rizvi Ashraf M., “Effective Technical Communication”, Tata Mc Graw Hill, New Delhi, 2008.
4. BaradwajKumkum, “Professional Communication”, I.K.International Publishing House Pvt.Lt., New Delhi, 2008.
5. Wood,F.T., “Remedial English Grammar”, Macmillan, 2007.

L	T	P	Cr.
2	1	0	3

Pre-requisites: Nil

Course Educational Objective: In this course, students learn Matrix Algebra and introduced with transformation techniques such as Laplace Transforms and Z – Transforms.

Course Outcomes: At the end of the course, the student will be able to

CO1: Investigate the consistency of the system of equations and solve them (**Apply – L3**).

CO2: Determine the Eigen vectors and inverse, powers of a matrix using Cayley – Hamilton Theorem (**Apply – L3**).

CO3: Use the concepts of Laplace Transforms to various forms of functions (**Understand – L2**).

CO4: Solve ordinary differential equations by using Laplace Transforms (**Apply – L3**).

CO5: Apply Z - Transforms to solve difference equations (**Apply – L3**).

UNIT – I

System of Linear Equations

Matrices - Rank- Echelon form, Normal form, PAQ form– Solution of Linear Systems – Homogeneous system of equations and Non-Homogeneous system of equations.

UNIT – II

Eigen Values and Eigen Vectors

Eigen values – Eigen Vectors – Properties – Cayley-Hamilton Theorem – Inverse and Powers of a matrix by using Cayley-Hamilton Theorem.

UNIT – III

Laplace Transforms

Laplace transforms of standard functions –Linear Property - Shifting Theorems, Change of Scale Property Multiplication and Division by ‘t’ - Transforms of derivatives and integrals – Unit step function –Dirac’s delta function.

UNIT – IV

Inverse Laplace Transforms

Inverse Laplace transforms– Linear Property - Shifting Properties - Convolution theorem, Applications of Laplace transforms to ordinary differential equations.

UNIT – V

Z-Transforms

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse Z – transform - Convolution theorem – Solution of difference equation by Z-transforms.

Text Books:

1. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH Publications, New Delhi, 2010.

Reference Books:

1. M. D. Greenberg, "*Advanced Engineering Mathematics*", 2nd Edition, TMH Publications, New Delhi, 2011.
2. Erwin Kreyszig, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley & sons, New Delhi, 2011.
3. W.E. Boyce and R. C. Diprima, "*Elementary Differential Equations*", 7th Edition, John Wiley & sons, New Delhi, 2011.

B.Tech. (II Sem.)

20FE07 - APPLIED PHYSICS

L	T	P	Cr.
2	1	0	3

Pre-requisites: Nil

Course Educational Objectives: It enables the students to understand the fundamental concepts of optics, quantum mechanics, free electron theory of metals, semiconductors, dielectrics and their applications.

Course Outcomes: At the end of this course, the student will be able to

CO1: Define the nature of interference and diffraction (**Remember – L1**).

CO2: Apply the lasers and optical fibers in different fields (**Apply – L3**).

CO3: Estimate the electrical conductivity of metals (**Understand – L2**).

CO4: Analyze the properties of semiconducting materials (**Understand – L2**).

CO5: Classify the different types of magnetic and dielectric materials (**Understand – L2**).

UNIT – I**Wave Optics**

Interference: Principle of super position, Conditions for Interference, Interference in thin parallel film by reflection, Newton's rings (reflection), working principle of Interferometer.

Diffraction: Introduction, Fraunhofer diffraction at single slit- Diffraction due to circular aperture, Diffraction Grating- Resolving power of Grating.

UNIT – II**Lasers and optical fibers**

Lasers: Introduction - Principle of laser (absorption, spontaneous and stimulated emission of radiation), Einstein Coefficients –Nd-YAG laser, Helium Neon laser- applications.

Optical Fibers: Optical Fiber principle, Structure of optical fiber, numerical aperture and acceptance angle, types of optical fibers - applications.

UNIT – III**Principles of Quantum Mechanics & Free electron theory**

Principles of quantum mechanics: de Broglie Hypothesis, Davisson - Germer experiment, Schrodinger time independent and dependent wave equations, physical significance of the wave function – particle in a box.

Free electron theory

Classical free electron theory- Postulates, Advantages and Draw backs, Fermi-Dirac distribution Function- Temperature dependence of Fermi- Dirac distribution function, Classification of Solids on the basis of Band theory.

UNIT – IV**Semiconductor physics**

Conductivity of Intrinsic and Extrinsic semiconductors, Drift and Diffusion Current, Einstein relation, Hall Effect, Differences between direct and indirect Band Gap semiconductors, Solar Cell, Applications of Solar Cells.

UNIT – V**Magnetic & Dielectric materials**

Magnetic parameters, Classification of magnetic Materials-Diamagnetic, paramagnetic and ferromagnetic

materials, Hysteresis loop, soft and hard magnetic materials, Applications of Ferro magnetic materials
Dielectrics: polarization - Electronic and ionic polarization, orientation polarization (Qualitative), Local field, ClaussiusMosotti equation, Applications of dielectric materials.

Text books:

1. V. Rajendran, "*Engineering Physics*", TMH, New Delhi, 6th Edition, 2014.
2. M.N. Avadhanulu, P.G. Kshirsagar, "*Engineering Physics*", S. Chand & Co., 2nd Edition, 2014.

Reference books:

1. M.N. Avadhanulu, TVS Arun Murthy, "*Applied Physics*", S. Chand & Co., 2nd Edition, 2007.
2. P.K. PalaniSamy, "*Applied Physics*", Sci. Publ. Chennai, 4th Edition, 2016.
3. P. Sreenivasa Rao, K Muralidhar, "*Applied Physics*", Him. Publi. Mumbai, 1st Edition, 2016.
4. HitendraK Mallik , AK Singh "*Engineering Physics*", TMH, New Delhi, 1st Edition, 2009.

B.Tech. (II Sem.)

20CS03 – DATA STRUCTURES

L	T	P	Cr.
3	0	0	3

Pre-requisites: Nil

COURSE EDUCATIONAL OBJECTIVES: The objective of the course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

COURSE OUTCOMES (COs): At the end of this course, the student will be able to

- CO 1: Write the algorithms for various operations on list using arrays and linked list and analyze the time complexity of its operations. (**Understand - L2**)
- CO 2: Apply linear data structures like stack and queue in problem solving. (**Apply - L3**)
- CO 3: Demonstrate various searching and sorting techniques and compare their computational complexities in terms of space and time. (**Understand - L2**)
- CO 4: Write the algorithms for various operations on binary trees, binary search trees and AVL trees. (**Understand - L2**)
- CO 5: Demonstrate graph traversal techniques and hashing techniques. (**Understand - L2**)

UNIT - I**Algorithm Analysis:**

Introduction to Algorithm, Algorithm Analysis, Asymptotic Notations.

Introduction to arrays and Abstract Data Type (ADT)

Lists: List using arrays and linked list- Singly Linked List, Doubly Linked List, Circular Linked List.

UNIT – II

Stacks: Stack ADT, Implementation using arrays and linked list.

Applications of stacks: Infix to postfix expression conversion, Evaluation of Postfix expressions and balancing the symbols.

Queues: Queue: Queue ADT, Implementation of Queue using arrays and linked list, circular queue, DEQUE

UNIT - III

Sorting: Bubble sort, Insertion Sort, Selection sort, Merge Sort, Quick Sort & Heap Sort

UNIT - IV

Trees: Introduction, Tree traversals, Binary Trees, Binary Search Trees, Balanced Binary search tree - AVL Trees and its operations.

UNIT - V

Graphs: Fundamentals, Representation of graphs, Graph Traversals: BFS, DFS.

Hashing: Hash Table, Hash Function, Collision resolution Techniques- separate Chaining, Open addressing, rehashing.

TEXT BOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education, 2nd edition. [1,2,3 units]
2. Reema Thareja, Data Structures using c, Oxford Publications [3,4,5 units]

REFERENCES:

1. Langson, Augenstein&Tenenbaum, ‘Data Structures using C and C++’, 2nd Ed, PHI.
2. RobertL.Kruse, Leung and Tando, ‘Data Structures and Program Design in C’, 2nd edition, PHI

L	T	P	Cr.
3	0	0	3

B.Tech. (II Sem.) 20CS04 - DISCRETE MATHEMATICAL STRUCTURES

Pre-requisite: Basic mathematical knowledge

Course Educational Objective:

The objective of the course is to perform the operations associated with relations and functions. Relate practical examples to the functions and relations and interpret the associated operations and terminology used in the context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior of software or to solve problems such as puzzles.

Course Outcomes (COs): *At the end of this course, the student will be able to*

- CO1 Construct mathematical arguments using logical connectives & quantifiers and verify them. **(Understand – L2)**
- CO2 Demonstrate the basic terminology of functions, relations, lattices, and their operations. **(Understand – L2)**
- CO3 Apply the properties of graphs to solve the graph theory problems in Computer science. **(Apply – L3)**
- CO4 Illustrate the basic principles/techniques to solve different algebraic structures & combinatorial problems. **(Understand – L2)**
- CO5 Solve linear recurrence relations by recognizing homogeneity using constant coefficients characteristic roots and Generating functions. **(Understand – L2)**

UNIT – I

Mathematical Logic

Propositional logic and Predicate Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Logic, Statement Functions, Variables and Quantifiers.

UNIT – II

Sets, Relations & Functions

Introduction to Sets, representation of Sets, Operation on Sets, Properties of Binary Relations, Relation Matrix, Operations on Relations, Transitive Closure, Equivalence Relation, Compatibility and Partial Ordering Relations, Hasse Diagrams, Lattices: LUB, GLB.

Functions: Bijective Functions, Composition of Functions, Inverse Functions.

UNIT – III

Graph Theory I & II

Graph Theory I :Basic Concepts of Graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Eulerian and Hamiltonian Graphs.

Graph Theory II: Planar Graphs, Euler’s Formula, Graph Coloring, Chromatic Number, Graph Traversals: BFS, DFS. Trees: Spanning Trees: Properties, Algorithms for Minimum cost Spanning Trees

UNIT – IV

Algebraic Structures &Combinatorics

Algebraic Systems with one Binary Operation, Properties of Binary operations, Semi groups and Monoids: Homomorphism of Semi groups and Monoids, Group, Abelian group, Sub Groups, Lagrange’s Theorem

Combinatorics: Basic of Counting, Permutations, Combinations, Combinations with repetition Pigeonhole Principle and its Applications, Principle of inclusion-exclusion.

UNIT – V

Recurrence Relation

Generating Function of Sequences, Calculating Coefficient of Generating Functions, Recurrence Relations, Solving linear or homogeneous recurrence Relations by substitution, generating functions and Characteristic Roots.

TEXT BOOKS

1. Tremblay, Manohar, Discrete Mathematical Structures with Applications to Computer Science, TMH Publications [units- 1,2,3,4,5]

REFERENCES

1. Chandrasekaran, Umavparvathi, Discrete Mathematics, PHI, 2010[1,2,3,4,5]
2. Ralph. P.Grimaldi, Ramana, Discrete and Combinational Mathematics,Pearson,5th edition. [1,2,3,4,5]
3. <https://nptel.ac.in/courses/106/106/106106183/>[1,2,3,4,5] .

L	T	P	Cr.
2	0	0	0

Pre-requisites: Nil

Course Educational Objectives

- To enable the student to understand the importance of constitution.
- To understand the structure of Executive, Legislature and Judiciary.
- To understand Philosophy of fundamental rights and duties.
- To understand the autonomous nature of constitution bodies like Supreme Court and High Court Controller and Auditor General of India and Election Commission of India.
- To understand the Central and State relation, financial and administrative.

Course Outcomes: *At the end of the course, the student shall be able to*

CO1: Understand history and philosophy of constitution with reference to Preamble, Fundamental Rights and Duties (**Understand – L2**).

CO2: Understand the concept of Unitary and Federal Government along with the role of President, Prime Minister and Judicial System (**Understand – L2**).

CO3: Understand the structure of the state government, Secretariat, Governor and Chief Minister and their functions (**Understand – L2**).

CO4: learn local administration viz. Panchayat, Block, Municipality and Corporation (**Understand – L2**).

CO5: learn about Election Commission and the process and about SC, ST, OBC and women (**Understand – L2**).

UNIT – I:

Introduction to Indian Constitution: ‘Constitution’ meaning of the term, Indian Constitution – Sources and Constitutional History, Features – Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT – II:

Union Government and its Administration Structure of the Indian Union: Federalism Centre – State relationship, President: Role, Power and Position. Prime Minister (PM) and Council of Ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha. The Supreme Court and High Court: Powers and Functions.

UNIT – III:

State Government and its Administration Governor – Role and Position – Chief Minister (CM) and Council of Ministers. State Secretariat: Organization, Structure and Functions.

UNIT – IV:

A Local Administration -- Role and Importance, Municipalities – Mayor and Role of Elected Representative, Panchayati Raj: Functions of Panchayati Raj Institution, Zilla Panchayat, Elected Officials and their roles, Village level – Role of Elected and Appointed officials.

UNIT – V:

Election Commission: Election Commission – Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions and Commissions for the welfare of SC/ST/OBC and Women.

Reference Books

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd., New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government and Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai. Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication).
6. J.C. Johari, Indian Government and Politics Hans.
7. J.Raj, Indian Government and Politics.
8. M.V. Pylee, Indian Constitution, Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd., New Delhi.
9. Noorani, A.G. (South Asia Human Rights Documentation Centre), Challenges to Civil Right). Challenges to Civil Rights Guarantees in India, Oxford University Press 2012.

E-Resources:

1. nptel.ac.in/courses/109104074/8.
2. nptel.ac.in/courses/109104045.
3. nptel.ac.in/courses/101104065.
4. www.hss.iitb.ac.in/en/lecture-details.
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indianconstitution.

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B.Tech. (II Sem.)

20FE51 - PROFESSIONAL COMMUNICATION SKILLS
LAB

L	T	P	Cr.
0	0	2	1

Pre-requisites : Nil

Course Educational Objective: To improve the proficiency of students in English with an emphasis on better communication in formal and informal situations; Develop speaking skills required for expressing their knowledge and abilities and to face interviews with confidence.

Course Outcomes: At the end of this course, the student will be able to

CO1: Introduce oneself and others using appropriate language and details (**Understand– L2**).

CO2: Comprehend short talks and speak clearly on a specific topic using error free English (**Understand– L2**).

CO3: Report effectively after participating in informal discussions ethically (**Remember– L1**).

CO4: Interpret data aptly, ethically & make oral presentations (**Apply –L3**).

Syllabus: Professional Communication Lab (PCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems, LAN facility and English language software for self- study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorder etc.

Exercise – I

CALL Lab: Understand - Sentence structure.

ICS Lab: Practice - Listening: Identifying the topic, the context and specific information
Speaking: Introducing oneself and others.

Exercise – II

CALL Lab: Understand - Framing questions.

ICS Lab: Practice - Listening: Answering a series of questions about main idea and supporting ideas after listening to audio text.

Speaking: Discussing in pairs/small groups on specific topics; Delivering short structured talks using suitable cohesive devices (JAM)

Exercise – III

CALL Lab: Understand - Comprehension practice – Strategies for Effective Communication

ICS Lab: Practice - Listening: Listening for global comprehension and summarizing
Speaking: Discussing specific topics in pairs/small groups, reporting what is discussed

Exercise – IV

CALL Lab: Understand- Features of Good Conversation – Strategies for Effective Communication.

ICS Lab: Practice -Listening: making predictions while listening to conversations/transactional dialogues with/without video Speaking: Role – plays – formal & informal – asking for and giving information/directions/instructions/suggestions

Exercise – V

CALL Lab: Understand - Features of Good Presentation, Methodology of Group Discussion

ICS Lab:Practice - Introduction to Group Discussions.

Listening: Answering questions identifying key terms and understanding concepts.

Speaking: Formal Oral & Poster presentations on topics from academic contexts without the use of PPT.

Lab Manual:

1. Prabhavati. Y & et al, “English All Round – Communication Skills for Undergraduate Learners”, Orient Black Swan, Hyderabad, 2019.

Suggested Software:

1. Digital Mentor: Globarena, Hyderabad, 2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley, USA,2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, The Learning Company, USA, 2002
6. Learning to Speak English - 4 CDs. The Learning Company, USA,2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi,2008.

L	T	P	Cr.
0	0	3	1.5

Pre-requisites : Nil

Course Educational Objective: This course enables the students to acquire theoretical ideas, analytical techniques, and graphical analysis, by completing a host of experiments with the procedures and observational skills for appropriate use of simple and complex apparatus.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- CO1:** Analyze the wave characteristics of light(**Understand – L2**).
- CO2:** Estimate the magnetic field using Stewart's and Gee's apparatus(**Understand – L2**).
- CO3:** Verify the characteristics of semiconductor diodes(**Apply – L3**).
- CO4:** Determine the acceptance angle and numerical aperture of optical fiber (**Apply – L3**).
- CO5:** Improve report writing skills and individual teamwork with ethical values (**Understand – L2**).

List of Experiments

(Any of the 10 experiments are required to be conducted)

GENERAL EXPERIMENTS:

1. Determine the energy band gap of a semiconductor Diode.
2. Study the characteristics of Zener Diode.
3. Study the magnetic field along the axis of a current carrying circular coil using Stewart's & Gee's apparatus and to verify Biot - Savart's law.
4. Study the characteristics of Solar cell
5. Determination of dielectric constant by charging and discharging method.
6. Study the characteristics of Photo diode.
7. Determination of resistivity of semiconductor by four probe method.

OPTICS LAB EXPERIMENTS:

8. Determine the wavelength of a laser radiation.
9. Determine the width of a single slit by forming diffraction pattern.
10. Determine the Radius of Curvature of a Plano - Convex lens by forming Newton's Rings.
11. Determine the Wavelengths of various spectral lines by using diffraction grating.
12. Resolving power of grating.
13. Determine the acceptance angle and numerical aperture of a fiber.
14. Measure the bending losses in the optical fiber cable at different wavelengths.

L	T	P	Cr.
0	0	3	1.5

Pre-requisite: Programming Language

COURSE EDUCATIONAL OBJECTIVES: The objective of this course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

COURSE OUTCOMES (COs): At the end of this course, the student will be able to

- CO 1: Implement Linear Data Structures using array and Linked list.(**Apply - L3**)
- CO 2: Implement Various Sorting Techniques.(**Apply - L3**)
- CO 3: Implement Non-Linear Data Structure such as Trees & Graphs.(**Apply - L3**)
- CO 4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

List of Programs:

I) Exercise Programs on List ADT

- a) Implementation of List using Arrays.
- b) Implementation of List using Linked List.

II) Exercise Programs on Stacks & Queue ADT

- a) Implementation of Stack Operations using Arrays.
- b) Implementation of Stack Operations using Linked List.
- c) Implementation of Queue Operations using Arrays.
- d) Implementation of Queue Operations using Linked List.

III) Exercise Programs on Stack Applications

- a) Conversion of Infix Expression to postfix Expression.
- b) Conversion of Infix Expression to prefix Expression.
- c) Evaluation of Postfix Expression
- d) Implementation of Balancing Symbols.

IV) Exercise Programs on Types of Queues

- a) Implementation of Circular Queues Linked List.
- b) Implementation of Double Ended Queue using Arrays.
- c) Implementation of Double Ended Queue using Linked List.

V) Exercise Programs on Sorting Techniques.

- a) Implementation of Insertion Sort and
- b) Implementation of Selection Sort.
- c) Implementation of Merge Sort.
- d) Implementation of Quick Sort.
- e) Implementation of Bubble Sort.
- f) Implementation of Heap Sort.

VI) Exercise Programs on Trees

- a) Implementation of Binary Tree Traversals.
- b) Implementation of Binary Search Tree Operations.

VII) Exercise Programs on Graph Traversal Techniques.

- a) Breadth First Search (BFS)
- b) Depth First Search (DFS)

L	T	P	Cr.
0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVE:

The main objectives of this course are to familiarize various commands used in Auto-CAD and to visualize the isometric and orthographic views of any solid object.

COURSE OUTCOMES:

After completion of the course students are the able to:

- CO 1: Understand the Auto-CAD basics and apply to solve practical problems used in industries where the speed and accuracy can be achieved. **(Understand-L2)**
- CO 2: Understand the principle of Orthographic projections of points, lines, planes and solids. **(Understand-L2)**
- CO 3: Draw the isometric views of lines, planes and simple solids. **(Understand-L2)**
- CO 4: Convert orthographic to isometric vice versa. **(Understand-L2)**

At least 10 Exercises are to be conducted using Auto Cad software:

BASIC AUTO CAD COMMANDS:

1. Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).
2. Edit commands (copy, move, erase, zoom).
3. Array commands (polar array, rectangular array, P-edit, divide a line, offset).
4. Hatching & line commands (hatching with different angles& different types of lines).
5. Mirror & trim commands (mirror an object, trim, extend a line, chamfer& fillet, explode).
6. Dimensioning & text commands (linear, angular, radius, diameter& text).

PROJECTION OF POINTS AND LINES:

1. Projection of points (I, II, III, & IV quadrants).
2. Projection of lines parallel to both reference planes.
3. Projection of lines parallel to one reference plane & inclined to other reference plane.

PROJECTION OF PLANES AND SOLIDS:

1. Projection of planes parallel to one reference plane & perpendicular to other reference plane.
2. Projection of planes inclined to one reference plane& perpendicular to other reference plane.
3. Projection of solids in simple position.
4. Projection of solids with axes inclined to one reference plane & parallel to other.

CONVERSION OF ORTHOGRAPHIC PROJECTIONS INTO ISOMETRIC PROJECTIONS & VICE VERSA:

1. Conversion of plane objects.
2. Conversion of circular objects.
3. Conversion of both combination of plane figures and circular objects.

Expt. No.	Type of Drawings	Name of the Experiment
1.	Basic drawing	Exercise on Basic Drawing Commands-I
2.	Commands	Exercise on Basic Drawing Commands-II
3.	Modify commands	Exercise on Modify Commands
4.	Projection of Lines	Exercise on Projection of Lines-I
5.		Exercise on Projection of Lines-II
6.	Isometric Diagrams	Exercise on isometric views-I
7.		Exercise on isometric views-II
8.		Exercise on isometric views-III
9.		Exercise on isometric views-IV
10.	Conversion of Isometric to Orthographic views	Exercise on conversion of Isometric views into Orthographic views

REFERENCES

1. M. Kulkarni, A.P Rastogi, and A.K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
2. Bethune, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
3. N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar Publishers, 2012.

B.Tech. (III Sem.)

20FE09 - PROBABILITY AND STATISTICS

L	T	P	Cr.
3	0	0	3

Pre-requisite(s) : None

Course Educational Objective: The objective of this course is to provide students with the foundations and applications of probabilistic and statistical methods mainly used in varied applications in engineering and science.

Course Outcomes: At the end of the course, the student will be able to

CO1: Understand various probabilistic situations using the various laws of probability and random variables. **(Understand- L2)**

CO2: Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems. **(Apply- L3)**

CO3: Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on the sample data. **(Apply- L3)**

CO4: Analyze the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis. **(Analyze-L4)**

CO5: Construct the regression lines to predict the dependent variables and calculate the Correlation Coefficient for a bivariate statistical data. **(Evaluate-L5)**

Unit-1:

Probability and Random variables

Probability, Sample space and events, Additive Rule, Conditional probability, Multiplicative rule, Baye's theorem.

Random variables – Discrete and continuous Random Variables, distribution function. Mathematical Expectation of one-dimensional Random Variable.

Unit-2:

Probability Distributions

Binomial distribution, Poisson distribution, Poisson approximation to Binomial distribution, Exponential distribution, Normal distribution, Normal approximation to Binomial distribution.

Unit-3:

Sampling distribution & Estimation

Population, sample, parameter, statistic, sampling distribution, Standard error, Types of sampling, Sampling distribution of means and sampling distribution of variance,

Parameter estimations –point estimation and interval estimation for mean and proportions.

Unit-4:

Tests of Hypothesis

Hypothesis, Null and Alternate Hypothesis, Type I and Type II errors, level of significance.

Z-test for means and proportions, t-test for single mean, difference of means, paired t-test, F-test for equality of population variances, χ^2 - test for goodness of fit and independence of attributes.

Unit-5:

Correlation & Regression

Karl Pearson's coefficient of correlation, linear Regression, Regression lines, Regression coefficients, Spearman's Rank correlation coefficient, Spearman's Rank correlation for repeated ranks.

TEXT BOOKS:

1. Jay L.Devore “Probability and Statistics for engineering and the sciences.” , 8th edition, Cengage Learning india, 2012.
2. S.C.Gupta, V.K.Kapoor, “Fundamentals of Mathematical Statistics”, 11thEdition, Sultan Chand and sons, New Delhi,2014.

REFERENCE BOOKS:

1. Miller & Freund’s “Probability and Statistics for Engineers”,8th edition. PHI, New Delhi,2011.
2. B.V. Ramana, “Higher Engineering Mathematics”, 1st Edition, TMH, New Delhi, 2010

L	T	P	Cr.
2	0	0	0

B.Tech. (III Sem.)

20MC02 – ENVIRONMENTAL SCIENCE

Pre-requisite : Nil

Course Objectives:

In this course the student will learn about

- Environmental issues like over population, human health etc related to local, regional and global levels.
- The necessity of resources, their exploitation and sustainable management.
- The interactions of human and ecosystems and their role in the food web in the natural world.
- The global biodiversity, threats to biodiversity and its conservation.
- Environmental problems like pollution, disasters and possible solutions.

The importance of environmental decision making in organizations through audits

Course Outcomes: After the completion of this course, the students will able to

- CO1:** Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions. **(Remember-L1)**
- CO2:** Evaluate local, regional and global environmental issues related to resources and their sustainable management. **(Understand- L2)**
- CO3:** Realize the importance of ecosystem and biodiversity for maintaining ecological balance. **(Understand- L2)**
- CO4:** Acknowledge and prevent the problems related to pollution of air, water and soil. **(Apply- L3)**
- CO5:** Identify the significance of implementing environmental laws and abatement devices for environmental management. **(Understand- L2)**

Unit I**Nature and scope of Environmental Problems**

- Introduction to Environmental Science
- Population explosion, variations among nations
- Resettlement and Rehabilitation - Issues and possible solutions
- Environmental hazards – causes and solutions. Biological hazards – AIDS, Malaria, Chemical hazards- BPA, PCB, Phthalates, Mercury, Nuclear hazards- Risk and evaluation of hazards.
- Role of Information Technology in environmental management and human health

Unit II**Natural Resources and Conservation**

- Introduction and classification of Natural Resources
- Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people
- Water resources: Use and over-utilization of surface and ground water, conflicts over water, interlinking of rivers, dams-benefits and problems, Rain water harvesting
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, soil salinity
- Energy resources: Growing energy needs renewable, non-renewable and alternate energy resources

Unit III**Ecology and Biodiversity**

- Structure and functions of an Ecosystem, Food chains and Food webs, Ecological succession, Ecological pyramids, Biogeochemical cycles
- Biodiversity, Values of biodiversity, Bio geographical classification of India. Endangered and endemic species of India, Threats to biodiversity; Man and wild life conflicts, Conservation of biodiversity: In-situ and Ex-situ conservation methods

Unit IV**Environmental Pollution**

Introduction to Environmental Pollution Causes, effects and control measures of:

Air pollution, Water pollution, Noise pollution, Solid Waste Management – Sources, Classification, effects and control measures of Municipal solid waste, Biomedical waste & Hazardous and e-waste, Disaster Management.

Unit V**Environmental Management**

- Sustainable development and unsustainability
- Climate disruption, Greenhouse effect, Ozone layer depletion and Acid rain. Stockholm Conference
- Environmental Impact Assessment (EIA)
- Green building
- Environmental Law- Air, Water, Wild life, Forest, and Environmental protection act

TEXT BOOKS:

1. Anubha Kaushik, C.P.Kaushik, “*Perspectives in Environmental Studies*”, 5nd edition, New age international publishers, Delhi, 2016.
2. G. Tyler Miller, Scott Spoolman, “*Introduction to Environmental Studies*”, 13th Edition, Cengage Learning, New Delhi, 2009.

REFERENCE BOOKS:

1. M. Anji Reddy, “*Textbook of Environmental Sciences and Technology*”, 2nd Edition, BS Publications, Delhi 2011.
2. Deeshita Dave, P. Udaya Bhaskar, “*Environmental Studies*”, 2nd Edition, Cengage Learning, New Delhi, 2012.
3. S.Deswal, A. Deswal, “*A Basic course in Environmental Studies*”, 2nd Edition, Educational & Technical Publishers, Delhi, 2014.
4. R. Rajagopalan, “*Environmental Studies (From Crisis to Cure)*”, 3rd Edition, Oxford University Press, New Delhi, 2012.
5. De, A.K, “*Environmental Chemistry*”, 5th Edition, New Age International (P) Limited, New Delhi, 2003.
6. Dr.K.V.S.G. Murali Krishna, “*Environmental Studies*”, 1st Edition, VGS Techno Series, Vijayawada, 2010.
7. Mahua Basu, S.Xavier, “*Fundamentals of Environmental Studies*”, 1st edition, Cambridge University Press, Delhi, 2016.

L	T	P	Cr.
3	0	0	3

B.Tech. (III Sem.) 20CS06-DESIGN AND ANALYSIS OF ALGORITHMS

Pre-requisite: Programming language, Discrete Mathematics and Data Structures.

Course Educational Objective: The Objective of the course is to learn various algorithm design techniques and analyze the computing resources of the algorithms, and motivate the students to design new algorithms for various problems

Course Outcomes: At the end of this course, the student will be able to

- CO1:** Identify the characteristics of an algorithm and analyze its time and space complexity. (**Understand- L2**)
- CO2:** Apply the divide-and-conquer method for solving problems like searching and sorting. (**Apply- L3**)
- CO3:** Design Greedy algorithms for the optimization problems like knapsack problem, minimum cost spanning tree, single source shortest path problem. (**Apply - L3**)
- CO4:** Apply dynamic programming paradigm to solve optimization problems like travelling sales person problem, 0/1 knapsack problem, Optimal binary search tree. (**Apply - L3**)
- CO5:** Analyze the backtracking and branch-and-bound search methods on optimization problems like N-queens, sum of subsets, 0/1 knapsack, Hamiltonian circuit and so on. (**Apply - L3**)

UNIT – I

Introduction:

Algorithm definition, Specifications, Performance Analysis- Time Complexity, Space Complexity. Asymptotic Notations-Big-Oh, Omega, Theta.

Divide and Conquer: General Method, Binary Search, Finding Maximum and Minimum, Merge Sort, Quick sort.

UNIT – II

The Greedy Method– General Method, Knapsack Problem, Job sequencing with deadlines, Minimum-cost spanning trees, Optimal storage on tapes, Single source shortest paths, Huffman coding.

UNIT – III

Dynamic Programming- General method, Multistage graph, All pairs shortest path, Single Source Shortest path, Optimal Binary search trees, 0/1 Knapsack, Reliability design, the travelling salesman problem.

UNIT - IV

Back tracking- The General Method, The 8-Queens Problem, Sum of subsets, Graph Coloring, Hamiltonian cycles.

UNIT-V

Branch and Bound– General method, Job sequencing with deadlines –LC Branch and Bound, FIFO Branch and Bound and LIFO Branch and Bound, 0/1 Knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution, travelling salesperson Problem – LC Branch and Bound

solution

TEXT BOOK(S):

1. Ellis Horowitz, Sartaj Sahni, —Fundamentals of Computer Algorithms, Galgotia Publications [units – 1,2,3,4,5]

REFERENCE BOOKS:

1. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C++, Pearson,3/e,2007.
2. Aho, Hopcroft Ullman, —The Design and Analysis of Computer Algorithms, Addison Wesley publications.
3. ThomasH.Cormanetal, —Introduction to Algorithms, PHI.
4. AnanyLevitin, —Introduction to the Design and Analysis of Algorithms, PEA
5. P.H. Dave, H.B. Dave, —Design and Analysis of Algorithms, PearsonEducation,2008.

B.Tech. (III Sem.)

20AD02-PYTHON FOR DATA SCIENCE

L	T	P	Cr.
3	0	0	3

Pre-requisite : Problem Solving Skills

Course Educational Objective: The objective of the course is to provide basic knowledge of python. python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language for Problem solving and programming capability.

Course Outcomes: At the end of this course, the student will be able to

- CO1:** Identify basic building blocks of python to solve mathematical problems. **(Understand-L2)**
- CO2:** Apply the in-built data structures like list, tuple, set and dictionary for solving problems. **(Apply - L3)**
- CO3:** Demonstrate compelling concepts about string manipulation and functions in python. **(Understand - L2)**
- CO4:** Use exception-handling mechanism to catch run-time errors and demonstrate regular expressions. **(Apply - L3)**
- CO5:** Understand NumPy, Pandas, and Matplotlib. **(Understand - L2)**

UNIT- I

Introduction to Python: History of Python, Usage of Python interpreter, Python Shell, Indentation, Python Built-in types, Variables, Assignment, Input-Output Statements, Simple Programs, Identifiers and keywords, Literals, Python Operators & Operator precedence.

Control Structures: Conditional Statements, Python Loops, Nested loops with Programming Examples, Jumping Statements, Mathematical Functions and Constants (import math), Random Number Functions.

UNIT-II

Lists: Concept, Creating and Accessing Elements, Updating & Deleting Lists, basic List Operations, Reverse, Indexing, Slicing and Matrices, Built-in List Functions.

Tuples: Introduction, Creating & Deleting Tuples, accessing values in a Tuple, Updating tuples, Delete Tuple Elements, basic Tuple Operations, Indexing, Slicing and Matrices, built- in tuple Functions.

Sets: Concept, Operations.

Dictionaries: Introduction, accessing values in dictionaries, working with dictionaries, Properties, Functions.

UNIT- III Functions: Defining a Function, Calling a Function, Types of Functions, Function Arguments,

Anonymous functions, Global and Local Variables, Recursion

Python strings: Concept, Slicing, Escape characters, String Special Operations, String formatting Operator, Triple Quotes, Raw String, Unicode Strings, and Built-in String methods.

UNIT- IV

Modular Design: Creating modules, import statement, from, Date and Time Module.

Exception Handling: Exception, Exception Handling, except clause, Try, finally clause, User Defined Exceptions.

Regular Expression Operations: Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions and Regular Expression with glob Module.

UNIT- V

NumPy Library: Creating Arrays, Initialization of Arrays, Array Properties, Array Operations (Basic Operations, Arithmetic Operations, and Comparisons), Array Functions.

Pandas Library: Introduction to Pandas (Series, Data Frame, Panel).

Pandas Data Frame: Loading the data into Pandas (CSVs, Excel, TXTs), Indexing & Slicing Data Frames, Iterate through each Row,loc &iloc, Getting rows based on a specific condition, Sorting Values, Adding & Deleting a column, Removing Duplicates, Rearranging columns, Saving our Data (CSV, Excel, TXT).

Matplotlib Library: Simple Plotting, Multiple Plots, Using Figure Objects, Subplots, Appearance Options, Saving Plots, Working with Pandas Data Frame, Histograms, Bar Charts, Pie Charts, Scatter plots, 3DSurfaces

TEXT BOOKS:

1. Reema Thareja, “Python Programming Using Problem Solving Approach”, Oxford Publications
2. Dr. Charles Russell Severance, SueBlumenberg, “Python for Everybody: Exploring Data In Python3”.
3. Christopher Wilkinson, “Python Data Science: An Ultimate Guide for Beginners to Learn Fundamentals of Data Science Using Python”,

REFERENCE BOOKS:

1. Gowri Shankar Sand Veena ,“Introduction to Python Programming”, CRC Press, Taylor, and Francis Group –ACHAPMAN&HALLBOOK.
2. R. Nageswara Rao, “Core python programming”, Dreamtech,2017.
3. Y. Daniel Liang, “Revel for Introduction to Python Programming and Data Structures”, Pearson Publications
4. Jake Vander Plas, “Python Data Science Handbook”, November 2016, O'Reilly Media, Inc.

L	T	P	Cr.
3	0	0	3

B.Tech. (III Sem.) 20CS07 - DATABASE MANAGEMENT SYSTEMS

Pre-requisite: Data Structures.

Course Educational Objective: The Objective of this course is to know about basic concepts of DBMS, Database Languages, Database Design, Normalization Process, Transaction Processing, Indexing and Interfacing with NOSQL using MonogoDB.

Course Outcomes: At the end of this course, the student will be able to

- CO1:** State the Basic Components of Database Management System and data modelling using Entity-Relationship Diagrams. (**Understand-L2**)
- CO2:** Examine the relational model using Structured Query Language (SQL). (**Understand-L2**)
- CO3:** Employ principles of normalization for effective database design. (**Understand-L2**)
- CO4:** Demonstrate the necessity of transaction processing, Concurrency control mechanisms and recovery strategies in DBMS. (**Understand-L2**)
- CO5:** Describe file organization, indexing techniques and the competency in selecting NoSQL Database. (**Understand-L2**)

UNIT – I

Introduction: An overview of Database Management System, Database System Vs File System, Database System Concepts and Three Schema Architecture, Data Models, Database Schema and Instances, Data Independence, Database Languages, Database Structure.

Data Modelling using the Entity Relationship Model: ER model concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Relationships of Higher Degree.

UNIT – II

Relational Data Model and Language: Relational Data Model Concepts, Integrity Constraints: Entity Integrity, Referential Integrity, Key Constraints, Domain Constraints, and Relational Algebra.

Introduction to SQL: Characteristics of SQL, Advantage of SQL. SQL Data types and Literals, Insert, Update and Delete Operations, Tables, Views and Indexes, Nested Queries, Aggregate Functions, Joins, Unions, Intersection, Minus, Cursors in SQL, Triggers in SQL.

UNIT – III

Normalization: Functional Dependencies, Normal Forms - First, Second, Third Normal Forms, BCNF, Inclusion Dependencies, Loss Less Join Decompositions, Multi Valued Dependencies, Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT – IV

Transaction Processing Concepts: Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializability, Recoverability, Deadlock Handling.

Concurrency Control Techniques: Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Recovery with Concurrent Transactions.

Crash Recovery: Log Based Recovery, Checkpoints, ARIES Algorithm

UNIT – V

Physical Database Design: Storage and file structure, indexed files, hashed files, B+ trees, files with dense index; files with variable length records.

Interfacing and interacting with NoSQL: Introduction to NoSQL, Storing and Accessing Data, Storing Data in and Accessing Data from MongoDB, Querying MongoDB.

TEXT BOOKS:

1. Henry F. Korth, AbrahamSilberschatz, S. Sudarshan, —Database System Concepts|, McGraw Hill, 6th edition, 2009. [1,2,3,4,5]
2. ShashankTiwari, “Professional No Sql”, JohnWiely& Sons,2011.[5]

REFERENCE BOOKS:

1. Raghu Rama Krishnan, JohanneseGehrke, —DatabaseManagementSystem|,McGrawHill,3rd edition,2000.
2. DateCJ,— AnIntroductiontoDatabaseSystem,PearsonEducation,8thedition,2003.
3. Ramez Elmasri, Sham kanth B.Navathe,—Fundamentals of Database Systems|, Addison Wesley, 6th edition, 2010.[1,2,3,4,5]

L	T	P	Cr.
3	0	0	3

B.Tech. (III Sem.)

20AD03-COMPUTER ARCHITECTURE

Pre-requisite: Fundamentals of computer hardware

Course Educational Objective The objective of the course is to learn about the functional blocks and data representation of computer system, and understands the design principles of processor and organization and management of memory and peripheral devices.

Course Outcomes: At the end of this course, the student will be able to

- CO1:** Identify the functional blocks of a computer and Instruction set architecture of CPU. **(Understand-L2)**
- CO2:** Understand Data representation and perform computer arithmetic operations. **(Apply-L3)**
- CO3:** Illustrate the design principles of control unit and pipelining. **(Understand-L2)**
- CO4:** Analyze the memory hierarchy in a computer system. **(Analyze-L4)**
- CO5:** Discuss the working principles of peripheral devices, their interfaces, and characteristics. **(Understand-L2)**

UNIT-I

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

UNIT-II

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

UNIT-III

CPU control unit design: hardwired and micro-programmed design approaches. Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

UNIT-IV

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

UNIT-V

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers—program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions

TEXT BOOKS:

1. M.MorrisMano, “Computer Systems Architecture”, Pearson Education publishers. [units-1,2]
2. Carl Hamacher, ZvonksVranesic, SafeaZaky, “Computer Organization”, TMH publications. [units-3,4,5]

REFERENCE BOOKS:

1. William Stallings, “Computer Organization and Architecture”, Pearson/PHI publishers, Sixth Edition.
2. Andrew S. Tanenbaum, “Structured Computer Organization”, Pearson/PHI publishers.
3. Siva raama Dandamudi, “Fundamentals or Computer Organization and Design”, Springer publishers.

B.Tech. (III Sem.) 20AD52 - PYTHON FOR DATA SCIENCE LAB

L	T	P	Cr.
0	0	3	1.5

Pre-requisite: Basic Knowledge of Programming.

Course Educational Objective: The Objective of Python course is to lead the students from the basics of writing and running Python scripts in problem solving and to design and implement the modules and understands the working of classes and objects in python.

Course Outcomes: *At the end of the course, the student shall be able to*

- CO 1:** Apply building blocks of Python in solving computational problems. (**Apply - L3**)
- CO 2:** Implement in-built data structures available in Python to solve computational problems. (**Apply - L3**)
- CO 3:** Implement modular programming, string manipulations and Object-oriented programming in python. (**Apply - L3**)
- CO 4:** Improve individual / teamwork skills, communication & report writing skills with ethical values.

Introduction: Language basics and example problems (Two weeks)

- a) Implement Python Script for checking the given year is leap year or not.
- b) Implement Python Script for finding biggest number among three numbers.
- c) Implement Python Script for displaying reversal of a number.
- d) Implement Python Script to check given number is Armstrong or not.
- e) Implement Python Script to print sum of N natural numbers.
- f) Implement Python Script to check given number is palindrome or not.
- g) Implement Python script to print factorial of a number.
- h) Implement Python Script to print all prime numbers with in the given range.
- i) Implement Python Script to calculate the series: $S=1+x+x^2+x^3+.....x^n$
- j) Implement Python Script to print the following pattern:

```

*
*   *
*   *   *

```


Module 1: Exercise Programs on Lists.

- a) Write a Python script to display elements of list in reverse order.
- b) Write a Python script to find the minimum and maximum elements without using built-in operations in the lists.
- c) Write a Python script to remove duplicates from a list.
- d) Write a Python script to append a list to the second list.
- e) Write a Python script to count the number of strings in a list where the string length is 2 or more.

Module 2: Exercise Programs on Tuples.

- a) Write a Python script to create a tuple with different data types.
- b) Write a Python script to find the repeated items of a tuple.
- c) Write a Python script to replace last value of tuples in a list.
Sample list: [(10, 20, 40), (40, 50, 60), (70, 80, 90)]
Expected Output: [(10,20,100), (40,50,100), (70,80,100)]
- d) Write a Python script to sort a tuple by its float element.
Sample data: [('item1', '12.20'), ('item2', '15.10'), ('item3', '24.5')]
Expected Output: [('item3', '24.5'), ('item2', '15.10'), ('item1', '12.20')]

Module 3: Exercise Programs on Sets

- a) Write a Python script to add member(s) in a set.
- b) Write a Python script to perform Union, Intersection, difference, and symmetric difference of given two sets.
- c) Write a Python script to test whether every element in S is in T and every element in T is in S

Module 4: Exercise Programs on Dictionaries

- a) Write a Python script to sort (ascending and descending) a dictionary by value.
- b) Write a Python script to check whether a given key already exists or not in a dictionary.
- c) Write a Python script to concatenate following dictionaries to create a new one.
Sample Dictionary: dic1= {1:10,2:20} dic2= {3:30,4:40} dic3= {5:50,6:60} Expected Result: {1:10,2:20,3:30,4:40,5:50,6:60}
- d) Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are square of keys.
- e) Write a Python program to map two lists into a dictionary.

Module 5: Exercise Programs on functions and recursion

- a) Define a function max_of_three () that takes three numbers as arguments and returns the largest of them.
- b) Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between given range X and Y.
- c) Define functions to find mean, median, mode for the given numbers in a list
- d) Define a function, which generates Fibonacci series up to n numbers.
- e) Implement a python script for factorial of number by using recursion.
- f) Implement a python script to find GCD of given two numbers using recursion

Module 6: Exercise programs on Date and Time Modules

- a) Write a Python script to get the current time in Python.
- b) Write a Python script to get current time in mille seconds in Python
- c) Write a Python script to print next 5 days starting from today.

Module 7. Exercise programs on Exception Handling

- a) Write a Python script to handle simple errors by using exception-handling mechanism.
- b) Write a Python script to handle multiple errors with one except statement.

Module 8: Exercise programs on Strings

- a) Implement Python Script to perform various operations on string using string libraries.
- b) Implement Python Script to check given string is palindrome or not.
- c) Implement python script to accept line of text and find the number of characters, number of vowels and number of blank spaces init.

Module 9: Exercise programs on Regular Expressions

- a) Write a Python script to check that a string contains only a certain set of characters (in this case a-z, A-Z and 0-9).
- b) Write a Python script to check whether password is valid or not.

Conditions for a valid password are:

Should have at least one number.

Should have at least one uppercase and one lowercase character. Should have at least one special symbol.

Should be between 6 to 20 characters' long

Module10: Exercise programs on Python Libraries

- a) Write a NumPy program to generate a matrix product of two arrays.
- b) Write a NumPy program to create a random array with 1000 elements and compute the average, variance, standard deviation of the array elements.
- c) Demonstrate how to download data set and how to create Data Frame
 - i. Write a Pandas program to get the first 3rows of a Data Frame
 - ii. Write a Pandas program to select the specified columns and rows from a given data frame.
 - iii. Write a Pandas program to select the rows where the score is missing, i.e.is NaN.
 - iv. Write a Pandas program to insert a new column in existing Data Frame.
- d) Write a Pandas program to select rows from a given Data Frame based on values in some columns.
- e) Write a Python program to draw a line with suitable label in the x axis, y axis and a title.
- f) Write a Python program to plot two or more lines with legends, different widths and colors.
- g) Write a Python program to create multiple plots.
- h) Write a Python programming to display a bar chart using different color for each bar.
- i)Write a Python programming to create a pie chart with a title.
- j)Write a Python program to draw a scatterplot with empty circles taking a random distribution in X and Y and plotted against each other.

L	T	P	Cr.
0	0	3	1.5

Pre-requisite: Programming language, Set theory, and Data structures.

Course Educational Objective: The objective of this lab is to provide a strong formal foundation in database concepts, technology, and practice to the participants to groom them into well-informed database application developers.

Course Outcomes (CO): *At the end of this course, the student will be able to:*

- CO1:** Create & manipulate the relational database using SQL. **(Apply-L3)**
- CO2:** Implement Views, procedures, triggers, and cursors on relational database. **(Apply-L3)**
- CO3:** Create Unstructured Databases using MongoDB. **(Apply-L3)**
- CO 4:** Improve individual / teamwork skills, communication & report writing skills with ethical values.

Introduction: Language basics and example queries (**one or two weeks**)

1) Create a table STUDENT with appropriate data types and perform the following queries. Attributes are Roll number, student name, date of birth, branch and year of study.

- a) Insert 5 to 10 rows in a table?
- b) List all the students of all branches
- c) List student names whose name starts with 's'
- d) List student names whose name contains 's' as third literal
- e) List student names whose contains two 's' anywhere in the name
- f) List students whose branch is NULL
- g) List students of CSE&ECE who born after 1980
- h) List all students in reverse order of their names
- i) Delete students of any branch whose name starts with 's'
- j) Update the branch of CSE students to ECE
- k) Display student name padded with '*' after the name of all the students.

2) Create the following tables based on the above Schema Diagram with appropriate data types

and constraints and perform the following queries.

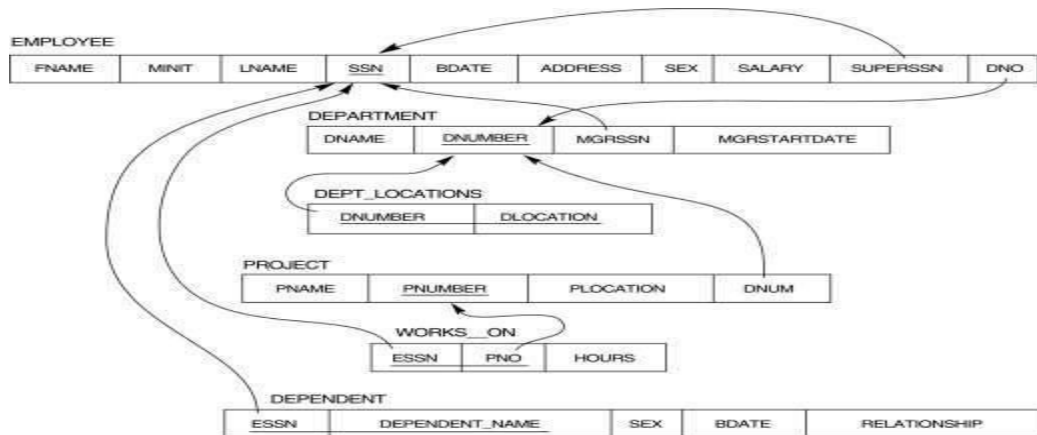
SAILORS (Sail id, Sail name, Rating, Age)

RESERVES (Sail id, boat id, Day)

BOATS (Boat id, Boat-name, Color)

- a) Insert 5 to 10 rows in all tables?
- b) Find the name of sailors who reserved boat number 3.
- c) Find the name of sailors who reserved green boat.
- d) Find the colors of boats reserved by Ramesh.
- e) Find the names of sailors who have reserved at least one boat.
- f) Find the all sailed of sailors who have a rating of 10 or have reserved boated 104.

- g) Find the Sail id 's of sailors with age over20 who have not registered are d boat.
 - h) Find the names of sailors who have reserved are d or green boat.
 - i) Find sailors whose rating is better than some sailor called Salvador.
 - j) Find the names of sailors who are older than the oldest sailor with a rating of 10.
- 3) Schema Diagram for the rest of the SQL and PLSQL Programs.



Create the following tables based on the above Schema Diagram with appropriate data types and constraints.

EMPLOYEE (F name, M name, L name, SSN, B date, Address, Gender, Salary, Super SSN, D no)

DEPARTMENT (D number, D name, Mgr. SSN, Mgr. start date) DEPENDENT

(ESSN, Dependent Name, Gender, B date, Relationship)

- a) Insert 5to10 rows into all the tables.
- b) Display all employees' names along with their department names.
- c) Display all employees' names along with their dependent details.
- d) Display name and address of all employees who work for Research department.
- e) List the names of all employees with two or more dependents.
- f) List the names of employee who have no dependents.
- g) List the names of employees who have at least one dependent.
- h) List the names of the employees along with names of their supervisors using aliases.
- i) Display name of the department and name of manager for all the departments.
- j) Display the name of each employee who has a dependent with the same first name and gender as the employee.

4) Create the following tables based on the above Schema Diagram with appropriated data types and constraints in addition to the tables in

Experiment 2. DEPT_LOCATIONS (D number, D location) PROJECT (P name, P number, P location, D num) WORKS_ON (ESSN, Pno, Hours)

- k) Insert 5to10 rows into all the tables.
- l) Find the names of the employees who work on all the projects controlled by the department Research.
- m) List the project number, name and no. Of employees who work on that project for all the projects.

- n) List the names of all the projects controlled by the departments department wise.
- o) Retrieve the names of employees who work on all projects that John works on.
- p) List the project numbers for projects that involve an employee either as a worker or as a manager of the department that controls the project.
- q) List the names of all employees in one department who work more than 10 hours on one specific project.
- r) For each project, list the project name and total hours (by all employees) spent on that project.
- s) Retrieve the names of all employees who work on one very project.
- t) Retrieve the names of all employees who do not work on any project.

5) Create a view that has project name, controlling department name, number of employees and

Total hours worked on the project for each project with more than one employee working on it.

- u) List the projects that are controlled by one department from this view.
- v) List the managers of the controlling departments for all the projects.
- w) Demonstrate one update operation on this view.
- x) List the Location of the controlling departments for all the projects.
- y) Retrieve the data from the view.

6) Create a view emp from employee such that it contains only emp_no and emp_name and department.

7) Create a view dept from department with only dept_no and location.

8) Create a view that contains the details of employees who are managers only.

9) Write a procedure to check whether the given number is Armstrong or not.

10) Write a procedure which accepts the account number of a customer and retrieve the balance.

11) Write a procedure which accepts the student number and displays the department in which he belongs to.

12) Create a cursor to modify the salary of all employees belonging to 'Research' department by 150%.

13) Consider the college database. Retrieve all students who have registered for a specific course and store their details into another table using Cursors.

14) Write an update trigger on Account table. The system should keep track of the records that are being updated.

15) Create NoSQL database for a sample application and perform CRUD operations

Design Database for any one of the following Case Studies

Case Study1: Hospital Management System

Aim: XYZ hospital is a multi-specialty hospital that includes a number of departments, rooms, doctors, nurses, compounders, and other staff working in the hospital. Patients having different kinds of ailments come to the hospital and get checkup done from the concerned doctors. If required they are admitted in the hospital and discharged after treatment. The aim of this case study is to design and develop a database for the hospital to maintain the records of various departments, rooms, and doctors in the hospital. It also maintains records of the regular patients,

patients admitted in the hospital, the checkup of patients done by the doctors, the patients that have been operated, and patients discharged from the hospital.

Description: In hospital, there are many departments like Orthopedic, Pathology, Emergency, Dental,

Gynecology, Anesthetics, I.C.U., Blood Bank, Operation The after, Laboratory, M.R.I., Neurology, Cardiology, Cancer Department, Corpse, etc. There is an OPD where patients come and get a card (that is, entry card of the patient) for checkup from the concerned doctor. After making entry in the card, they go to the concerned doctor's room and the doctor checks up their ailments. According to the ailments, the doctor either prescribes medicine or admits the patient in the concerned department. The patient may choose either private or general room according to his/her need. But before getting admission in the hospital, the patient has to fulfill certain formalities of the hospital like room charges, etc. After the treatment is completed, the doctor discharges the patient. Before discharging from the hospital, the patient again has to complete certain formalities of the hospital like balance charges, test charges, operation charges (if any), blood charges, doctors' charges, etc. Next we talk about the doctors of the hospital. There are two types of the doctors in the hospital, namely, regular doctors and call on doctors. Regular doctors are those doctors who come to the hospital daily. Calls on doctors are those doctors who are called by the hospital if the concerned doctor is not available.

Table Description:

Following are the tables along with constraints used in Hospital Management database

1. **DEPARTMENT:** This table consists of details about the various departments in the hospital. The information stored in this table includes department name, department location, and facilities available in that department.

Constraint: Department name will be unique for each department.

2. **ALL_DOCTORS:** This table stores information about all the doctors working for the hospital and the departments they are associated with. Each doctor is given an identity number starting with DR or DC prefixes only.

Constraint: Identity number is unique for each doctor and the corresponding department should exist in DEPARTMENT table.

3. **DOC_REG:** This table stores details of regular doctors working in the hospital. Doctors are referred to by their doctor number. This table also stores personal details of doctors like name, qualification, address, phone number, salary, date of joining, etc. Constraint: Doctor's number entered should contain DR only as a prefix and must exist in ALL_DOCTORS table.

4. **DOC_ON_CALL:** This table stores details of doctors called by hospital when additional doctors are required. Doctors are referred to by their doctor number. Other personal details like name, qualification, fees per call, payment due, address, phone number, etc., are also stored.

Constraint: Doctor's number entered should contain DC only as a prefix and must exist in ALL_DOCTORS table.

5. **PAT_ENTRY:** There cord in this table is created when any patient arrives in the hospital for a checkup. When patient arrives, a patient number is generated which acts as a primary key. Other details like name, age, sex, address, city, phone number, entry date, name of the doctor referred

to, diagnosis, and department name are also stored. After storing the necessary details patient is sent to the doctor for checkup.

Constraint: Patient number should begin with prefix PT. Sex should be M or F only. Doctor's name and department referred must exist.

6. PAT_CHKUP: This table stores the details about the patients who get treatment from the doctor referred to. Details like patient number from patient entry table, doctor s number, date of checkup, diagnosis, and treatment are stored. One more field status issued to indicate whether patient is admitted, referred for operation or is a regular patient to the hospital. If patient is admitted, further details are stored in PAT_ADMIT table. If patient is referred for operation, the further details are stored in PAT_OPR table and if patient is a regular patient to the hospital, the further details are stored in PAT_REG table.

Constraint: Patient number should exist in PAT_ENTRY table and it should be unique.

7. PAT_ADMIT: When patient is admitted, his/her related details are stored in this table. Information stored includes patient number, advance payment, mode of payment, room number, department, date of admission, initial condition, diagnosis, treatment, number of the doctor under whom treatment is done, attendant name, etc.

Constraint: Patient number should exist in PAT_ENTRY table. Department, doctor number, room number must be valid.

8. PAT_DIS: An entry is made in this table whenever a patient gets discharged from the hospital. Each entry includes details like patient number, treatment given, treatment advice, payment made, mode of payment, date of discharge, etc.

Constraint: Patient number should exist in PAT_ENTRY table.

9. PAT_REG: Details of regular patients are stored in this table. Information stored includes date of visit, diagnosis, treatment, medicine recommended, status of treatment, etc.

Constraint: Patient number should exist in patient entry table. There can be multiple entries of one patient as patient might be visiting hospital repeatedly for checkup and there will be entry for patient's each visit.

10. PAT_OPR: If patient is operated in the hospital, his/her details are stored in this table. Information stored includes patient number, date of admission, date of operation, number of the doctor who conducted the operation, number of the operation theater in which operation was carried out, type of operation, patient's condition before and after operation, treatment advice, etc.

Constraint: Patient number should exist in PAT_ENTRY table. Department, doctor number should exist or should be valid.

11. ROOM_DETAILS: It contains details of all rooms in the hospital. The details stored in this table include room number, room type (general or private), status (whether occupied or not), if occupied, the n patient number, patient name, charges per day, etc.

Constraint: Room number should be unique. Room type can only be G or P and status can only be Y or N

Case Study2: Railway Reservation

Aim: The railway reservation system facilitates the passengers to enquire about the trains available on the basis of source and destination, booking and cancellation of tickets, enquire about the status of the booked ticket, etc. The aim of case study is to design and develop a database maintaining the records of different trains, train status, and passengers. The record of train includes its number, name, source, destination, and days on which it is available, whereas record of train status includes dates for which tickets can be booked, total number of seats available, and number of seats already booked. The database has been developed and tested on the Oracle.

Description:

Passengers can book their tickets for the train in which seats are available. For this, passenger has to provide the desired train number and the date for which ticket is to be booked. Before booking a ticket for a passenger, the validity of train number and booking date is checked. Once the train number and booking date are validated, it is checked whether the seat is available. If yes, the ticket is booked with confirm status and corresponding ticket ID is generated which is stored along with other details of the passenger. After all the available tickets are booked, certain numbers of tickets are booked with waiting status. If waiting lot is also finished, then tickets are not booked and a message of non-availability of seats is displayed. The ticket once booked can be cancelled at any time. For this, the passenger has to provide the ticket ID (the unique key). The ticket ID is searched and the corresponding record is deleted. With this, the first ticket with waiting status also gets confirmed.

List of Assumption

Since the reservation system is very large in reality, it is not feasible to develop the case study to that extent and prepare documentation at that level. Therefore, a small sample case study has been created to demonstrate the working of the reservation system. To implement this sample case study, some assumptions have been made, which are as follows:

1. The number of trains has been restricted to 5.
2. The booking is open only for next seven days from the current date.
3. Only two categories of tickets can be booked, namely, ACandGeneral.
4. The total number of tickets that can be booked in each category(ACandGeneral)is10.
5. The total number of tickets that can be given the status of waiting is2.
6. The in-between stoppage stations and their bookings are not

considered. **Description of Tables and Procedures**

Tables and procedures that will be created are as follows:

1. **Train List:** This table consists of details about all the available trains. The information stored in this table includes train number, train name, source, destination, fair for AC ticket, fair for general ticket, and week days on which train is available.

Constraint: The train number is unique.

2.Train_Status: This table consists of details about the dates on which ticket can be booked for a train and the status of the availability of tickets. The information stored in this table includes train number, train date, total number of AC seats, total number of general seats, number of AC seats booked, and number of general seats booked.

Constraint: Train number should exist in Train List table.

2. **Passenger:** This table consists of details about the booked tickets. The information stored in this table includes ticket ID, train number, date for which ticket is booked, name, age, sex and address of the passenger, status of reservation (either confirmed or waiting), and category for which ticket is booked.

Constraint: Ticket ID is unique and the train number should exist in Train List table.

3.Booking: In this procedure, the train number, train date, and category is read from the passenger. On the basis of the values provided by the passenger, corresponding record is retrieved from the Train Status table. If the desired category is AC, then total number of AC seats and number of booked AC seats are compared in order to find whether ticket can be booked or not. Similarly, it can be checked for the general category. If ticket can be booked, then passenger details are read and stored in the Passenger table.

4.Cancel: In this procedure, ticket ID is read from the passenger and corresponding record is searched in the Passenger table. If their cord exists, it is deleted from the table. After deleting the record (if it is confirmed), first record with waiting status for the same train and same category are searched from the Passenger table and its status is changed to confirm.

CaseStudy3: Painting Hire Business

System Description:

A local businesswoman has decided to start her own Internet business, called Masterpieces Ltd, hiring paintings to private individuals and commercial companies. Because of your reputation as a database designer, she has called upon your services to design and implement a database to support her new business. At the initial planning meeting, to discuss the design, the following user requirements were requested. The system must be able to manage the details of customers, paintings, and those paintings currently on hire to customers. Customers are categorized as B (bronze), S (silver), G (gold) or P (platinum). These categories entitle a customer to a discount of 0%, 5%, 10% or 15% respectively.

Customers often request paintings by a particular artist or theme (e.g. animal, landscape, seascape, naval, still-life, etc.). Over time a customer may hire the same painting more than once.

Each painting is allocated a customer monthly rental price defined by the owner. The owner of the painting is then paid 10% of that customer rental price. Any paintings that are not hired within six months are returned to the owner. However, after three months, an owner may resubmit a returned painting. Each painting can only have one artist associated with it. Several reports are required from the system. Three main ones are:

1. For each customer, are port showing an over view of all the paintings they have hired or are currently hiring.
2. For each artist, are port of all paintings submitted for hire
3. For each artist, are turns report for those paintings not hired over the past six months remember to identify key attributes and any foreign key attributes.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (III Sem.) 20IT53- UI / UX Design Lab

Pre-requisite : Knowledge of basic Computer hardware & software.

Course Educational Objective: The objective of the course is to understand the design of HTML web pages, Styling of HTML pages using CSS, web forms validation using JavaScript and developing responsive web page using JQuery.

Course Outcomes (CO): *At the end of this course, the student will be able to:*

- CO1:** Understand the basic design and styling of web pages (**Understand- L2**)
- CO2:** Understand the DOM of web design, markup language and client-side scripting. (**Understand- L2**)
- CO3:** Understand the responsive web design and server-side scripting using PHP. (**Understand- L2**)
- CO 4:** Improve individual / teamwork skills, communication & report writing skills with ethical values.

Modules:

1. Design of web pages
2. Creating Web applications using HTML
3. Styling the web pages using CSS
4. Validating the web forms using javaScript
5. Handling and validating semi-structured data
 - a. XML
 - b. JSON
6. jQuery
 - a. validation
 - b. selectors
 - c. fades
 - d. slide
 - e. hide
 - f. animation
7. Server-side scripting with PHP
 - a. GET
 - b. POST
 - c. AJAX

REFERENCE BOOKS:

1. HTML & CSS: The Complete Reference, 5th Edition by Thomas Powell, McGrawHill, 2017.
2. Beginning HTML, XHTML, CSS, and JavaScript by Jon Duckett, Wiley India, 2010.
3. jQuery Cookbook by Cody Lindley, O'Reilly Media, 2009
4. Programming PHP by RasmusLerdorf, Kevin Tatroe, O'Reilly Media, 2002.
5. HTML, XHTML, and CSS Bible, 5th Edition by Steven M. Schafer, Wiley India, 2011.
6. Web Development with jQuery by Richard York, Wiley India, 2015.
7. Learning PHP, MySQL & JavaScript 5e (Learning PHP, MYSQL, Javascript, CSS & HTML5) by Robin Nixon, O'Reilly Media, 2018.

B.Tech. (III Sem.) 20CS09 -OBJECT ORIENTED PROGRAMMING

L	T	P	Cr.
3	0	0	3

Pre-requisite : Programming for Problem Solving using C.

Course Educational Objective The objective of the course is to learn the constructs of the Java programming language along with built-in facilities to create different applications such as console & graphical user interfaces. In the process of learning the language, they will be applying knowledge of object-oriented programming; they will get the fundamental knowledge reason collection framework.

Course Outcomes: At the end of this course, the student will be able to

- CO 1 Demonstrate the fundamentals of object-oriented programming and basic building blocks of Java. (**Understand- L2**)
- CO 2 Apply object-oriented programming principles to solve problems. (**Apply - L3**)
- CO 3 Demonstrate JAVA built-in API packages and create user-defined packages and interfaces (**Understand- L2**)
- CO 4 Develop multitasking applications using JAVA multithreaded programming and handling runtime errors using Exception Handling. (**Apply – L3**)
- CO 5 Develop GUI applications using AWT (Abstract Window Toolkit). (**Apply- L3**)

UNIT-I

Introduction to OOP: Programming paradigms, procedural programming language versus object-oriented language, principles of OOP.

Introduction to JAVA : Data types, variables, keywords, operators, and control statements.

Introduction to Classes and Object: Class definition, variables, and methods. Declaring Objects , Constructors, and this keyword.

UNIT-2

Classes and objects: overloading methods and constructors, parameter passing, returning objects, recursion. Access control, nested and inner classes, final and static keyword, variable and command-line arguments.

Inheritance and polymorphism: Inheritance, types of inheritance, super keyword, polymorphism (overloading & overriding), dynamic method dispatch, abstract class, using final with inheritance.

String handling classes: String, StringBuffer, StringTokenizer.

UNIT-3

Interfaces and packages: Interface methods, inheritance in interfaces. API : The built-in JAVA packages and creating and managing user defined packages, importance of CLASSPATH.

Exception Handling: Exception hierarchy, importance of try, catch, throw, throws and finally. Block creation of user-defined exceptions, Assertions.

UNIT-4

Multithreading: Introduction, thread life cycle, creation of threads, naming a thread, joining a thread, thread priorities, daemon thread, thread pool, thread group, thread synchronization, Inter-thread communication.

Collection Framework: Introduction, generics, collection framework hierarchy, list, set, queue, and map.

UNIT-5

AWT: AWT hierarchy, components and containers, Button, Label, Text Field, Checkbox, Choice, List, Canvas, Scrollbar, Menu Item & Menu, Container class, Layout managers (Border Layout, Flow Layout, Grid Layout, Card Layout).

Event handling: Event delegation model, event classes (Action Event, Mouse Event, Key Event, Window Event), listener interfaces (Action Listener, Mouse Listener and Mouse Motion Listener, Key Listener, Window Listener), adapter classes, close AWT window.

TEXT BOOKS:

1. Herbert Schildt, "Java: The complete reference", TMH Publications, 7th edition, 2006.
2. Cay S. Horstmann, "Core Java Volume I – Fundamentals", Pearson, Eleventh edition, 2018.

REFERENCE BOOKS:

1. Dr.R.NageswaraRao, "Core JAVA: An Integrated Approach", Dreamtech Press, 1st Edition 2008.
2. E. Balaguruswamy, "Programming with JAVA", TMH Publications, 2nd Edition, 2000.
3. Patrick Niemeyer & Jonathan Knudsen, "Learning Java", O'REILLY Publications, 3rd Edition, 2005.
4. Benjamin J Evans & David Flanagan, "Java-in a Nutshell – A desktop quick reference", O'REILLY Publications, 6th Edition, 2014

B.Tech. (III Sem.)

20HS01 – UNIVERSAL HUMAN VALUES 2:
UNDERSTANDING HARMONY

L	T	P	Cr.
3	0	0	3

Pre-requisite : Nil

Course Educational Objective: To become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

COURSE OUTCOMES: At the end of the course, the student will be able to-

CO1: Apply the value inputs in life and profession (**Apply – L3**)

CO2: Distinguish between values and skills, happiness and accumulation of physical facilities, the self, and the Body (**Understand – L2**)

CO3: Understand the role of a human being in ensuring harmony in society (**Understand – L2**)

CO4: Understand the role of a human being in ensuring harmony in the nature and existence. (**Understand – L2**)

CO3: Distinguish between ethical and unethical practices (**Apply – L3**)

UNIT-I: Need, Basic Guidelines, Content and Process for Value Education

‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration; Continuous Happiness and Prosperity- A look at basic Human Aspirations; Right understanding, Relationship and Physical Facility, Understanding Happiness and Prosperity

UNIT-II: Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’; Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility; Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer);

Understanding the characteristics and activities of ‘I’ and harmony in ‘I’; Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

UNIT-III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship;

Understanding the harmony in the society: Resolution, Prosperity, fearlessness and co-existence as comprehensive Human Goals; Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family, Gratitude as a universal value in relationships.

UNIT-IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature; Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature; Understanding Existence as Co-existence of mutually interacting units in all-pervasive space; Holistic perception of harmony at all levels of existence.

UNIT-V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics, Strategy for transition from the present state to Universal Human Order

TEXT BOOKS:

Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCE BOOKS:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

L	T	P	Cr.
3	0	0	3

B.Tech. (IV Sem.)

20CS11 - OPERATING SYSTEMS

Pre-requisite : Knowledge of Computer fundamentals & Data structures & Algorithms

Course Educational Objective: The objective of the course is to provide basic knowledge of computer operating system structure and functioning, understand how Operating Systems evolved with advent of computer architecture, and comprehend the different CPU scheduling algorithms, page replacement algorithms, disk scheduling and identify best one.

Course Outcomes: At the end of this course, the student will be able to

CO1: Demonstrate the underlying principles and techniques of operating system(**Understand-L2**)

CO2: Interpret scheduling and communication methods of processes handled by operating systems(**Understand-L2**).

CO3: Distinguish the process synchronization methods and deadlock handling approaches employed in operating systems(**Understand-L2**).

CO4: Classify memory management techniques and virtual memory mechanisms(**Understand-L2**).

CO5: Interpret the strategies of disk scheduling algorithms and file system architecture (**Understand-L2**).

Unit-1: Introduction to Operating System

Operating System Structures: Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure, Virtual Machines, Operating-System Generation, System Boot.

Unit-2: Process Management

Processes: Process concept, Inter-process Communication, Communication in Client-Server Systems.

Threads: Overview, Multithreading Models

Process Scheduling: Scheduling Criteria, Scheduling Algorithms (FCFS, SJF, PRIORITY, ROUNDROBIN)

Unit-3: Synchronization and Deadlocks

Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention. Deadlock Avoidance, Deadlock Detection, Recovery from deadlock.

Unit-4: Memory Management

Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.

Virtual Memory Management: Demand Paging, Page Replacement, Allocation of Frames, Thrashing.

Unit-5: File System Management

Mass-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management.

Implementing File System: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery.

TEXT BOOKS:

1. Silberschatz& Galvin, “Operating System Concepts”, Wiley, 7th edition, 2007.

REFERENCE BOOKS:

1. William Stallings, “Operating Systems”, PHI, 5th Edition, 2004.
2. B.A. Forouzan& R.F. Giberg, —Unix and shell Programming, Thomson, First Edition, New Delhi, 2003.
3. <http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir/index.html>
4. https://swayam.gov.in/nd1_noc19_cs50/preview

L	T	P	Cr.
3	0	0	3

B.Tech. (IV Sem.)

20AD04-MACHINE LEARNING

Pre-requisite: Probability and Statistics, Linear Algebra

Course Educational Objective: The objective of the course provides the basic concepts and techniques of Machine Learning and helps to use recent machine learning software for solving practical problems. It enables students to gain experience by doing independent study and research.

Course Outcomes: At the end of this course, the student will be able to

- CO1:** Identify the characteristics of machine learning. (Understand- L2)
- CO2:** Summarize the Model building and evaluation approaches (Understand- L2)
- CO3:** Apply Bayesian learning and regression algorithms for real-world Problems. (Apply- L3)
- CO4:** Apply supervised learning algorithms to solve the real-world Problems. (Apply- L3)
- CO5:** Apply unsupervised learning algorithms for the real-world data. (Apply- L3)

UNIT-I: Introduction to Machine Learning and Preparing to Model

Introduction to Machine Learning- Introduction, What is Human Learning? Types of Human Learning, What is Machine Learning? Types of Machine Learning, Problems Not To Be Solved Using Machine Learning, Applications of Machine Learning.

Preparing to Model- Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre- Processing

UNIT-2: Modelling & Evaluation, Basics of Feature Engineering

Modelling & Evaluation- Introduction, Selecting a Model, Training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model.

Basics of Feature Engineering- Introduction, Feature Transformation, Feature Subset Selection

UNIT-3: Bayesian Concept Learning and Regression

Bayesian Concept Learning - Introduction, Why Bayesian Methods are Important?, Bayes 'Theorem, Bayes' Theorem and Concept Learning, Bayesian Belief Network.

Regression: Introduction, Regression Algorithms - Simple linear regression, linear regression, Polynomial Regression Model, Logistic Regression, Maximum Likelihood Estimation.

UNIT-4: Supervised Learning: Classification, Ensemble Learning

Classification- Introduction, Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms - k-Nearest Neighbour (kNN), Decision tree, Random forest model, Support vector machines.

Ensemble Learning- Boosting, Bagging

UNIT-5: Unsupervised learning

Unsupervised Learning- Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering –Clustering as a Machine Learning task, Different types of clustering techniques, Partitioning methods, Hierarchical clustering, Density-based methods: DBSCAN.

Finding Pattern using Association Rule - Definition of common terms, Association rule, Apriori algorithm.

TEXT BOOKS:

1. Machine Learning by Subramanian Chandra Mouli, Saikat Dutt, Amit Kumar Das, edition- 1/publisher(s): Pearson Education India.
2. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev - Shwartz, Shai Ben David, Cambridge.
2. Machine Learning in Action, PeterHarington,2012, Cengage.
3. Machine Learning, Tom M. Mitchell, MGH.
4. Machine Learning Mastery with Python Understand Your Data, Create Accurate Models and Work Projects End-To-End, Jason Brownlee, Edition: v1.4.

L	T	P	Cr.
3	0	0	3

B.Tech. (IV Sem.) 20AD05 - AUTOMATA AND COMPILER DESIGN

Pre-requisite: Knowledge in Discrete mathematics (set theory and graph theory) and programming language.

Course Educational Objective: The Objective of the course is to introduce students to the mathematical foundations of computation like automata theory, the theory of formal languages and grammars, the notion of algorithm, decidability, complexity, and computability. Understand the theory and practice of compiler implementation.

Course Outcomes: At the end of this course, the student will be able to

- CO1:** Design Finite Automata and regular expression for regular language (**Understand-L2**)
- CO2:** Design Context free grammar and push down automata for CFL (**Understand – L2**)
- CO3:** Design and implement lexical analyzer and syntax analyzer. (**Apply - L3**)
- CO4:** Create framework for syntax directed translation schemes and understand the runtime organization of the program. (**Apply - L3**)
- CO5:** Analyze various code optimization techniques and code generation algorithm. (**Apply - L3**)

UNIT – I

Introduction to Automata and formal language theory: Basic Mathematical notations and techniques, classification of Automata, definitions, and its applications. Finite state Machine- Deterministic Finite State Automaton(DFA), Non deterministic Finite State Automaton(NFA), Equivalence of NFA and DFA, Minimization of DFA, examples. Regular expressions- Equivalence of Regular expressions and Finite Automata, pumping lemma and closure properties.

UNIT –II

Introduction to Grammar– Context-free Grammar (CFG), derivation, parse tree, ambiguity, Simplification of CFG, Chomsky Normal Form (CNF) and Greibach Normal Form (GNF). Pushdown Automata-Definition, Equivalence of Context-free Languages and pushdown Automata, Deterministic Pushdown Automaton, pumping lemma and properties of context-free Languages.

UNIT– III

Introduction to compiler: Basic Language processing system, phases of a compiler, Bootstrapping. Lexical Analysis: The role of a Lexical analyzer, input buffering, Specification and Recognition of tokens. Syntax Analysis: The role of a Parser, top-down parsing- recursive descent and predictive parsing, Bottom -up Parsing-Handle pruning, shift-reduce parsing, LR parsers-SLR, CLR and LALR.

UNIT – IV

Syntax-Directed translation (SDT): Attribute grammar, Syntax-Directed Definitions (SDD), and Translation schemes, Applications of SDT 's. Intermediate Code Representations- syntax tree, three- address code and static single assignment. Translation of expressions and statements. Run- time Environment: Storage organization, storage allocation strategies, access to non-local data and parameter passing techniques.

UNIT – V

Basics of Code optimization: Basic blocks and flow graphs, the principal sources of optimization, optimization of Basic blocks, loops in flow graph. Code generation: Issues in the design of a code generator, generic code generation algorithm, Register allocation and assignment, DAG representation of basic blocks, peephole optimization Generating code from DAG.

TEXTBOOKS:

1. John E. Hop craft and J.D. Ullman, —Introduction to Automata Theory Languages and Computation|, NarosaPublications,1999(for1,2units)
2. AlfredV.Aho, Jeffrey Ullman, Ravisethi, —Compilers Principles, Techniques and Tools|, PearsonEducation,2ndEdition,2008. (for3,4,5units)

REFERENCE BOOKS:

1. Sipser, —Introduction to Theory of Computation|, Thomson,2ndEdition
2. Mishra and Chandrashekar,|Theory of Computer Science–Automata languages and computation —2nd edition, PHI
3. Parag H. Dave, Himanshu B. Dave—Compilers Principles and Practice|, Person Education, First Edition,2012.
4. Andrew W. appel—Modern compiler implementation in Cambridge, Revised edition, 2010.
5. <http://nptel.ac.in/courses/111103016/>(VidelecturesforAutomatatheoryandformal languages)
6. <http://nptel.ac.in/courses/106108052/>(VidelecturesforCompilerdesign)

L	T	P	Cr.
0	0	3	1.5

B.Tech. (IV Sem.) **20CS57-OBJECT ORIENTED PROGRAMMING LAB**

Pre-requisite : Programming for Problem Solving using C and Data structures

Course Educational Objective: The objective of the course is to apply the constructs of Java programming language along with built-in facilities to create different applications such as console & graphical user interfaces. They will be applying knowledge of object-oriented programming, collection framework to perform all operations on data.

Course Outcomes (CO): *At the end of this course, the student will be able to:*

CO1: Solve basic mathematical problems using fundamentals of Java and its object-oriented principles. (**Apply – L3**)

CO2: Implement multithreading and exception handling mechanisms. (**Apply – L3**)

CO3: Develop GUI applications and basic data structures using collection framework. (**Apply – L3**)

CO 4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

Introduction: Language basics and example problems (**one or two Modules**)

1. Write a C++ program to display default value of all primitive data type of Java.
2. Write a C++ program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.
3. Write a C++ Program to find the factorial of list of numbers reading input as command line argument.
4. Write a C++ Program to display all prime numbers between two limits.
5. Five bikers compete in a race such that they drive at a constant speed, which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all five racers. Take as input the speed of each racer and print back the speed of qualifying racers.
6. Write a C++ program to implement Rhombus pattern reading the limit from the user.
7. Write a C++ program to calculate gross salary & net salary taking the following data.

Input: empno, empname, basic salary

Process: DA=50% of basic, HRA=25% of basic, CCA=Rs240/-, PF=10% of basic, PT=Rs100/-.

8. Write a C++ program to search for an element in a given list of elements using binary search mechanism.

Module 1:

- a. Develop a java program to create class, which contains data & methods, create an object to access those members.
- b. Develop a java program, which implements all types of java variables (local, class level: static, instance).
- c. Develop a java program to calculate the sum of diagonal elements of given n x n matrix.

Module 2:

- a. Develop a java program, which contains both static and non-static methods.
- b. Develop a java program to find area of geometrical figures using method.
- c. Develop a java program to initialize instance variables by using constructors.
- d. Develop a java program, which implements constructor overloading by passing different number of parameters of different types.

Module 3:

- a. Develop a java program to count the words, characters in the given line of text.
- b. Develop a java program for sorting a given list of names in ascending order.
- c. Develop a java program that reads a line of integers separated by commas and then displays each integer, find the sum of the integers (using StringTokenizer).
- d. Develop a java program to implement multi-level inheritance.

Module 4:

- a. Develop a java program to create and access user-defined package.
- b. Develop a java program to identify the accessibility of a variable by means of different access specifier within and outside the package.
- c. Develop a java program to implement the concept of method overloading.
- d. Develop a java program to implement the concept of method overriding.

Module 5:

- a. Develop a java program for abstract class to find areas of different shapes.
- b. Develop a java program to achieve multiple inheritance using interfaces.
- c. Develop a java program to create an interface named Vehicle which contains two abstract methods (Specifications (), Display ()). Provide two classes named Two-wheeler, Four-wheeler that is implemented by that interface.

Module 6:

- a. Develop a java program that implements a multi-threaded program, which has three threads. First thread generates a random integer for every 1 second, if the generated integer is even the second thread computes the square of the number and print it. If the generated integer is odd the third thread will print the value of cube of the number.
- b. Develop a java program to identify the use of synchronized blocks, synchronized methods and static synchronized methods in threads concept.
- c. Develop a java program to illustrate the concept of inter thread communication.

Module 7:

- a. Develop a java program that creates a user interface to perform integer divisions with possible validations (Divide by Zero, Number Format Exception).
- b. Develop a java program to implement mouse events like mouse pressed, mouse released, and mouse moved by means of adapter classes.

Module 8:

- a. Develop a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
- b. Develop a java program to simulate a traffic light, user can select any one of the three buttons with: red, yellow, and green color. On selecting a button, an appropriate message with “**Stop**” or “**Ready**” or “**Go**” should appear with the selected button color.

Module 9:

- a. Develop a java program to print the collection data by using the following ways
 - i) for loop
 - ii) for-each loop
 - iii) Iterator
 - iv) List Iterator
- b. Develop a java program to perform all the operations in Collection interface.

Module 10:

- a. Develop a java program to implement and perform all the operations in List, Set Interface.
- b. Develop a java program to implement and perform all the operations in Map interface.

L	T	P	Cr.
0	0	3	1.5

B.Tech. (IV Sem.)

20CS59 - OPERATING SYSTEMS LAB

Pre-requisite : Shell Scripting and Object-Oriented Programming

Course Educational Objective: The objective of this lab is to provide the various UNIX/Linux operating system commands, importance of System calls, Scheduling algorithms and Memory Management techniques.

Course Outcomes (CO): *At the end of this course, the student will be able to:*

- CO1:** Experiment with Unix commands and shell programming (**Understand- L2**)
- CO2:** Implement CPU scheduling algorithms and memory management techniques(**Apply- L3**).
- CO3:** Simulate process synchronization and file system management using system calls(**Apply –L3**).
- CO 4:** Improve individual / teamwork skills, communication & report writing skills with ethical values.

Cycle-1:

Execute various UNIX system calls

1. Process Management
2. File Management
3. Input/Output System Calls

Cycle-2:

Simulate the following CPU scheduling algorithms.

- a) FCFS b) SJF c) Round Robin d) Priority.

Cycle-3:

Simulate the file allocation strategies:

- a) Sequential b) Indexed c) Linked

Cycle-4:

Simulate MVT and MFT

Simulate contiguous memory allocation techniques

- a) Worst-fit b) Best fit c) First fit

Cycle-5:

Simulate all File Organization techniques

- A) Single level directory b) Two level c) Hierarchical d) DAG

Cycle-6:

Simulate Bankers Algorithm for Deadlock Avoidance

Simulate Bankers algorithm for Deadlock Prevention

Cycle-7:

Simulate disk scheduling algorithms.

a) FCFS b) SCAN c) C-SCAN

Cycle-8:

Programs on process creation and synchronization, inter process communication including shared memory, pipes, and messages. (Dinning - Philosopher problem).

REFERENCES:

1. <https://github.com/brenns10/lsh/tree/407938170e8b40d231781576e05282a41634848c>
2. <https://github.com/MaaSTaaR/SSFS>

L	T	P	Cr.
0	0	3	1.5

B.Tech. (IV Sem.)

20AD53 - MACHINE LEARNING LAB

Pre-requisite: Probability and Statistics, Programming Knowledge

Course Educational Objective: The objective of this lab is to Make use of Data sets in implementing the machine learning algorithms in any suitable language of choice.

Course Outcomes (CO): *At the end of this course, the student will be able to:*

- CO1:** Apply the appropriate pre-processing techniques on data set. (**Apply – L3**)
- CO2:** Implement supervised Machine Learning algorithms. (**Apply – L3**)
- CO3:** Implement unsupervised Machine Learning algorithms (**Apply – L3**)
- CO 4:** Improve individual / teamwork skills, communication & report writing skills with ethical values.

Experiments:

1. EDA Analysis
2. Exploring Feature Selection Algorithms
 - Ranking
 - Wrapper methods
3. Dimensionality Reduction-PCA
4. Exploring Model Evolution Parameters.
5. Probabilistic Classification Algorithm
6. Regression Techniques: Linear, Logistic
7. Classification Techniques – Tree Based
8. Classification Techniques- Neural network.
9. Ensemble Learning
10. Clustering & Apriori Algorithm.