



KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCES
(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE & SYLLABUS

(Regulations – R20)

For B. Tech COMPUTER SCIENCE AND ENGINEERING
(Applicable for Batches admitted from 2020-2021)



KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCES
(Autonomous)

(Accredited by NBA & NAAC with Grade “A” and Affiliated to JNTUK-Kakinada)
Vinjanampadu, Vatticherukuru Mandal, Guntur,
Andhra Pradesh 522017

**COURSE STRUCTURE & SYLLABUS – R20
SEMESTER - I**

Sno	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH1T06	Differential Equations	3	0	0	3	30	70	100
2	20SH1T04	Applied Chemistry	3	0	0	3	30	70	100
3	20CS1T01	Problem Solving and Programming Using C	3	0	0	3	30	70	100
4	20ME1T01	Engineering Graphics	1	0	4	3	30	70	100
5	20EE1T02	Basics of Electrical and Electronics Engineering	3	0	0	3	30	70	100
PRACTICAL									
6	20SH1L04	Applied Chemistry Lab	0	0	3	1.5	15	35	50
7	20CS1L01	Problem Solving and Programming Using C Lab	0	0	3	1.5	15	35	50
8	20CS1L02	IT Workshop	0	0	3	1.5	15	35	50
Total Credits						19.5	195	455	650

Theory: BSC-2, ESC-3 **Practical:** BSC-1, ESC-2

SEMESTER - II

Sno	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH2T07	Linear Algebra and Vector Calculus	3	0	0	3	30	70	100
2	20SH2T02	Applied Physics	3	0	0	3	30	70	100
3	20SH2T01	Communicative English	3	0	0	3	30	70	100
4	20EC2T01	Digital Logic Design	3	0	0	3	30	70	100
5	20CS2T01	Python Programming	3	0	0	3	30	70	100
6	20GE2M01	Environmental Sciences	2	0	0	0	--	--	--
PRACTICAL									
7	20SH2L01	Communicative English Skills Lab	0	0	3	1.5	15	35	50
8	20SH2L02	Applied Physics Lab	0	0	3	1.5	15	35	50
9	20CS2L01	Python Programming Lab	0	0	3	1.5	15	35	50
Total Credits						19.5	195	455	650

Theory: BSC-2, HSMC-1, ESC-2 **Practical:** MC-1: BSC-1, HSMC-1, ESC-1

**COURSE STRUCTURE & SYLLABUS – R20
SEMESTER-III**

Sno	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20CS3T01	Software Engineering	3	0	0	3	30	70	100
2	20CS3T02	Data Structures & Algorithms	3	0	0	3	30	70	100
3	20CS3T03	Object Oriented Programming through Java	3	0	0	3	30	70	100
4	20CS3T04	Discrete Mathematics	3	0	0	3	30	70	100
5	20CS3T05	Computer Organization and Architecture	3	0	0	3	30	70	100
6	20GE3M01	Constitution of India	2	0	0	0	--	--	--
PRACTICAL									
7	20CS3L01	Object Oriented Analysis and Design Lab	0	0	3	1.5	15	35	50
8	20CS3L02	Data Structures & Algorithms Lab	0	0	3	1.5	15	35	50
9	20CS3L03	OOPS through Java lab	0	0	3	1.5	15	35	50
10	20CS3S01	Mobile App Development	1	0	2	2.0	--	50	50
Total Credits						21.5	195	505	700

Theory: PCC-5, SC-1, MC-1 Practical: PCC-3
SEMESTER - IV

Sno	Course Code	Course Title	L	T	P	C	IM	EM	TM
THEORY									
1	20SH4T03	Probability & Statistics	3	0	0	3	30	70	100
2	20CS4T01	Formal Languages & Automata Theory	3	0	0	3	30	70	100
3	20CS4T02	Web Technologies	3	0	0	3	30	70	100
4	20CS4T03	Database Management Systems	3	0	0	3	30	70	100
5	20SH4T01	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
PRACTICAL									
6	20CS4L03	Database Management Systems Lab	0	0	3	1.5	15	35	50
7	20CS4L01	Data Visualization Lab	0	0	3	1.5	15	35	50
8	20CS4L02	Web Technologies Lab	0	0	3	1.5	15	35	50
9	20CS4S01	Mongo DB	1	0	2	2.0	--	50	50
Total Credits						21.5	195	505	700

Theory: BSC-2, ESC-3 Practical: BSC-1, ESC-2

SEMESTER - I

Course Code	Course Name	L	T	P	C
20SH1T06	Differential Equations	3	0	0	3

Course Outcomes:

At the end of the Course, Student will be able to:

CO1 : Solve the differential equations and apply differential equations related to various engineering fields

CO2 : Solve linear differential equations of second and higher order

CO3 : Calculate Jacobian, maxima and minima of functions of two Variables.

CO4 : Solve first order partial differential equations

CO5 : Solve the higher order partial differential equations

UNIT I: Differential equations of first order and first degree:

Linear differential equations – Bernoulli equations – Exact equations and equations reducible to exact form. Applications: Newton’s Law of cooling - Law of natural growth and decay -Orthogonal trajectories.

UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $x^n V(x)$ - Method of Variation of parameters. Applications: L-R circuit, C-R circuit and L-C-R circuit.

UNIT III: Differential Calculus :

Taylor and Mc Laurent’s series for one & two variables – Functional dependence – Jacobian.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT IV: First order Partial differential equations:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations

UNIT V: Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients – RHS terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$ and Method of separation of Variables.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley- India.
2. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.
3. Peter O'Neil, Advanced Engineering Mathematics, Cengage

SEMESTER - I

Course Code	Course Name	L	T	P	C
20SH1T04	Applied Chemistry	3	0	0	3

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1** : Understand the importance of plastics and composites in various fields.
- CO2** : Apply corrosion control methods to protect metals.
- CO3** : Understand the importance of advanced materials in engineering.
- CO4** : Understand computational chemistry and importance of molecular machines.
- CO5** : Understand the use of non-conventional energy sources to produce power

UNIT-I: POLYMER TECHNOLOGY

Polymerisation:- Introduction-methods of polymerization (emulsion and suspension)-physical and mechanical properties.

Plastics: Compounding-fabrication (compression, injection, blown film, extrusion) - preparation, properties and applications of PVC, polycarbonates and Bakelite-mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste.

Elastomers:- Natural rubber-drawbacks-vulcanization-preparation, properties and applications of synthetic rubbers (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics-conducting polymers-biodegradable polymers.

Learning Outcomes: At the end of this unit, the students will be able to outline the properties of polymers and various additives added and different methods of forming plastic materials.

Explain the preparation, properties and applications of some plastic materials. Interpret the mechanism of conduction in conducting polymers .

Discuss natural and synthetic rubbers and their applications.

UNIT-II: ANALYTICAL TECHNIQUES AND CORROSION
PART A: ANALYTICAL TECHNIQUES

Conductometric titrations – titrations between strong acid and strong base, strong acid and weak base. Potentiometric titrations (redox titrations). Complexometric titrations using EDTA

PART B: CORROSION

Definition-theories of corrosion (chemical and electrochemical)-galvanic corrosion, differential aeration corrosion, stress corrosion, waterline corrosion-passivity of metals-galvanic series -factors influencing rate of corrosion-corrosion control (proper designing,

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cathodic protection)-Protective coatings: Surface preparation, cathodic and anodic coatings, electroplating, electroless plating (nickel). Paints (constituents, functions, special paints).

Learning Outcomes: At the end of this unit, the students will be able to understand the principles of different analytical instruments.

explain the different applications of analytical instruments.

Categorize the reasons for corrosion and study some methods of corrosion control

UNIT-III : MATERIAL CHEMISTRY

PART A: Non-elemental semiconducting materials:- Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling, epitaxy, diffusion, ion implantation) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

Insulators: Electrical insulators- applications.

PART B: Nano materials:- Introduction-sol-gel method- characterization by BET, SEM and TEM methods applications of graphene-carbon nanotubes and fullerenes: Types, preparation and applications Liquid crystals:- Introduction-types-applications.

Super conductors:-Type –I, Type II-characteristics and applications

Learning Outcomes: At the end of this unit, the students will be able to

Understand the importance of materials like nanomaterials and fullerenes and their uses.
Understand liquid crystals and superconductors.

Understand the preparation of semiconductors

UNIT-IV: ADVANCED CONCEPTS/TOPICS IN CHEMISTRY

Computational chemistry: Introduction, Ab Initio studies 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, a molecular elevator, an autonomous light-powered molecular motor

Learning Outcomes: At the end of this unit, the students will be able to Obtain the knowledge of computational chemistry Understand importance molecular machines.

UNIT-V: GREEN CHEMISTRY & NON CONVENTIONAL ENERGY SOURCES**PART A: GREEN CHEMISTRY**

Green synthesis:- Principles –Applications- 3or 4 methods of synthesis with examples – R4M4 principles.

PART B: NON CONVENTIONAL ENERGY SOURCES

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, ocean thermal energy conversion, tidal and wave power.

Learning Outcomes: At the end of this unit

The importance of green synthesis is well understood and how they are different from conventional methods is also explained.

The students will be able to understand power generation by different natural sources.

TEXT BOOKS:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publishing Co.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2019 edition.
2. Engineering Chemistry by Bharathi kumari Yelamanchili, VGS series

SEMESTER - I

Course Code	Course Name	L	T	P	C
20CS1T01	Problem Solving and Programming Using C	3	0	0	3

Course Objectives:

The objectives of Programming for Problem Solving Using C are

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C
- To learn about the design concepts of arrays, strings, enumerated structure and union types. To learn about their usage.
- To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor.
- To assimilate about File I/O and significance of functions

Course Outcomes:

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

CO 1: Build algorithms and to draw flowcharts for solving problems

CO 2: Convert flowcharts/algorithms to C Programs, compile and debug programs

CO 3: Use different operators, data types and write programs that use two-way/ multi-way selection

CO 4: Select the best loop construct for a given problem

CO 5: Design and implement programs to analyze the different pointer applications

CO 6: Decompose a problem into functions and to develop modular reusable code

UNIT I

Introduction to Computers: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Type Qualifiers. Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs.

UNIT II

Bitwise Operators: Exact Size Integer Types, Logical, Bitwise Operators, Shift Operators.

Selection & Making Decisions: Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions. Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples.

UNIT III

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application.

Department of Computer Science and Engineering**UNIT IV**

Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application. Processor Commands: Processor Commands.

UNIT V

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Storage Classes, Scope, life time, Passing Array to Functions, Passing Pointers to Functions, Command Line Arguments, Recursion Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.

Text Books:

- 1) Programming for Problem Solving, Behrouz A. Forouzan, Richard F. Gilberg, CENGAGE.
- 2) The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, 2e, Pearson.

Reference Books:

- 1) Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill.
- 2) Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson.
- 3) Computer Fundamentals and Programming in C, Pradip Dey, Manas Ghosh, OXFORD.

E-Resources:

1. <https://www.tutorialspoint.com/cprogramming/index.htm>
2. <https://www.programiz.com/c-programming>
3. <https://www.javatpoint.com/c-programming-language-tutorial>
4. <https://www.javatpoint.com/c-programming-language-tutorial>

SEMESTER - I

Course Code	Course Name	L	T	P	C
20ME1T01	Engineering Graphics	3	0	0	3

COURSE OUTCOMES:

At the end of the Course student will be able to:

CO1: To illustrate the fundamental Engineering Drawing Standards and discuss about conics and scales.

CO2: Ability to draw the projection of points and straight lines.

CO3: Ability to draw the projection of planes

CO4: Understand the classification of solids and draw the projection of solids.

CO5: Ability to draw isometric and orthographic projections.

UNIT-I

Introduction to Engineering graphics: Conventions in drawing-lettering - BIS conventions.

Polygons: Constructing regular Polygon by general methods.

Curves: Conic sections in general method and Cycloid, Involute tangent and normal for the curves Scales: Plain scales, Diagonal scales and vernier scale.

UNIT-II

Introduction to Orthographic Projections; Projections of Points in various quadrants, Projections of Straight Lines parallel to both planes Projections of Straight Lines-Parallel to one and inclined to other plane

Projections of Straight Lines inclined to both planes, determination of true lengths, angle of inclinations and traces.

UNIT-III

Projections of Planes

Regular Planes Perpendicular / parallel to one Reference Plane and inclined to other Reference Plane, Planes inclined to both the Reference Planes.

UNIT-IV

Projections of solids: Projections of Prisms, Cylinders, with the axis inclined to one Reference Plane. Projections of Pyramids and Cones with the axis inclined to one Reference Plane

UNIT-V

Conversion of isometric views to orthographic views. Conversion of orthographic views to isometric views.

TEXT BOOKS :

1. Elementary Engineering Drawing By N.D.Bhatt, Charotar Publishing House
2. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers.
3. Engineering Drawing, K.L.Narayana & P. Kannaiah, Scitech Publishers.

REFERENCE BOOKS

1. A Text Book of Engineering Graphics By P.J.Shah S.Chand & Company Ltd., New Delhi
2. Engineering Graphics I and II By Arunoday Kumar Tech Max Publication, Pune
3. A text book of Engineering Drawing By P.S.Gill S.K.Kataria & sons, Delhi

SEMESTER - I

Course Code	Course Name	L	T	P	C
20EE1T02	Basic of Electrical and Electronics Engineering	3	0	0	3

COURSE OUTCOMES:

- CO1** : Recognize the fundamentals of solar energy, simple DC and AC circuits.
- CO2** : Demonstrate the construction, working principles and operating characteristics of DC machines and transformer
- CO3** : Demonstrate the construction, working principles and operating characteristics of AC rotating machines.
- CO4** : Demonstrate the working principles and operations of diode rectifiers and transistors
- CO5** : Comprehend the concept of working principles and operations of operational amplifiers and CRO.

UNIT-I :DC & AC Fundamentals

Electrical Circuit Elements (R, L and C)-Voltage and Current Sources - Ohms Laws - Kirchoff's Laws - Series-Parallel- Series and Parallel Combination (Only Resistances)- Problems in Simple Circuits with DC Excitation - Representation of Sinusoidal Waveforms - Cycle, Time Period, Frequency, Instantaneous Value, Peak, Average and RMS Values- Phase Angle, Power Factor, Real Power, Reactive Power and Apparent Power (Definition and Simple Problems).

UNIT-II:DC Machines & Transformers

DC Machines: Principle of Operation of DC Generator – EMF Equation – Types of DC Machine

- Torque Equation of DC Motor – Applications – Three-Point Starter, Speed Control Methods
- OCC Of DC Generator Transformers: Principle of Operation of Single-Phase Transformers – EMF Equation – Losses – Efficiency and Regulation.

UNIT-III : AC Rotating Machines

Principle of Operation of Alternators – Regulation by Synchronous Impedance Method – Principle of Operation Of 3- Phase Induction Motor – Slip-Torque Characteristics - Efficiency – Applications.

UNIT-IV : Rectifiers and Transistors & Concept of uninterrupted power supply (UPS)

PN Junction Diodes – Diode Applications (Half, Full Wave and Bridge Rectifiers) - Zener Diode- Applications (Voltage Regulator) – LED - Photo Diode – SCR- UJT (Principle of Operation)- BJT FET (Types & Principle of Operation)- Concept of UPS-Introduction-Types-Block diagram- applications-Advantages

UNIT-V : Operational Amplifiers and CRO.

Characteristics of Operation Amplifiers (OP-AMP) – Application Of OP-Amps (Inverting, Non- Inverting, Integrator & Differentiator)- Simple Problems on Operation Amplifiers - Cathode Ray Oscilloscope –Construction and Operation.

TEXT BOOKS:

1. D.P. Kothari and I.J. Nagrath, Basic Electrical Engineering, 4th ed., Tata McGraw-Hill, 2019.
2. J. Millman, C. Halkias, Electronic Devices and Circuits, 2nd ed., Tata Mc-Graw-Hill, 2008
3. D. Roy Choudhury and Shail B. Jain, Linear Integrated Circuits, 2nd ed., New Age International (p) Ltd, 2004.

REFERENCE BOOKS:

1. P. V. Prasad, S. Sivanagaraju, K. R. Varmah, and Chikku Abraham, Basic Electrical Engineering, 1st ed., Cengage India, 2018.
2. D.C. Kulshreshtha, Basic Electrical Engineering, 1st ed., Revised, Tata McGraw-Hill, 2012.
3. V K Mehta & Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd ed., S Chand Publishers, 2019.
4. S. Salivahanan, N. Suresh Kumar, Electronic Devices and Circuits, Tata Mc-Graw Hill Education, 2018.
5. S. Salivahanan, V.S. Kanchana Bhaaskaran, Linear Integrated Circuits, 3rd ed., McGraw-Hill Education, 2018
6. <https://www.slideshare.net/GautamMishra5/ups-uninterrupted-power-supply>.

SEMESTER - I

Course Code	Course Name	L	T	P	C
20SH1L04	Applied Chemistry Lab	0	0	3	1.5

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1 : Estimate unknown solutions by using volumetric titration method.
- CO2 : Analyse the quality of water.
- CO3 : Determine the p^H of liquid samples.
- CO4 : Measure the strength of acids by conductometric and potentiometric titrations.
- CO5 : Estimate the acid content in fruit juices and soft drinks.

LIST OF EXPERIMENTS

1. Introduction to Chemistry laboratory – Molarity, normality, primary, secondary standard solutions, volumetric titrations, quantitative analysis
2. Estimation of HCl using standard Na_2CO_3 solution.
3. Estimation of alkalinity of a sample containing Na_2CO_3 and NaOH.
4. Estimation of total hardness of water using standard EDTA solution.
5. Estimation of copper using standard EDTA solution.
6. Estimation of zinc using standard EDTA solution.
7. Estimation of Ferrous iron using standard $K_2Cr_2O_7$ solution.
8. Estimation of $KMnO_4$ using standard Oxalic acid solution.
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base.
11. Conductometric Titrations between strong acid and Weak base.
12. Preparation of Bakelite.
13. Estimation of acid content in soft drinks.
14. Potentiometric Titrations between ferrous iron with potassium dichromate.
15. Estimation of copper (II) using standard hypo solution.
16. Estimation of iron (III) by colorimetric method.

Of the above experiments atleast 10 assessment experiments should be completed in a semester.

Outcomes: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr.Bharathi Kumari Yelamanchili - Laboratory Manual of Engineering Chemistry, VGS Techno Series

SEMESTER - I

Course Code	Course Name	L	T	P	C
20CS1L01	Problem Solving and Programming Using C Lab	0	0	3	1.5

Course Objectives:

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers & functions.
- To review the file operations, preprocessor commands.

Course Outcomes:

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

CO 1:Gains Knowledge on various concepts of a C language.

CO 2: Draw flowcharts and write algorithms.

CO 3:Design and development of C problem solving skills.

CO 4:Design and develop modular programming skills.

CO 5:Trace and debug a program

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r and s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Department of Computer Science and Engineering**Exercise 7:**

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk

SEMESTER - I

Course Code	Course Name	L	T	P	C
20CS1L02	IT Workshop	0	0	3	1.5

Course Objectives:

The objective of IT Workshop is to

- Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
- Demonstrate basic command line interface commands on Linux
- Teach the usage of Internet for productivity and self paced lifelong learning
- Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools

Course Outcomes:

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

- CO1: Describe evolution of computers, storage devices, networking devices, transmission media and peripherals of a computer .
- CO2: Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems
- CO3: Construct a fully functional virtual machine, Summarize various Linux operating system commands.
- CO4: Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTeX .

Computer Hardware:**Experiment 1:**

Identification of peripherals of a PC, Laptop, Server and Smart Phones: Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Operating Systems:**Experiment 2:Virtual Machine setup:**

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

Experiment 3: Operating System installation:

- Installing an Operating System such as Linux on Computer hardware.

Experiment 4: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

Networking and Internet**Experiment 5: Networking Commands**

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

Internet Services:**Experiment 6:**

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/ plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Email creation and usage, Creating a Digital Profile on LinkedIn

Productivity Tools:**Office Tools****Experiment 7:**

Demonstration and Practice on Text Editors like Notepad++, Sublime Text, Atom, Brackets, Visual code, etc

Experiment 8:

Demonstration and practice on Microsoft Word, Power Point

Experiment 9:

Demonstration and practice on Microsoft Excel.

Experiment 10:

Demonstration and practice on LaTeX and produce professional PDF documents.

Experiment 11:

Internet of Things (IoT): IoT fundamentals, applications, protocols, Architecture, IoT Devices communication models.

Introduction to HTML:**Experiment 12:**

Understanding HTML tags and creation of simple web pages.

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Text Books:

1. Computer Fundamentals, Anita Goel, Pearson Education, 2017
2. PC Hardware Trouble Shooting Made Easy, TMH
3. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand.

4. HTML & CSS ,The Complete Reference , Fifth Edition , Thomas A. powell
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.

Reference Text Books:

1. B. Govindarajulu, “IBM PC and Clones Hardware Trouble shooting and Maintenance”, 2nd edition, Tata McGraw-Hill, 2002
2. “MOS study guide for word, Excel, Powerpoint& Outlook Exams”, Joan Lambert, Joyce Cox, PHI.
3. “Introduction to Information Technology”, ITL Education Solutions limited, Pearson Education.
4. Bigelows, “Trouble shooting, Maintaining& Repairing PCs”, TMH.
5. Excel Functions and Formulas, Bernd held, Theodor Richardson, Third Edition

E-Resources:

1. https://explorersposts.grc.nasa.gov/post631/20062007/computer_basics/ComputerPorts.doc
2. https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc
3. <https://www.thegeekstuff.com/2009/07/linux-ls-command-examples>
4. <https://www.pcsuggest.com/basic-linux-commands/>
5. <https://www.vmware.com/pdf/VMwarePlayerManual10.pdf>
6. <https://gsuite.google.com/learning-center/products/#/>
7. <https://www.raspberrypi.org>

SEMESTER - II

Course Code	Course Name	L	T	P	C
20SH2T07	Linear Algebra & Vector Calculus	3	0	0	3

Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 :** Solve simultaneous linear equations numerically using various matrix methods.
- CO 2:** Find the Eigen values and Eigen vectors of a given matrix and nature of quadratic form.
- CO 3 :** Determine double integral over a region and triple integral over a volume.
- CO 4 :** Calculate gradient of a scalar function, divergence and curl of a vector function.
- CO 5:** Determine line, surface and volume integrals and apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:

Rank - Echelon form – Normal form – Solving system of homogeneous and Non– Homogeneous equations – Gauss elimination – Gauss Jordan. Applications: Finding the current in electrical circuits.

UNIT II: Eigen values - Eigen vectors and Quadratic forms:

Eigen values – Eigen vectors– Properties (without proof) – Cayley-Hamilton theorem (Without of proof) – Inverse and powers of a matrix by using Cayley-Hamilton theorem– Diagonalisation – Reduction of quadratic form to canonical form by Orthogonalisation – Rank – Positive, negative and semi definite – Index – Signature.

UNIT III: Multiple integrals:

Double and Triple integrals – Change of order of integration – Change of variables. Applications: Finding Areas.

UNIT IV: Vector Differentiation:

Gradient– Directional derivative – Divergence – Curl – Scalar Potential – Laplacian and second order operators -Vector identities.

UNIT V: Vector Integration

Line integral – Work done – Potential function – Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) .

Text Books:

1. **B. S. Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana**, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **Dass H.K., Rajnish Verma. Er.**, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi

SEMESTER - II

Course Code	Course Name	L	T	P	C
20SH2T02	Applied Physics	3	0	0	3

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1** : Explain the need of coherent sources and the conditions for sustained interference.
- CO2** : Understand the basic concepts of LASER light Sources
- CO3** : Analyze the physical significance of wave function.
- CO4** : Identify the type of semiconductor using Hall effect.
- CO5** : Apply the concept of magnetism to magnetic devices

UNIT-I : WAVE OPTICS

INTERFERENCE: Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications -Colors in thin films- Newton’s Rings- Determination of wavelength and refractive index.

DIFFRACTION: Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits(Qualitative) – Grating - Dispersive power and resolving power of Grating(Qualitative).

POLARIZATION: Introduction-Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol’s Prism -Half wave and Quarter wave plates.

UNIT-II LASERS & FIBER OPTICS

LASERS: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation- Einstein’s coefficients – Population inversion –Lasing action- Pumping mechanisms – Ruby laser – He-Ne laser - Applications of lasers.

FIBER OPTICS: Introduction –Principle of optical fiber- Acceptance Angle-Numerical Aperture- Classification of optical fibers based on refractive index profile and modes –Propagation of electromagnetic wave through optical fibers - Applications.

UNIT-III MAGNETISM & DIELECTRICS

MAGNETISM: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment - Bohr magneton- Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism – Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material.

DIELECTRICS: Introduction - Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (Quantitative), Orientation Polarizations (Qualitative) - Lorentz Internal field-Claussius –Mossotti’s equation- Frequency dependence of polarization - Applications of dielectrics.

UNIT-IV : QUANTUM MECHANICS , FREE ELECTRON THEORY & BAND THEORY OF SOLIDS

Introduction – matter waves – de Broglie’s hypothesis, Heisenberg’s Uncertainty Principle Schrödinger time independent and time dependent wave equations – physical significance of Schrödinger wave function – Particle in a potential box (determination of energy).

FREE ELECTRON THEORY : Introduction - Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory- Equation for electrical conductivity based on quantum free electron theory-Fermi-Dirac distribution- Density of states (3D) – Fermi energy

BAND THEORY OF SOLIDS:

Introduction - Bloch theorem, krong-Penney model, E vsK diagram, effective mass of electron, classification of c solids –concept of hole.

UNIT – V : SEMICONDUCTOR PHYSICS

Introduction – Intrinsic semiconductors - density of charge carriers – Electrical conductivity - Fermi level - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Drift and Diffusion currents - Einstein’s equation. Hall effect- Hall coefficient - Applications of Hall effect.

TEXT BOOKS:

1. B. K. Pandey, S. Chaturvedi ., “Engineering Physics” - Cengage Publications, 2012
2. M.N. Avadhanulu, P.G.Kshirsagar., “A Text book of Engineering Physics” - S.Chand, 2017.
3. D.K.Bhattacharya and Poonam Tandon., “Engineering Physics”, Oxford press (2015).
4. R.K Gaur. and S.L Gupta., “Engineering Physics” - Dhanpat Rai publishers, 2012.

REFERENCE BOOKS:

1. M.R.Srinivasan, “Engineering Physics”, New Age international publishers (2009).
2. Ajoy Ghatak “Optics”, 6th Edition McGraw Hill Education, 2017.
3. A.J.Dekker “Solid State Physics”, Mc Millan Publishers (2011).

SEMESTER - II

Course Code	Course Name	L	T	P	C
20SH2T01	Communicative English	3	0	0	3

COURSE OUTCOMES :

- CO1** : Recall life in one's past which had fine balancing act.
- CO2** : Decide the qualities required to take up a promising career.
- CO3** : Evaluate the obstacles hinder of student’s progress and find the ways to overcome them.
- CO4** : Explain the environment activism and empowerment of women
- CO5** : Interpret the efforts of successful persons to keep idealistic approach in achieving goals.

UNIT-I: A Drawer full of happiness

Speaking: Asking and answering general questions on familiar topics such as home, family, work, Study and interests. Self introduction and introduce others.

Vocabulary: Technical vocabulary from a cross technical branches, GRE Vocabulary
(Antonyms and Synonyms, Word applications).

Grammar: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns- Countable and uncountable; singular and plural, basic sentence structures; simple question form –,,wh” questions; word order in sentences.

Writing: Note Making and Note Taking.

Employability Skills: Teamwork

UNIT-II: Nehru’s letter to daughter Indira on her Birthday

Speaking: Discussion in pairs, small groups on specific topics followed by short structured talks.
Functional English: Greetings and leave takings.

Vocabulary: Technical vocabulary from across technical branches. GRE Vocabulary, Analogies
(Antonyms and Synonyms, Word applications)

Grammar: Use of articles and zero article; prepositions.

Writing: Resume, Cover Letter.

Employability Skills: Time Management

UNIT-III: Stephen Hawking-Positivity ‘Benchmark’

Speaking: Discussing specific topics in pairs or in small groups and reporting what is discussed.
Functional English: Complaining and Apologizing.

Reading: Reading a text in detail by making basic inferences-recognizing and interpreting Specific context clues; strategies to use text clues for comprehension. Criticalreading.

Vocabulary : Technical vocabulary from a cross technical branches,GRE Vocabulary(Antonyms and Synonyms, Word applications) Association, sequencing of words- Grammar: Verbs– Tenses; subject-verb agreement.

Writing: Letter Writing: -Formal, Business, Editorial, Complaints, Applications, Permissions.

Employability Skills: Leadership skills.

UNIT-IV: Like a Tree, Unbowed: Wangari Maathai-biography

Reading: Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

Vocabulary: Technical vocabulary from across technical branches, GRE Vocabulary, (Antonyms and Synonyms, Word applications) Cloze Encounters.

Writing: Essay Writings: - Paragraph Writing, Precis Writing,

Employability Skills: Management skills.

UNIT-V: Stay Hungry-Stay Foolish

Reading: RAP Strategy Intensive reading and Extensive reading techniques.

Reading for Writing: Writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches, GRE Vocabulary (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

Grammar: Editing short texts-identifying and correcting common errors in grammar and usage (Articles, prepositions, tenses, subject verb agreement)

Writing : E- Mail, Reports, Reporting to media.

Employability Skills: Creative Thinking.

TEXTBOOKS:

01. "InfotechEnglish", Maruthi Publications.

REFERENCEBOOKS:

01. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
02. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
03. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
04. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

SEMESTER - II

Course Code	Course Name	L	T	P	C
20EC2T01	Digital Logic Design	3	0	0	3

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1** : Define different number systems and recognize various applications of it.
- CO2** : Select the concept of Boolean algebra in minimization and identify the solution of switching functions.
- CO3** : Execute different types of combinational logic circuits.
- CO4** : Execute the PLA logic for different applications
- CO5** : Use knowledge of flip-flops in operation of Registers and counters

UNIT-I : NUMBER SYSTEMS & CODES:

Review of number systems, conversions, r’s and r-1’s complements of signed numbers, arithmetic addition and subtraction, Gray code, 4-bit codes, Error detection and correction codes.

UNIT-II : BOOLEAN THEOREMS & MINIMIZATION TECHNIQUES

Boolean theorems, representations of Boolean functions, logic gates, NAND-NAND and NOR- NOR realizations, Minimization of switching functions using Boolean theorems, K-map (up to 5 variables and tabular method, with & without Don’t-care conditions).

UNIT-III : COMBINATIONAL LOGIC CIRCUIT DESIGN

Analysis and design procedure of combinational logic circuits: Half-adder, Full-adder, Half subtractor, Full-subtractor, 4-bit adder-subtractor, Decoders, Encoders, Multiplexers, De- Multiplexers comparator, code converters.

UNIT-IV : INTRODUCTION OF PROGRAMMABLE LOGIC DEVICES

PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table memory types

UNIT-V : SEQUENTIAL LOGIC CIRCUIT DESIGN

Introduction to Sequential Circuits, Storage Elements: Latches, Flip-Flops: RS, JK, D and T flip-flop truth and excitation tables, conversion of flip-flops. Registers, shift registers, Counters: synchronous and asynchronous.

TEXT BOOKS:

1. M.Morris Mano, Digital Design, 4th Edition, PHI Publication, 2008.
2. A. Anand Kumar, Fundamentals of digital circuits, 4th Edition, PHI Publication, 2016.

REFERENCE BOOKS:

1. [Norman Balabanian and Bradley Carlson](#), Digital Logic Design Principles 1st Edition, Wiley publisher, 2010
2. John P.Hayes, Introduction to Digital Logic Design, 1st Edition, Pearson Publication, 1993.
3. [AlamMansaf](#) and [Alam Bashir](#), Digital Logic Design, PHI Publication, 2015.

SEMESTER - II

Course Code	Course Name	L	T	P	C
20CS2T01	Python Programming	3	0	0	3

Course Objectives:

The Objectives of Python Programming are

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object-oriented programming

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

CO1: Develop essential programming skills in computer programming concepts like data types, containers

CO2: Apply the basics of programming in the Python language

CO3: Solve coding tasks related conditional execution, loops

CO4: Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming.

UNIT I

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.

Data Types, and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables.

Programming: Introduction to Programming Concepts with Scratch.

UNIT II

Repetition Structures: Introduction, while loop, for loop, Nested Loops.

Control Statement: Definite iteration for Loop Formatting Text for output, Selection if and if else Statement Conditional Iteration The While Loop

Strings and Text Files: Accessing Character and Substring in Strings, Data Encryption, Strings and Number Systems, String Methods TextFiles, string pattern matching. Understanding

read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

UNIT III

List and Dictionaries: Lists, tuple, Dictionaries and sets, frozen sets.

Design with Function: Defining Simple Functions, Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions, Managing a Program's Namespace, Higher Order Function.

Modules: Modules, Standard Modules, Packages.

UNIT IV

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using OOPS support.

Design with Classes: Objects and Classes, Data modeling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism.

UNIT V

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions.

Graphical User Interfaces: The Behavior of Terminal Based Programs and GUI -Based, Programs, Coding Simple GUI-Based Programs, Other Useful GUI Resources, Turtle Graphics

Testing: Basics of testing? unit testing in python, writing test cases, running tests.

Text Books

- 1) Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
- 2) Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
- 3) Reema Thareja, Python Programming using problem solving Approach, Oxford University Press 2017
- 4) R. Nageswara Rao core python Programming second Edition.

Reference Books:

- 1) Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press.
- 2) Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

E - Resources:

- 1) https://www.tutorialspoint.com/python3/python_tutorial.pdf
- 2) https://bugs.python.org/file47781/Tutorial_EDIT.pdf

SEMESTER - II

Course Code	Course Name	L	T	P	C
20SH2L01	English Communication Skills Lab	0	0	3	1.5

Module - I:

Introduction to Phonetics.

- a) Brief Introduction to Consonants
- b) Brief Introduction to Vowels & Diphthongs

Module - II:

Listening Comprehension

- a) Comprehending Spoken material in British English.
- b) Comprehending Spoken material in American English.
- c) Intelligent Listening in Situations.

Module -III:

Role – Play / Dialogue Writing

- a) Introducing one and others.
- b) Asking for and giving information.
- c) Asking for and responding to give directions.
- d) Seeking permission, requests.
- e) Apologizing.

Module - IV:

Communication Skills

- a) Verbal and Non – verbal communications
- b) Barriers of communication.
- c) Body Language – Voluntary and Involuntary.

Module - V:

Presentation Skills.

- a) Extempore
- b) JAM Sessions
- c) Paper Presentation

Module - VI:

- a) Group Discussions: Dos and Don'ts- Types, Modalities
- b) Resume Preparation.

References:

1. Infotech English, Maruthi Publications (with Compact Disc).
2. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
3. English Pronunciation in use- Mark Hancock, Cambridge University Press.
4. English Phonetics and Phonology-Peter Roach, Cambridge University Press.
5. English Pronunciation in use- Mark Hewings, Cambridge University Press.
6. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
7. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.
8. Technical Communication- Meenakshi Raman, Sangeeta Sharma, Oxford University Press.
9. Technical Communication- Gajendra Singh Chauhan, SmitaKashiramka, Cengage Publications.

SEMESTER - II

Course Code	Course Name	L	T	P	C
20SH2L01	Applied Physics Lab	0	0	3	1.5

COURSE OUTCOMES:

After successful completion of this course, students should be able to

- CO1 : **Memorize** the conditions for sustained Interference and Diffraction.
- CO2 : **Understand** the basic concepts of LASER.
- CO3 : **Identify** the properties of various materials.
- CO4 : **Apply** the concept of dielectrics on the materials.
- CO5 : **Analyze** the acoustic properties of sound.

List of Experiments :

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton’s rings – Radius of Curvature of Plano - Convex Lens.
3. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
4. Energy Band gap of a Semiconductor p - n junction
5. Characteristics of Thermistor – Temperature Coefficients
6. Determination of dielectric constant.
7. LASER - Determination of wavelength by plane diffraction grating
8. Rigidity modulus of material by wire-dynamic method (Torsional pendulum)
9. Verification of laws of vibrations in a stretched string – Sonometer
10. LASER - Determination of particle size using laser.
11. Determination of moment of inertia of a fly wheel.
12. Melde’s Experiment – Transverse and longitudinal waves
13. Determination of time constant – C- R Circuit.
14. I/V Characteristics of ZENAR diode.
15. Determination of Young’s Modules of the given Beam – Cantilever.

SEMESTER - II

Course Code	Course Name	L	T	P	C
20CS2L01	Python Programming Lab	0	0	3	1.5

Course Objectives:

The aim of Python Programming Lab is

- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python
- To develop the skill of designing Graphical user Interfaces in Python
- To develop the ability to write database applications in Python

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

CO 1: Write, Test and Debug Python Programs

CO 2: Use Conditionals and Loops for Python Programs

CO 3: Use functions and represent Compound data using Lists, Tuples and Dictionaries

CO 4: Use various applications using python

- 1) Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a kilogram.
- 2) Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
- 3) Write a program that uses a *for* loop to print the numbers 8, 11, 14, 17, 20, . . . , 83, 86,89.
- 4) Write a program that asks the user for their name and how many times to print it. The program should print out the user’s name the specified number of times.
- 5) Use a *for* loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.


```
*
**
***
****
```
- 6) Generate a random number between 1 and 10. Ask the user to guess the number and print a message based on whether they get it right or not.
- 7) Write a program that asks the user for two numbers and prints *Close* if the numbers are within .001 of each other and *Not close* otherwise.
- 8) Write a program that asks the user to enter a word and prints out whether that word contains any vowels.
- 9) Write a program that asks the user to enter two strings of the same length. The program should then check to see if the strings are of the same length. If they are not, the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters *abcde* and *ABCDE* the program should print out *AaBbCcDdEe*

- 10) Write a program that asks the user for a large integer and inserts commas into it according to the standard American convention for commas in large numbers. For instance, if the user enters 1000000, the output should be 1,000,000.
- 11) Write a program that generates a list of 20 random numbers between 1 and 100.
 - (a) Print the list.
 - (b) Print the average of the elements in the list.
 - (c) Print the largest and smallest values in the list.
 - (d) Print the second largest and second smallest entries in the list
 - (e) Print how many even numbers are in the list.
- 12) Write a program to use split and join methods in the given string and store them in a dictionary data structure.
- 13) Write a program that removes any repeated items from a list so that each item appears at most once. For instance, the list [1,1,2,3,4,3,0,0] would become [1,2,3,4,0].
- 14) Write a program that asks the user to enter a length in feet. The program should then give the user the option to convert from feet into inches, yards, miles, millimeters, centimeters, meters, or kilometers. Say if the user enters a 1, then the program converts to inches, if they enter a 2, then the program converts to yards, etc. While this can be done with if statements, it is much shorter with lists and it is also easier to add new conversions if you use lists.
- 15) Write a function called *sum_digits* that is given an integer num and returns the sum of the digits of num.
- 16) Write a function called *first_diff* that is given two strings and returns the first location in which the strings differ. If the strings are identical, it should return -1.
- 17) Write a function called *number_of_factor* that takes an integer and returns how many factors the number has.
- 18) Write a function called *is_sorted* that is given a list and returns True if the list is sorted and False otherwise.
- 19) Write a function called *root* that is given a number x and an integer n and returns $x^{1/n}$. In the function definition, set the default value of n to 2.
- 20) Write a function called *merge* that takes two already sorted lists of possibly different lengths, and merges them into a single sorted list.
 - (a) Do this using the sort method.
 - (b) Do this without using the sort method
- 21) Write a program that asks the user for a word and finds all the smaller words that can be made from the letters of that word. The number of occurrences of a letter in a smaller word can't exceed the number of occurrences of the letter in the user's word.
- 22) Write a program that reads a file consisting of email addresses, each on its own line. Your program should print out a string consisting of those email addresses separated by semicolons.
- 23) Write a program that reads a list of temperatures from a file called *temps.txt*, converts those temperatures to Fahrenheit, and writes the results to a file called *ftemps.txt*.
- 24) Write a class called *Product*. The class should have fields called name, amount, and price, holding the product's name, the number of items of that product in stock, and the regular price of the product. There should be a method *get_price* that receives the number of items to be bought and returns the cost of buying that many items, where the regular price is charged for orders of less than 10 items, a 10% discount is applied for orders of between 10 and 99 items, and a 20% discount is applied for orders of 100 or more items. There should also be a method called *make_purchase* that receives the

number of items to be bought and decreases amount by that much.

- 25) Write a class called Time whose only field is a time in seconds. It should have a method called *convert_to_minutes* that returns a string of minutes and seconds formatted as in the following example: if seconds is 230, the method should return '5:50'. It should also have a method called *convert_to_hours* that returns a string of hours, minutes, and seconds formatted analogously to the previous method.
- 26) Write a Python class to implement $\text{pow}(x,n)$.
- 27) Write a Python class to reverse a string word by word.
- 28) Write a program to demonstrate Try/except/else.
- 29) Write a function *nearly_equal* to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
- 30) Write a python program to create wheel using turtle graphics.
- 31) Write a python program on GUI to create a Registration form.
- 32) Write a python program to check whether a string starts and ends with the same character or not (using Regular Expression re module).

Text Books

- 5) Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
- 6) Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
- 7) Reema Thareja, Python Programming using problem solving Approach, Oxford University Press 2017
- 8) R. Nageswara Rao core python Programming second Edition.

Reference Books:

- 3) Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press.
- 4) Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

E-Resources:

- 3) https://www.tutorialspoint.com/python3/python_tutorial.pdf
https://bugs.python.org/file47781/Tutorial_EDIT.pdf

SEMESTER - II

Course Code	Course Name	L	T	P	C
20GE2M01	Environmental Sciences	2	0	0	0

COURSE OUTCOMES:

After successful completion of this course, students will be able to

- CO1 : Identify the fundamental concepts and the first global initiatives towards sustainable development and the possible means to combat the challenges
- CO2 : Examine the natural resources, their availability for the sustenance of the life and recognize the need to promote the green technologies to conserve the natural resources
- CO3 : Assess the concepts of the ecosystem, its function in the environment and the need for protecting various ecosystems
Discuss the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- CO4 : Explain various attributes of the pollution and their impacts and measures to control the pollution along with waste management practices
- CO5 : Outline the social issues including the environmental legislations of India and environmental assessment and also to investigate the industrial, urban and rural conditions in the surroundings.

Unit 1 : Scope and Importance of Environmental Studies

Definition and components of environment, Scope and Importance: Sustainability: Stockholm and Rio Summit: Global Environmental Challenges: Global warming and climate change- Acid rains, Ozone layer depletion, Population Explosion and effects, Role of IT in environmental protection and human health.

UNIT-II : Natural Resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems,

Energy resources: Growing energy needs, renewable and non-renewable energy sources

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification.

UNIT-III : Ecosystems and Biodiversity and its conservation

Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem –Bio geo chemical cycles-Ecological succession. – Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

Green Campus and Green Energy. Identification of species by involving in activities like plantation inside or outside the campus.

Biodiversity and its conservation: Definition: genetic, species and ecosystem

diversity- classification - Value of biodiversity: consumptive use, productive use, social-

India as a mega-diversity nation - Hot-spots of biodiversity- Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT-IV : Environmental Pollution

Definition, Cause, effects and control measures of **Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards**. Role of an individual in prevention of pollution. - Pollution case studies,

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management. Industrial Disasters and Pollution Case studies: -Bhopal Disaster, Chernobyl accident, Love canal Disaster.

UNIT-V : Environmental Legislation and the Environmental Management

Environmental Protection Act –Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness

Impact Assessment and its significance-various stages of EIA, preparation of EMP and EIS, Eco-tourism.

Visit to an Industry / Urban/Rural/Agricultural Ecosystem and submit a report individually on any issues or Documentation of Plants and Animals (Field work Equal to 3 lecture hours).

TEXT BOOKS:

1. Environment Studies, Fourth Edition, Anubha Kaushik, C P Kaushik, New Age International Publishers.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi.
3. Fundamentals of Environment Studies, MahuaBasu and S.Xavier, Cambridge Publishers, 2014.

Textbook of Environmental Science, M. Anji Reddy, B S Publications, Hyderabad

REFERENCE BOOKS :

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, NewDelhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, NewDelhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New AgeInternational Publishers,2014

SEMESTER - III

Course Code	Course Name	L	T	P	C
20CS3T01	Software Engineering	3	0	0	3

Course Outcomes:

At the end of the Course the Student will be able to:

CO1: Explain about appropriate software process models for software project/product.

CO2: Interpret the functional, non-functional requirements and requirement Engineering Process.

CO3: Choose the Architecture for a given software application.

CO4: Identify appropriate test strategies that can be applied to a given software application.

CO5: Analyze various Risk Management and Quality Management Techniques.

UNIT-I

INTRODUCTION TO SOFTWARE ENGINEERING: Software, The Nature of Software, Software Myths, The Software Process, A Generic Process Model, CMMI.

PROCESS MODELS: Prescriptive Process Models- The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models. Specialized Process Models. The Unified Process

UNIT-II

SOFTWARE REQUIREMENTS: Functional and Nonfunctional Requirements, the software requirements document, Requirements Specification, The Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Validation, Requirements Management.

UNIT-III

DESIGN ENGINEERING: The Design Process, Design Concepts, the Design Model.

ARCHITECTURAL DESIGN: Software Architecture, Architectural Styles, Architectural Design, Architectural Mapping using Data Flow.

UNIT-IV**SOFTWARE TESTING STRATEGIES:**

A Strategic Approach to Software Testing, Test Strategies for Conventional Software and Object Oriented Software, Validation Testing, White- Box Testing, Basis Path Testing, Black-Box Testing, System Testing.

UNIT-V**RISK MANAGEMENT:**

Reactive versus Proactive Risk Strategies, Risk Identification, Risk Projection, Risk Refinement, RMMM, RMMM Plan.

QUALITY MANAGEMENT:

Software Quality, Informal Reviews, Formal Technical Reviews, Statistical Software Quality Assurance, Software Reliability.

TEXTBOOKS:

1. Roger S. Pressman, *Software Engineering a Practitioner's Approach*, 7th Edition, TMH, 2010.
2. Sommerville, *Software Engineering*, 9th Edition, Pearson Education, 2011.

REFERENCES:

1. K.K. Agarwal & Yogesh Singh, *Software Engineering*, 3rd Edition, New Age International Publishers, 2008.
2. Pankaj Jalote, *An Integrated Approach to Software Engineering*, 3rd Edition, Narosa Publishing House, 2011.

E- REFERENCES:

1. <https://nptel.ac.in/Courses/SoftwareEngineering>
2. [https://www.coursera.org/Courses?query=software engineering](https://www.coursera.org/Courses?query=software%20engineering)
3. <https://www.udemy.com/Courses/development/software-engineering>

SEMESTER - III

Course Code	Course Name	L	T	P	C
20CS3T02	Data Structures & Algorithms	3	0	0	3

COURSEOUTCOMES:

At the end of the Course the student shall be able to

CO 1: Analyze algorithms and Describe searching, sorting and hashing techniques.

CO 2: Describe the concepts of stacks and queues.

CO 3: Apply the concepts of linked lists.

CO 4: Describe the concepts of trees.

CO 5: Explain the concepts of graphs.

UNIT-1 :Analysis of Algorithms: Efficiency of algorithms, Apriori Analysis, Asymptotic notations, Time complexity of algorithms using O notation, Polynomial Vs Exponential algorithms, Average, Best, Worst case complexities, Analyzing recursive programs.

Searching: Introduction, Linear Search, Binary Search, Fibonacci Search.

Internal Sorting: Introduction, Bubble Sort, Insertion Sort, Selection Sort.

Hashing : Introduction, Hash Table Structure, Hash Functions.

UNIT-II : Stacks: Introduction, Stack operations, Applications.

Queues : Introduction, Operations on queues, circular queues, Priority queues, Applications.

UNIT-III

Linked Lists: Introduction, Singly linked lists, Circular linked lists, Doubly linked lists, Multiple linked lists, Applications.

Linked Stacks and Linked Queues: Introduction, Operations on linked stacks and linked queues, Dynamic memory management, Implementation of linked representations, Applications.

UNIT-IV: Trees and Binary Trees: Introduction, Trees: Definition and Basic Terminologies, Representation of trees. Binary trees: Basic terminologies and types, representation of binary trees, binary tree traversals, applications.

Binary Search Trees and AVL Trees : Introduction, Binary search trees: Definition and operations, AVL Trees: Definition and operations, Applications.

UNIT-V

Graphs: Introduction, Definitions and basic terminologies, Representations of graphs, Graph traversals and applications.

TEXT BOOKS:

1. Data Structures & Algorithm Analysis in C | Second Edition | Mark Allen Weiss |by Pearson
2. Data Structures using C |Second Edition| by Reema Thareja| Oxford

REFERENCES:

1. G.A.V. PAI, *Data Structures and Algorithms, Concepts, Techniques and Applications*, Volume 1, 1st Edition, Tata McGraw-Hill, 2008.
2. Richard F. Gilberg & Behrouz A. Forouzan, *Data Structures, Pseudo code Approach with C*, 2nd Edition, Cengage Learning India Edition, 2007.
3. Ansam, M.J. Augenstein, A.M. Tanenbaum, *Data structure using C and C++*, 2nd Edition, PHIE ducation, 2008.
4. Sartaj Sahni, Ellis Horowitz, *Fundamentals of Data Structures in C*, 2nd Edition, Orient blacks wan, 2010.

E- REFERENCES:

1. <https://www.javatpoint.com/data-structure-tutorial>

SEMESTER - III

Course Code	Course Name	L	T	P	C
20CS3T03	Object Oriented Programming through Java	3	0	0	3

Course Outcomes:

At the end of the Course the student shall be able to

- Able to realize the concept of Object Oriented Programming & Java Programming Constructs
- Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords
- Apply the concept of exception handling and Input/ Output operations
- Able to design the applications of Java & Java applet
- Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit

UNIT I

Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if-else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do-while Loop, for Loop, Nested for Loop, For-Each for Loop, Break Statement, Continue Statement.

UNIT II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Department of Computer Science and Engineering

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions, try-with-resources, Catching Subclass Exception, Custom Exceptions, Nested try and catch Blocks, Rethrowing Exception, Throws Clause

UNIT V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Methods for Comparison of Strings, Methods for Modifying Strings, Methods for Searching Strings, Data Conversion and Miscellaneous Methods, Class String Buffer, Class String Builder.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread- Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface, Creating JDBC Application, JDBC Batch Processing, JDBC Transaction Management.

Text Books:

- 1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
- 2) The complete Reference Java, 8th edition, Herbert Schildt, TMH.

References Books:

- 1) Introduction to java programming, 7th edition by Y Daniel Liang, Pearson
- 2) Murach's Java Programming, Joel Murach

E-Resources:

- 1) <https://nptel.ac.in/courses/106/105/106105191/>
- 2) https://www.w3schools.com/java/java_data_types.asp

Course Code	Course Name	L	T	P	C
20CS3T04	Discrete Mathematics	3	0	0	3

Course Outcomes:

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

CO1: Verify the validity of a logical flow of arguments.

CO2: Identify various types of relations and their properties.

CO3: Solve recurrence relations of various types.

CO4: Identify algebraic structures and learn modular arithmetic.

CO5: Understand various concepts of graphs and spanning trees.

Unit I: Mathematical logic

Statements and notations, connectives, well formed formulas, tautologies, equivalence of formulas, duality law, tautological implications, other connectives, normal forms, rules of inference, consistency of premises and indirect method of proof, automatic theorem proving.

Unit II : Relations

Relations, properties of binary relations in a set, Relation matrix and Graph of a relation, partition and covering of a set, equivalence relations, compatibility relations, composition of binary relations.

Unit III: Recurrence Relations

Generating function of sequences, calculating coefficients of a generating function, recurrence relations, solving linear recurrence relations by substitution method, generating function method and method of characteristic roots, solving in homogeneous recurrence relations.

Unit IV: Algebraic structures

Algebraic structure, group, abelian group, subgroup, ring, field-definitions and examples, residue arithmetic- applications of Chinese remainder theorem, Fermat's theorem, Euler's theorem.

Unit V: Graph theory

Basic concepts of a graph, isomorphism and sub graph, tree and its properties, DFS, BFS algorithms for finding a spanning tree, Kruskal's and Prim's algorithms for finding a minimal spanning tree.

Textbooks:

1. J.P. Tremblay and R. Manohar, "*Discrete Mathematical Structures with Applications to Computer Science*", Tata Mc Graw Hill, 1997.
2. Joe L. Mott, Abraham Kandel and T. P. Baker, "*Discrete Mathematics for Computer Scientists & Mathematicians*", 2nd edition, Prentice Hall of India Ltd, 2012.

References:

1. Keneth. H. Rosen, "*Discrete Mathematics and its Applications*", 6th edition, Tata McGraw-Hill, 2009.
2. Richard Johnsonburg, "*Discrete mathematics*", 7th edition, Pearson Education, 2008.
3. NarsinghDeo, "*Graph Theory with Applications to Engineering and Computer Science*", Prentice Hall of India, 2006.

SEMESTER - III

Course Code	Course Name	L	T	P	C
20CS3T05	Computer Organization and Architecture	3	0	0	3

Course Outcomes:

At the end of the Course the Student will be able to:

- CO1:** Identify the basic structure, organization and design of a computer.
- CO2:** Outline the elements in the RTL and micro operations, CPU organization and micro-programmed controlled unit.
- CO3:** Apply numerous algorithms to perform computer arithmetic operations and propose suitable hardware for them.
- CO4:** Contrast about the different types of memory organizations and their cost-performance trade offs.
- CO5:** Determine and get familiarized with the design characteristics I-O Organization, multiprocessors and pipelining.

UNIT I: Basic Structure of Computers: Computer Types, functional unit, basic operational concepts, bus structures. Data Representation:, other binary codes & Error detection Codes, fixed point representation, floating- point representation,

Register Transfer Language and Micro Operations: Register Transfer Language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logical micro operations, shift micro operations, Arithmetic logic shift unit.

UNIT II: Basic Computer Organization and Design: Instruction codes, Computer Register, Computer Instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions. Input-Output and Interrupt, Design of basic computer, Design of Accumulator Logic.

UNIT III: Central Processing Unit: General Register Organization, STACK Organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction Set Computer.

Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

UNIT IV: Computer Arithmetic: Addition and subtraction, multiplication algorithms, division algorithms, floating- point arithmetic operations.

UNIT V: The Memory System: Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, modes of transfer, priority interrupts, direct memory access. Introduction to Multi Processors: Characteristics and Inter connection structures. Introduction to pipelining.

TEXT BOOKS:

1. M. Moris Mano, Computer System Architecture, 3rd ed, Pearson/PHI.
2. Carl Hamacher, Zvonks Vranesic, Safea Zaky, Computer Organization, 5th ed, McGraw Hill.
3. William Stallings, Computer Organization and Architecture, 6th ed, Pearson/PHI.
4. B. Ram, Computer Fundamentals Architecture and Organization, 5th ed., New Age International Publications.
5. Computer Systems Organization & Architecture John D. Carpinelli Pearson Education

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, Structured Computer Organization, 4th ed. PHI/ Pearson.
2. Sivarama Dandamudi, Fundamentals of Computer Organization and Design, Springer Int. Edition.
John L. Hennessy and David A. Patterson, Computer Organization a quantitative approach, 4th ed, Elsevier.

SEMESTER - III

Course Code	Course Name	L	T	P	C
20CS3L01	Object Oriented Analysis and Design Lab	0	0	3	1.5

Course Outcomes:

At the end of the Course the student shall be able to

CO1: Interpret software requirements of various real-time applications.

CO2: Construct structural elements of the application in terms of object-oriented-design.

CO3: Classify the modeling of interaction diagrams of the application to represent functionalities of a software system.

List of Case Studies:

- 1) ATM System
- 2) Online Reservation System
- 3) Online Quiz System
- 4) Banking System
- 5) Stock Maintenance System
- 6) Student Marks Analysis System
- 7) Course Registration System
- 8) Library Management System
- 9) Real-time Scheduler

List of Experiments:

- 1) Draw Use case diagrams for above case studies.
- 2) Draw Class diagrams for above case studies.
- 3) Draw Object diagrams for above case studies.
- 4) Draw Sequence diagrams for above case studies.
- 5) Draw Collaboration diagrams for above case studies.
- 6) Draw Activity diagrams for above case studies.
- 7) Draw State chart diagrams for above case studies.
- 8) Draw Component diagrams for above case studies.
- 9) Draw Deployment diagrams for above case studies.

TEXT BOOKS:

1. GradyBooch, James Rumbaugh, Ivar Jacobso, The Unified Modeling Language User Guide, Pearson Education.

REFERENCE BOOKS:

1. Meilir Page-Jones, Fundamentals of Object-oriented Design in UML, Pearson Education.
2. Martina Seidl, Marion Scholz, Christian Huemer, GertiKappel, UML@Classroom - An introduction to Object-Oriented Modeling, Springer

SEMESTER - III

Course Code	Course Name	L	T	P	C
20CS3L02	Data Structures & Algorithm Lab	0	0	3	1.5

Course Outcomes:

At the end of the Course the student shall be able to

CO1: Apply recursive and iterative methodologies to solve complex engineering problems.

CO2: Solve searching and sorting techniques and evaluate time & space complexities.

CO3: Develop solutions to create and implement operations of linear and nonlinear data structures.

CO 4: Identify and apply suitable data structure for a given real time problem

List of Experiments:**Exercise 1:**

- Write a recursive C program to calculate Factorial of an integer.
- Write a recursive C program which computes the n^{th} Fibonacci number, for appropriate values of n .

Exercise 2:

- Write a recursive C program to calculate GCD (n, m).
- Write a recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise 3:

- Write a C program that implements Selection sort, to sort a given list of integers in ascending order.
- Write a C program that implements Insertion sort, to sort a given list of integers in ascending order.

Exercise 4:

- Write a C program that implements Quick sort, to sort a given list of integers in ascending order.
- Write a C program that implements Radix sort, to sort a given list of integers in ascending order.
- Write a C program that implements Merge sort, to sort a given list of integers in ascending order.

Exercise 5:

- Write a C program that implements Stack (its operations) using arrays.
- Write a C program that uses Stack operations to convert infix expression into postfix expression.

Exercise 6:

- Write a C program that implements Queue (its operations) using arrays.
- Write a C program that implements Circular Queue (its operations) using arrays.

Exercise 7:

- Write a C program that uses functions to create a singly linked list and its operations (insert, delete, search).
- Write a C program to reverse elements of a singly linked list.

Department of Computer Science and Engineering**Exercise 8:**

- a) Write a C program that implements Stack (its operations) using Linked list.
- b) Write a C program that implements Queue (its operations) using Linked list.

Exercise 9:

- a) Write a C program to create a Circular Linked list and its operations(insert, delete, search).
- b) Write a C program to create a Doubly Linked list and its operations(insert, delete, search).

Exercise 10:

- a) Write a C program to create a Binary Search Tree and its operations.
- b) Write a recursive C program for traversing a Binary Search Tree in preorder, in order and post order.

Exercise 11:

- a) Write a C program to perform BFS traversal on given graph.
- b) Write a C program to perform DFS traversal on given graph.

TEXT BOOKS:

1. Richard F, Gilberg, Forouzan, Data Structures, 2nd edition, Cengage
2. Aaron M. Tenenbaum, YedidyahLangsam, Moshe J Augenstein, Data Structures using C, Pearson.
3. Mark Allen Weiss, Data structures and Algorithm Analysis in C, 2nd edition, Pearson Education. Ltd.

REFERENCE BOOKS:

1. Jean-Paul Tremblay Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd edition, Mc Graw Hill Higher Education
2. Seymour Lipschutz, Data Structure with C, TMH
3. ReemaThareja, Data Structures using C, 2nd edition, Oxford

SEMESTER - III

Course Code	Course Name	L	T	P	C
20CS3L03	OOPS through Java lab	0	0	3	1.5

Course Outcomes:

By the end of the course student will be able to write java program for

- CO1:** Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings.
- CO2 :**Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism.
- CO3 :**Illustrating simple inheritance, multi-level inheritance, Exception handling Mechanism.
- CO4 :**Construct Threads, Event Handling, implement packages, developing Applets.

Exercise - 1 (Basics)

- a) Write a JAVA program to display default value of all primitive data type of JAVA
- b) Write a java 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.
- c) 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 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

- a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
- c) Write a JAVA program to sort for an element in a given list of elements using merge sort.
- d) Write a JAVA program using StringBuffer to delete, remove character

Exercise - 3 (Class, Objects)

- a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.
- b) Write a JAVA program to implement constructor

Exercise - 4 (Methods)

- a) Write a JAVA program to implement constructor overloading.
- b) Write a JAVA program implement method overloading

Exercise - 5 (Inheritance)

- a) Write a JAVA program to implement Single Inheritance
- b) Write a JAVA program to implement multi level Inheritance
- c) Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)

- a) Write a JAVA program give example for “super” keyword.
- b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

- a) Write a JAVA program that describes exception handling mechanism
- b) Write a JAVA program illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

- a) Write a JAVA program that implements Runtime polymorphism
- b) Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise – 9 (User defined Exception)

- a) Write a JAVA program for creation of Illustrating throw
- b) Write a JAVA program for creation of Illustrating finally
- c) Write a JAVA program for creation of Java Built-in Exceptions
- d) Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

- a) Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)
- b) Write a program illustrating **isAlive** and **join ()**
- c) Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

- a) Write a JAVA program Producer Consumer Problem
- b) Write a case study on thread Synchronization after solving the above producer consumer problem

Exercise – 12 (Packages)

- a) Write a JAVA program illustrate class path
- b) Write a case study on including in class path in your os environment of your package.
- c) Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 13 (Applet)

- a) Write a JAVA program to paint like paint brush in applet.
- b) Write a JAVA program to display analog clock using Applet.
- c) Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

- a) Write a JAVA program that display the x and y position of the cursor movement using Mouse.
- b) Write a JAVA program that identifies key-up key-down event user entering text in a Applet

TEXT BOOKS:

1. Herbert schildt and Dale skrien, Java Fundamentals- A Comprehensive introduction, TMH.
2. P.J.Dietel and H.M.Dietel, Java: How to Program , PHI.

REFERENCE BOOKS:

1. P.Radha Krishna, Object Oriented Programming through java, Universities Press.
2. Bruce Eckel, Thinking in Java, Pearson Education.
3. S.Malhotra and S.Choudhary, Programming in Java, Oxford University Press.

SEMESTER - III

Course Code	Course Name	L	T	P	C
20CS3S01	Mobile App Development	0	0	4	2

Course Objectives:

- To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- To understand how to work with various mobile application development frameworks.
- To learn the basic and important design concepts and issues of development of mobile applications.
- To understand the capabilities and limitations of mobile devices.

Course Outcomes:

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

CO1 :Identify various concepts of mobile programming that make it unique from programming for other Platforms.

CO2 :Critique mobile applications on their design pros and cons

CO3 :Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,

CO4 :Program mobile applications for the Android operating system that use basic and advanced phone features and Deploy applications to the Android marketplace for distribution

LIST OF EXPERIMENTS:

1. Introduction to mobile technologies and devices , Android platform and applications overview
2. Setting Android development environments
3. Writing Android applications, Understanding anatomy of an Android application
4. Develop an application that uses GUI components, Font and Colours
5. Develop an application that uses Layout Managers and event listeners.
6. Write an application that draws basic graphical primitives on the screen.
7. Develop an application that makes use of databases.
8. Develop an application that makes use of Notification Manager
9. Implement an application that uses Multi-threading
10. Develop a native application that uses GPS location information
11. Implement an application that writes data to the SD card.
12. Implement an application that creates an alert upon receiving a message
13. Write a mobile application that makes use of RSS feed
14. Develop a mobile application to send an email.
15. Develop a Mobile application for simple needs (Mini Project)

References:

1. Android Programming unleashed , B.M. Harwani, Pearson, 2013.
2. Android Programming (Big Nerd Ranch Guide), by Bill Phillips, Chris Stewart, Brian Hardy, Kristin Marsicano, Pearson, 2016
3. Android Programming – Pushing the limits by Hellman by Erik Hellman, WILEY, 2013

References:

1. Android Programming unleashed , B.M. Harwani, Pearson, 2013.
2. Android Programming (Big Nerd Ranch Guide), by Bill Phillips, Chris Stewart, Brian Hardy, Kristin Marsicano, Pearson, 2016
3. Android Programming – Pushing the limits by Hellman by Erik Hellman, WILEY, 2013

SEMESTER - III

Course Code	Course Name	L	T	P	C
20GE3M01	Constitution of India	2	0	0	0

Course 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 constitutional 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 will be able to have a clear knowledge on the following:

CO1 : Understand historical background of the constitution making and its importance for building a democratic India.

CO2 : Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.

CO3: Understand the value of the fundamental rights and duties for becoming good citizen of India.

CO4 : Analyze the decentralization of power between central, state and local self-government.

CO5 : Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Panchayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

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.

Learning outcomes: After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre-State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning outcomes: After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Learning outcomes: After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

UNIT IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy - (Different departments), Village level

- Role of Elected and Appointed officials - Importance of grass root

democracy Learning outcomes:-After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation

UNIT V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Learning outcomes: After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

References:

- 1) Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt.Ltd.
- 2) SubashKashyap, Indian Constitution, National Book Trust
- 3) J.A. Siwach, Dynamics of Indian Government & Politics
- 4) D.C. Gupta, Indian Government and Politics
- 5) H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal LawPublication)
- 6) J.C. Johari, Indian Government andPolitics Hans
- 7) J. Raj IndianGovernment 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 CivilRight), 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
www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution
- 5) <https://www.javatpoint.com/html-tutorial>
- 6) <https://www.javatpoint.com/css-tutorial>

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20SH4T07	Probability And Statistics	3	0	0	3

Course Outcomes:

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

- CO 1:** Determine the mean and variance of discrete and continuous random variables.
- CO 2 :** Calculate probabilities using normal distribution and construct sampling distribution of means.
- CO 3:** Estimate the confidence interval for the mean of a population and test a hypothesis concerning means.
- CO 4:** Estimate the confidence intervals, test a hypothesis concerning variances and proportions.
- CO 5:** Calculate correlation coefficient and determine line a regression for bivariate data

Unit I: Random Variables: Random variables, types of random variables, probability distribution function, probability density function, mean and variance of a random variable

Unit II: Probability Distributions and Sampling Distributions:

Normal distribution: calculating normal probabilities, normal approximation to the Binomial distribution. Sampling distributions: population and sample, sampling distribution of the mean (known), sampling distribution of the mean (unknown).

Unit III: Estimation and Test of Hypothesis of Means :

Point estimation, interval estimation, introduction to test of hypothesis, hypotheses is concerning one mean, hypothesis concerning two means, matched pair comparisons.

Unit IV: Estimation, Test of Hypothesis of Variances and Proportions Estimation of variance, hypothesis concerning one variance, hypothesis concerning two variances, estimation of proportion, hypothesis concerning one proportion, hypotheses is concerning several proportions.

Unit V: Regression analysis:

The method of least squares, curvilinear regression, multiple regression, correlation (excluding causation).

Text book:

Richard A. Johnson, "*Miller & Freund's Probability and Statistics for Engineers*", 8th edition, PHI Learning India Private Limited, 2011.

Reference Books:

1. S. Ross, "*A First Course in Probability*", Pearson Education India, 2002.
2. W. Feller, "*An Introduction to Probability Theory and its Applications*", 1st edition, Wiley, 1968.
3. Gilbert Strang, "*Introduction to Linear Algebra*", 5th edition, Wellesley- Cambridge Press, 2016.

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20CS4T01	Formal Languages & Automata Theory	3	0	0	3

Course Outcomes:

At the end of the Course the student shall be able to

CO1: Employ finite state machines for modeling and their power to recognize the languages.

CO2: Understand the concept of Regular languages and Converting Regular Expression to Finite Automata (Vice Versa)

CO3: Understand the concept of context free languages and normal forms CO4: Design CFG's and PDA as well as or the given set of grammars

CO5: Designing turing machines for the given set of grammars.

UNIT-I

Fundamentals: Formal Languages, Central concepts, Chomsky Hierarchy of languages.

Finite Automata: Introduction to Finite State machine, Acceptance of strings and languages, Deterministic finite automaton (DFA) and Non-deterministic finite automaton (NFA), Equivalence of NFA and DFA – Equivalence of NDFAs with and without ϵ -moves, Minimization of finite automata, Equivalence between two DFA's, Finite automata with output – Moore and Mealy machines, conversion of Moore to Mealy and Mealy to Moore

UNIT-II

Regular Languages: Regular sets, Regular expressions, Operations and applications of regular expressions, Identity rules, Conversion of a given regular expression into a finite automaton, Conversion of finite automata into a regular expression, Pumping lemma for regular sets, Closure properties of regular sets (proofs not required).

UNIT-III

Regular Grammars: Definition of a grammar, Regular grammars, Right linear and left linear grammars, Conversion from left linear to right linear grammars, Equivalence of regular grammar and finite automata, Inter conversion.

Context Free Grammars: Context free grammars and languages, Derivation trees, Left most and rightmost derivation of strings and Sentential forms, Ambiguity, left recursion and left factoring in context free grammars, Normal forms for context free grammars, Reduced grammars, Chomsky normal form, Greibach normal form, Pumping Lemma for Context free Languages, Closure and decision properties of context free languages

UNIT-IV

Pushdown Automata: Introduction to Push down automata, Acceptance of context free languages, Acceptance by final state and acceptance by empty state and its equivalence, Equivalence of context free grammars and pushdown automata, Inter-conversion (Proofs not required), Introduction to DPDA and NPDA.

UNIT-V

Turing Machine: Introduction to Turing Machine, Design of Turing machines, Types of Turing machines, P, NP, NP hard and NP complete, closure properties of recursive and recursively enumerable languages.

TextBook:

1. John E Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, "*Introduction to Automata Theory Languages and Computation*", 3rdEdition, Pearson Education,2011.

ReferenceBooks:

1. Peter Linz, "*An introduction to Formal Languages and Automata*", 6th Edition, Jones&Bartlett,2016
2. Mishra and Chandrashekar, "*Theory of Computer Science – Automata Languages and Computation*", 3rdEdition, PHI,2009
3. K.V.N.Sunitha , N.Kalyani, "*Formal Languages and Automata Theory*", 1st Edition,TMH, 2010
4. Michel Sipser, "*Introduction to Theory of Computation*", 2ndEdition, Thomson, 2012

E- Reference:

1. https://swayam.gov.in/nd1_noc19_cs79/preview

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20CS4T02	Web Technologies	3	0	0	3

COURSE OUTCOMES:

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

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets.
- Build dynamic web pages .
- Build web applications using PHP.
- Programming through PERL and Ruby
- write simple client-side scripts using AJAX

UNIT-I:HTML tags, Lists, Tables, Images, forms, Frames. Cascading style sheets. Introduction to Java script. Objects in JavaScript. Dynamic HTML with Java Script

UNIT-II: Working with XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX.

UNIT-III:AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX. Consuming WEB services in AJAX:(SOAP, WSDL,UDDI)

UNIT-IV:PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as mySql, Oracle, SQLSever.

UNIT-V: Introduction to Perl, Perl language elements, Interface with CGI- A form to mail program, Simple page search Introduction to Ruby, variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching, Practical Web Applications

TEXT BOOKS:

1. Programming the World Wide Web, Robert W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, MacIntyre, Morrissey, Cengage

REFERENCE BOOKS:

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

E-Resources:

1. <https://www.javatpoint.com/java-tutorial>

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20CS4T03	Database Management Systems	3	0	0	3

Course Outcomes:

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

CO1 :Describe a relational database and object-oriented database

CO2 :Create, maintain and manipulate a relational database using SQL

CO3: Describe ER model and normalization for database design

CO4: Examine issues in data storage and query processing and can formulate appropriate solutions.

CO5: Outline the role and issues in management of data such as efficiency, privacy, security, ethicalresponsibility, and strategic advantage

UNIT I

Introduction: Database system, Characteristics (Database Vs File System), Database Users (Actors on Scene, Workers behind the scene), Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure.

UNIT II

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

UNIT III

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams. SQL: Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

UNIT IV

Schema Refinement (Normalization):Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT V

Transaction Concept: Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, ,Failure Classification.

Indexing Techniques: File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing: Tree base Indexing, Comparison of File Organizations

Text Books:

- 1) Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke, TMH
- 2) Database System Concepts, 5/e, Silberschatz, Korth, TMH

Reference Books:

- 1) Introduction to Database Systems, 8/e C J Date, PEA.
- 2) Database Management System, 6/e RamezElmasri, Shamkant B. Navathe, PEA
- 3) Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

e-Resources:

- 1) <https://nptel.ac.in/courses/106/105/106105175/>
- 2) <https://www.geeksforgeeks.org/introduction-to-nosql/>

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20SH4T01	Managerial Economics and Financial Analysis	3	0	0	3

Course Outcomes:

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

- CO 1:** To adopt the Managerial Economic concepts for decision making and forward planning. Also know law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services.
- CO 2:** To assess the functional relationship between Production and factors of production and list out various costs associated with production and able to compute breakeven point to illustrate the various uses of break even analysis
- CO 3:** To outline the different types of business organizations and provide a frame work for analyzing money in its functions as a medium of exchange.
- CO 4:** To adopt the principles of accounting to record, classify and summarize various transactions in books of accounts for preparation of final accounts.
- CO 5:** To implement various techniques for assessing the financial position of the business.

UNIT-I: INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND

Definition, Nature and Scope of Managerial Economics.

Demand Analysis: Definition-types of demand-Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Significance of Elasticity of Demand. Demand Forecasting: definition, methods of demand

Forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT-II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Law of Variable Proportion, Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns.

Cost Analysis: Types of Cost, Break-even Analysis(BEA)-Determination of Break-Even Point (Simple numerical problems) –Managerial Significance and limitations of BEA.

UNIT-III: BUSINESS ENVIRONMENT

Features of Business Organization, Sole Proprietorship, Partnership and Joint Stock Company, Steps for formation and Registration of the company. Monetary Economics: Inflation, GDP, Per-capita Income.

UNIT-IV: INTRODUCTION TO FINANCIAL ACCOUNTING

Accounting Principles, Concepts & conventions, Double-Entry Book Keeping, Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments)

UNIT-V:**PREPARATION AND ANALYSIS OF FINANCIAL STATEMENTS**

Financial statement Analysis (Comparative and Common Size Statements)-Ratio analysis (Liquidity Ratios, Activity ratios, Solvency and Profitability ratios)

TEXTBOOKS

1. AR Aryasri, "*Managerial Economics and Financial Analysis*", 4th Edition, TMH Publication, 2012.
2. S A Siddiqui & A. S. Siddiqui "*Managerial Economics and Financial Analysis*", 1st Edition, New Age Publishers, 2012.
3. P.K.Sharma & Shashi K. Gupta, "*Management Accounting Principles and Practice*", 12th Edition, Kalyani Publishers, 2004.
4. R.L.Varshney & K.L Maheswari, "*Managerial Economics*", 22nd Edition, S.Chand Publishers, 2004.

REFERENCES

1. Dominick Salvatore, "*Managerial Economics: Principles and Worldwide Applications*", 7th Edition, Oxford University Press, 2012.
2. Ramachandran N, Ram Kumar Kakani, "*Financial Accounting for Management*", 2nd Edition, Pearson Education, 2007.
3. D N Dwivedi, "*Managerial Economics*", 8th Edition, PHI Publication, 2010.
4. S P Jain & K L Narang, "*Cost and Management Accounting*", 3rd Edition, Kalyani Publishers, 2004.
5. P Venkata Rao & J.V.Prabhakar Rao, "*Managerial Economics & Financial Analysis*", 1st Edition, Maruti Publications, 2012.
6. Carl E. Walsh, "*Monetary Theory & Policy*", 3rd Edition, The MIT Press Cambridge, 2010.

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20CS4L03	Database Management Systems Lab	0	0	3	1.5

Course Outcomes:

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

CO1: Demonstrate the database design using ER Diagrams.

CO2: Develop SQL Queries to manipulate the data in the database.

CO3: Inspect and handle errors using exception handling mechanism.

CO4: Apply Procedural Language constructs to execute block of SQL statements.

List of Experiments:**Experiment 1: Working with ER Diagram**

Example: ER Diagram for Sailors Database

Entities: 1 Sailor 2. Boat

Relationship: Reserves

Primary Key Attributes:

1. SID (Sailor Entity)
2. BID (Boat Entity)

Experiment 2: Working with DDL, DML, DCL and Key Constraints

Creating, Altering and Dropping of Tables and Inserting Rows into a Table (Use Constraints While Creating Tables), Examples using Select command.

Experiment 3: Working with Queries and Nested Queries

Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT and Constraints.

Experiment 4: Working with Queries using Aggregate Operators & Views

Queries using Aggregate Functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING, Creation and Dropping of Views.

Experiment 5: Working with Conversion Functions & String Functions

Queries using Conversion Functions (to_char, to_number and to_date), String Functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), Date Functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date).

Experiment 6: Working with Triggers using PL/SQL

Develop programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers.

Experiment 7: Working with PL/SQL Procedures

Develop programs using Procedures, passing Parameters IN and OUT of Procedures.

Experiment 8: Working with Loops using PL/SQL and Exception Handling

Develop programs using WHILE loops, FOR loops, Nested loops using ERROR handling, BUILT-IN Exceptions, USER defined Exceptions, and RAISE_APPLICATION_ERROR.

Experiment 9: Working with Functions using PL/SQL

Develop programs using stored Functions, invoke Functions in SQL statements and write complex Functions.

Experiment 10: Working with Cursors using PL/SQL

Develop programs using Cursors, parameters in a Cursor, FOR UPDATE Cursor, WHERE CURRENT OF clause and Cursor variables.

TEXT BOOKS:

1. Benjamin Rosenzweig, Elena SilvestrovaRakhimov, Oracle PL/SQL by Example, 3rdEdition, Pearson Education.
2. Scott Urman, Ron Hardman, Michael Mclaughlin, Oracle Database 10G PL/SQL Programming, Tata Mc-Graw Hill.
3. Dr .P.S. Deshpande, SQL and PL/SQL for Oracle 11g, Black Book.

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20CS4L01	Data Visualization Lab	0	0	3	1.5

PREREQUISITES: Familiarity in Python programming.

COURSE OBJECTIVE:

The objective is to expose the students to the various key aspects of data visualization tools and technologies because data visualization is essential to analyze massive amounts of information and make data-driven decisions. Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. This lab uses the desirable and unique features tableau or python for data visualization tool because of ease in tableau tool interface or python graphical packages. Their powerful data discovery and exploration application allows users to answer important questions in seconds and solutions for all kinds of industries, departments, and data environments.

COURSE OUTCOMES :

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

- CO1:** Understand the importance of data visualization and its design features to use many visual components
- CO2:** Apply and analyze best practices in data visualization to develop charts, tables, maps, and other visual representations of data.
- CO3:** Plan and compel interactive dashboards to combine several visualizations into a single unit for effective communication.
- CO4:** Evaluate data with advanced visualizations techniques and by exploring visualization on geospatial data

LIST OF EXPERIMENTS: Platform: R / Python / Tableau

1. Tableau overview, environment setup, navigation and data types,
2. Introduction to usage of python 3 packages - matplotlib, numpy, pandas, seaborn, ggplot, ggplot2, plotly
3. Demonstrate the usage of data sources, custom data view and extracting data fields operations
4. Experimenting with data editing, metadata, data joining and data blending
5. Implementation of calculations with operators functions, and numeric calculations
6. Implementation of calculations with operations on string, date and table
7. Experiment to working with sorting and filtering operations
8. Experiment to demonstrate data visualization with charts: bar chart, line chart and pie chart
9. Experiment to demonstrate data visualization with charts: crosstab, scatter plot and bubble chart
10. Experiment to demonstrate data visualization with charts: bullet graph, box plot and tree map/heat map
11. Experiment to demonstrate data visualization with charts: bump chart, gantt chart and histograms
12. Experiment to demonstrate data visualization with charts: motion charts and waterfall charts
13. Experiment to demonstrate building a dashboard with tables and charts for any business applications

14. Experiment to demonstrate data visualization for prediction and forecasting with trend lines
15. Construction of advanced visualization with waffle charts.
16. Construction of advanced visualization with word clouds
17. Construction of advanced visualization sea born and regression plots
18. Creating maps and visualizing geospatial data with folium and map styles
19. Creating maps and visualizing geospatial data using maps with markers
20. Creating maps and visualizing geospatial data using choropleth maps

TEXT BOOKS:

1. Joshua N Milligan, Learning Tableau 2019 Tools for Business Intelligence, data prep, and visual analytics, 3e, Packt publications, 2020.
2. Wes McKinney, Python for Data Analysis, ie, O'Reilly, 2013
3. Fabio Nelli, Python Data Analytics With Pandas, NumPy, and Matplotlib, 2e, A Press, 2018
4. Ryan Sleeper, Practical Tableau 100 TIPS, TUTORIALS, AND STRATEGIES FROM A TABLEAU, 1e, O'Reilly, 2018
5. A shutosh Nandesh war, Tableau Data Visualization Cookbook, 1e, Packt Publishing, 2013

REFERENCE BOOKS:

1. Daniel G. Murray, Tableau your data, 1e, Wiley, 2019
2. Fabio Nelli, Python Data Analytics, 1e, A Press, 2018
3. Ben Jones, Communicating Data with Tableau, 1e, O'Reilly, 2014

E –References :

1. <https://www.javatpoint.com/python-pandas>
2. <https://www.tableau.com/academic/students>
3. <https://www.tableau.com/learn/articles/data-visualization>
4. <https://www.javatpoint.com/numpy-tutorial>

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20CS4L02	Web Technologies Lab	0	0	3	1.5

Course Outcomes:

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

CO 1: Analyze and apply the role of languages like HTML, CSS, XML

CO 2: Review JavaScript, PHP and protocols in the workings of the web and web applications

CO 3: Apply Web Application Terminologies, Internet Tools, E – Commerce and other web services

CO 4: Develop and Analyze dynamic Web Applications using PHP & MySQL

CO 5: Install & Use Frameworks

List of Experiments:

1) Design the following static web pages required for an online book store web site:

(a) HOME PAGE:

The static home page must contain three frames.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link “MCA” the catalogue for MCA Books should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
mca mba BCA	Description of the Web Site			


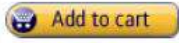
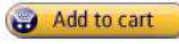


(b) LOGIN PAGE:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA	Login : <input type="text" value="11a51f0003"/> Password: <input type="password" value="*****"/> <input type="button" value="Submit"/> <input type="button" value="Reset"/>			

(C) CATALOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table:
The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA		Book : XML Bible Author : Winston Publication : Wiley	\$ 40.5	
MBA		Book : AI Author : S.Russel Publication : Princeton hall	\$ 63	
BCA		Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam	\$ 50	

(d). REGISTRATION PAGE:

Create a "registration form" with the following fields

- 1) Name (Text field)
- 2) Password (password field)
- 3) E-mail id (text field)
- 4) Phone number (text field)
- 5) Sex (radio button)
- 6) Date of birth (3 select boxes)
- 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
- 8) Address (text area)

2) Design a web page using **CSS (Cascading Style Sheets)** which includes the following: Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

Then, in the body of your pages, you refer to these selectors to activate the styles

- 3) Design a dynamic web page with validation using JavaScript.
- 4) Design a HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display
 - a. Factorial of that number
 - b. Fibonacci series up to that number
 - c. Prime numbers up to that number
 - d. Is it palindrome or not

- 5) Write JavaScript programs on Event Handling
- Validation of registration form
 - Open a Window from the current window
 - Change color of background at each click of button or refresh of a page
 - Display calendar for the month and year selected from combo box
 - On Mouse over event
- 6) Write an XML file which will display the Book information which includes the following:
- Title of the book
 - Author Name
 - ISBN number
 - Publisher name
 - Edition
 - Price
- Write a Document Type Definition (DTD) to validate the above XML file.
 - Write a XML Schema Definition (XSD) to validate the above XML file.
- 7) Create Web pages using AJAX.
- 8) User Authentication:
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.
- Create a Cookie and add these four user id's and passwords to this Cookie.
 - Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ". Use init-parameters to do this..
- 9) Example PHP program for registering users of a website and login.
- 10) Install a database (Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email- id, phone number (these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).
- 11) Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).
- 12) Implement a Servlet program on request response processing.
- 13) Implement a Servlet program for Registration Page.
- 14) Connect to a database using JSP and practice SQL Queries (MySql or Oracle).

SEMESTER - IV

Course Code	Course Name	L	T	P	C
20CS4S01	MongoDB	0	0	4	2

Course Outcomes :

Upon successful completion of the course, the student will be able to:

CO1 :Installing and configuring mongoDB in windows

CO2 :Perform all database operations using mongoDB

CO3: Develop applications by integrating mongoDBwith java/PHP

List of Experiments:

1. MongoDB installation and configuration in windows.
2. Demonstrate how to create and drop a database in MongoDB.
3. Creating the Collection in MongoDB on the fly
4. Creating collection with options before inserting the documents and drop the collection created.
5. MongoDB insert document
 - a. Insert single document
 - b. Insert multiple documents in collection
6. Querying all the documents in json format and Querying based on the criteria.
7. MongoDB update document
 - a. Using update() method.
 - b. Using save() method.
8. MongoDB delete document from a collection.
 - a. Using remove() method.
 - b. Remove only one document matching your criteria
 - c. Remove all documents
9. MongoDB Projection
10. limit() ,skip(), sort() methods in MongoDB
11. MongoDB indexing
 - a. Create index in MongoDB
 - b. Finding the indexes in a collection
 - c. Drop indexes in a collection
 - d. Drop all the indexes
12. MongoDB with java and PHP
 - a. Create a simple application that uses MongoDB with Java
Create a simple application that uses MongoDB with PHP

Web References:

1. <https://beginnersbook.com/2017/09/mongodb-tutorial/>