DEPARTMENT OF CSE – INTERNET OF THINGS

COURSE STRUCTURE AND SYLLABUS

For UG –R22

B. TECH - CSE – INTERNET OF THINGS

(Applicable for batches admitted from 2022-2023)

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

COURSE STRUCTURE

Year: I Semester: I

Category	Course Code	Course Title	Theory/ Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
BS	22UMT01	Mathematics – I	3	1	--	--	4	30	70	100	3
BS	22UPH01	Applied Physics	3	1	--	--	4	30	70	100	3
HS	22UEN01	Communicative English	3	1	--	--	4	30	70	100	3
ES	22UCS01	Programming for Problem Solving using C	3	1	--	--	4	30	70	100	3
HS	22UEN02	English Communication Skills Laboratory	--	--	3	--	3	15	35	50	1.5
BS	22UPH02	Applied Physics Laboratory	--	--	3	--	3	15	35	50	1.5
ES	22UCS02	Programming for Problem Solving Using C Laboratory	--	--	3	--	3	15	35	50	1.5
ES	22UCS03	IT Workshop	1	--	4	--	5	15	35	50	3
MC	22UEN03	Constitution of India	2	--	--	--	2	--	--	--	0
TOTAL			15	4	13	--	32	180	420	600	19.5

HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core, PE-Professional Elective, OE-Open Elective, OC-Online Course

Year: I Semester: II

Category	Course Code	Course Title	Theory/ Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
BS	22UMT02	Mathematics - II	3	1	--	--	4	30	70	100	3
BS	22UCH01	Applied Chemistry	3	1	--	--	4	30	70	100	3
ES	22UCS04	Data Structures	3	1	--	--	4	30	70	100	3
ES	22UCS05	Python Programming	3	1	--	--	4	30	70	100	3
ES	22UEC01	Digital Logic Design	3	1	--	--	4	30	70	100	3
BS	22UCH02	Applied Chemistry Laboratory	--	--	3	--	3	15	35	50	1.5
ES	22UCS06	Data Structures using C Laboratory	--	--	3	--	3	15	35	50	1.5
ES	22UCS07	Python Programming Laboratory	--	--	3	--	3	15	35	50	1.5
MC	22UCH03	Environmental Science	2	--	--	--	2	--	--	--	0
OC	22UOC01	SWAYAM, NPTEL, Spoken Tutorials	-	-	-	2	2	-	-	-	0
TOTAL			17	5	9	2	33	195	455	650	19.5

HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core, PE-Professional Elective, OE-Open Elective, OC-Online Course

Year: II Semester: I

Category	Course Code	Course Title	Theory/ Lecture (L)	Tutorial (T)	Practical / Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
BS	22UMT03	Mathematics III	3	1	--	--	4	30	70	100	3
PC	22UAI06	Operating Systems	3	1	--	--	4	30	70	100	3
PC	22UAI01	Object oriented Programming with java	3	1	--	--	4	30	70	100	3
PC	22UCS18	Database Management Systems	3	1	--	--	4	30	70	100	3
HS	22UMB01	Managerial Economics and Financial Accountancy	3	1	--	--	4	30	70	100	3
PC	22UAI07	Operating systems and Linux Programming Lab	--	--	3	--	3	15	35	50	1.5
PC	22UAI02	Object oriented Programming with java lab	--	--	3	--	3	15	35	50	1.5
PC	22UCS23	Database Management Systems Lab	--	--	3	--	3	15	35	50	1.5
SC	22UIT01	Introduction to electronics Hardware & Software for IOT	1	--	3	--	4	--	50	50	2
MC	22UEN04	Essence of Indian Traditional Knowledge	2	--	--	--	2	--	--	-	0
Community Service Project (Mandatory) (to be evaluated during IV semester)											
TOTAL			18	5	12	0	35	195	505	700	21.5
HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core,PE-Professional Elective, OE-Open Elective, OC-Online Course, SC-Skill Course											

Year: II Semester: II

Category	Course Code	Course Title	Theory/Lecture(L)	Tutorial (T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
BS	22UMT04	Probability and Statistics	3	1	--	--	4	30	70	100	3
PC	22UCS09	Computer Organization	3	1	--	--	4	30	70	100	3
PC	22UCS20	Formal Languages and Automata Theory	3	1	--	--	4	30	70	100	3
PC	22UIT02	Fundamentals of IoT and its Applications	3	1	--	--	4	30	70	100	3
PC	22UCS11	Mathematical Foundations of Computer Science	3	1	--	--	4	30	70	100	3
PC	22UCS25	Computer Organization Lab	--	--	3	--	3	15	35	50	1.5
PC	22UCS13	R Programming Lab	--	--	3	--	3	15	35	50	1.5
PC	22UIT03	Introduction to IOT Lab	--	--	3	--	3	15	35	50	1.5
SC	22UCY04	Android Application Development	1	--	4	--	5	--	50	50	2
		Community Service Project	--	--	--	--	--	100	--	100	4
TOTAL			16	5	13	0	34	295	505	800	25.5
Internship 2 Months (Mandatory) after 2-2 (during summer vacation)											
MINOR COURSE			3	--	2	--	--	--	--	--	4
HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core,PE-Professional Elective, OE-Open Elective, OC-Online Course, SC-Skill Course											

Year & Sem	I Year – I Semester					
Course Code	22UMT01	L	T	P	SS	C
Course Name	MATHEMATICS-I	3	1	0	0	3

Course Objectives:

- To instruct the concept of Matrices in solving linear algebraic equations.
- To assist the students to learn the concepts of partial differentiation.
- To enlighten the learners in the concept of differential equations.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.
- To make clear the students in the concepts of Multiple Integrals.

Course Outcomes:

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

CO1: Apply matrix techniques to model and solve system of linear equations.
CO2: To apply the mean value theorems to real life problems.
CO3: Solve the differential equations related to various engineering fields.
CO4: Apply double integration techniques in evaluating areas bounded by region.
CO5: Student will learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensinal and 3-dimensional coordinate systems.

UNIT-I: System of Linear Equations, Eigen Values, Eigen Vectors (12 Hours)

Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss Elimination method – Eigen values and Eigen vectors and properties. Cayley-Hamilton theorem (without proof) – Reduction of a matrix to Diagonal form. Applications –Finding the inverse and power of a matrix by Cayley Hamilton theorem.
Learning Resources: Text Book-1

UNIT-II: Differential Calculus (12 Hours)

Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem–Taylor's and Mac Laurin's theorems with remainders, Problems and applications on the above theorem. Partial Differentiation: Introduction–Homogeneous function–Euler's theorem–Total derivative – Chain rule – Jacobian – Functional dependence –Taylor's and Mac Laurin's series expansion of functions of two variables. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method.
Learning Resources: Text Book-1

UNIT-III: Differential Equations of First Order and First Degree (12 Hours)

Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories.
Learning Resources: Text Book-1

UNIT-IV: Differential Equations of Second and Higher Order (14 Hours)

Homogeneous and Non-homogeneous differential equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, sin ax, cos ax, polynomials in x^n, $e^{ax}V(x)$ and $x^nV(x)$ – Method

of Variation of parameters, Cauchy and Legendre's linear equations.
Applications: LCR circuits.
Learning Resources: Text Book-1

UNIT-V: Multiple Integrals (14 Hours)

Double and Triple integrals – Change of order of integration in double integrals – Change of variables to polar, cylindrical and spherical coordinates. Applications: Finding Areas and Volumes.
Learning Resources: Text Book-1

Text Books:

1. **B.S.Grewal,** Higher Engineering Mathematics, 44th Edition, Khanna Publishers.

Reference Books:

1. **Dr.T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganadham, Dr. M.V.S.S.N. Prasad**, a text book of Engineering Mathematics, S.Chand Publications.
2. **N.P.Bali, Manish Goyal**, A text book of Engineering Mathematics, Lakshmi Publications
3. **B.V.Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc.Graw Hill Education.
4. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	-	-	-	-	-	-	3
CO2	2	2	2	2	-	-	-	-	-	-	-	3
CO3	2	2	2	2	-	-	-	-	-	-	-	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3
CO5	3	3	3	2	-	-	-	-	-	-	-	3

Year & Sem	I Year – I Semester					
Course Code	22UPH01	L	T	P	SS	C
Course Name	APPLIED PHYSICS	3	1	0	0	3

This course centers on unifying essential theoretical concepts of Physics governing the physical properties of materials to interpret them from the perspective of engineering and technical applications.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides seamless consolidation of basic principles of Physics and applications. It emphasizes on modern technological advancement relevant to the latest developments in the fields of science, engineering, and technology and to have an insight into Dielectric and magnetic materials, principles of quantum mechanics, and electron dynamics of solids from the perspective of optoelectronic devices.

1. To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
2. Understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications, study of propagation of light through optical fibers and their implications in optical communications.
3. Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of de Broglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals and band theory for crystalline solids. Metals- Semiconductors-Insulators concepts utilization of transport phenomenon of charge carriers in semiconductors.
4. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
5. To Understand the physics of optoelectronic devices and working mechanism of display devices.

Course Outcomes:

1. Select the concepts of Physical Optics in view of engineering applications. Apply the knowledge of dielectric and magnetic materials to analyse them.
2. Grade the wavelengths of Lasers for suitable applications in the field of industry, medicine and communication and foster the knowledge on optical fibers.
3. Appraise electron dynamics based on quantum principles.
4. Choose dielectric and magnetic material to demonstrate the functioning of electric and electronic devices.
5. Judge the performance of optoelectronic devices based on their construction.

Unit-I: Wave Optics **12hrs**

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) – Diffraction 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 Outcomes:

- The students will be able to Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)

- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary polarized light and extraordinary polarized light (L2)

Unit-II: Lasers and Fiber optics 8hrs

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 Outcomes:

- The students will be able to Understand the basic concepts of LASER light Sources (L2)
- Apply the concepts to learn the types of lasers (L3)
- Identifies the Engineering applications of lasers (L2)
- Explain the working principle of optical fibers (L2)
- Classify optical fibers based on refractive index profile and mode of propagation (L2)
- Identify the applications of optical fibers in various fields (L2)

Unit III: Quantum Mechanics, Free Electron Theory and Band theory 10hrs

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. **Free Electron Theory:** 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:** Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - v vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

Unit Outcomes:

- The students will be able to explain the concept of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Explain the importance of K-P model¬ Classify the materials based on band theory (L2)
- Apply the concept of effective mass of electron (L3)

Unit-IV: Dielectric and Magnetic Materials 8hrs

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius-Mossotti equation. **Magnetic Materials:** Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Origin of permanent magnetic moment - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials- Eddy currents- Ferrites-Engineering applications.

Unit Outcomes:

- The students will be able to Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Claussius- Mosotti relation in dielectrics(L2)¬
- Classify the magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)
- Apply the concept of magnetism to magnetic data storage devices (L3)

Unit V: Semiconductors, Opto Electronic Devices and Nano Materials 10 hrs

Semiconductors: Bands in solids- Valence and conduction band, effective mass (Qualitative), Intrinsic and extrinsic semiconductors-P type and N type, Donor and acceptor levels (Qualitative), Determination of energy gap in semiconductors. Drift and Diffusion currents, Einstein relations, Direct and indirect semiconductors, **Opto electronic Devices:** Photo voltaic effect, Solar cell, Photo detectors, Photodiodes-PIN and APD, Principle and working of LED, Liquid crystal display (LCD), Applications of opto electronic devices.

Text books:

1. M.N.Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy" A Text book of Engineering Physics"- S.Chand Publications, 11th Edition 2019.
2. Engineering Physics" by D.K.Bhattacharya and PoonamTandon, Oxford press (2015).
3. Applied Physics by P.K.Palanisamy SciTech publications.

Reference Books:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
2. Engineering Physics by M.R.Srinivasan, New Age international publishers (2009).
3. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson Education, 2018
4. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press
5. Semiconductor physics and devices- Basic principle – Donald A, Neamen, McGraw Hill
6. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	3	-	-
CO3	3	-	3	3	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	3	-	-

Year & Sem	I Year – I Semester					
Course Code	22UEN01	L	T	P	SS	C
Course Name	COMMUNICATIVE ENGLISH	3	1	0	0	3

Introduction

With the growing importance of English for global communication and the emphasis on training the learners to gain communicative competence, the syllabus is designed to develop linguistic and communicative competence of the engineering students. The major focus of the syllabus is to enhance the communicative ability, with the focus on the language skills, grammar, vocabulary of the learners and to improve the learner's ability to use English language effectively in social, academic and professional contexts. There is a shift from learning about the language to using the language. Thereby enables the learner to appear confidently for international language qualification tests like IELTS, TOEFL, BEC Etc.

Course Objectives:

- Help students develop effective listening skills so that they can understand academic lectures and native English speakers' speech.
- Encourage the development of speaking abilities by taking part in exercises like role-playing, dialogues, and organized talks / oral presentations.
- Pay special attention to effective reading techniques for understanding a range of academic literature and real-world resources.
- Introduce useful writing techniques and illustrate them by summarizing, composing essays with a clear structure, recording and reporting relevant information.
- Increase vocabulary and grammatical knowledge, and promote proper use of words both in speech and writing.

Course Outcomes:

At the end of the module, the learners will be able to

- Comprehend social or transactional discussions presented by native English speakers and recognize the context, subject, and specific information.
- Introduce one self and others and engage in general conversation about well-known subjects.
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
- Recognize paragraph structure and be able to match beginnings/endings/headings withparagraphs
- Form sentences using proper grammatical structures and correct word forms.

Unit- 1

Lesson-1: The Scare Crow by Satyajit Ray from Panorama, a course on reading, Oxford publications. Listening: Listening to short audio texts and identifying the topic. Listening to prose and conversations. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work studies and interests. Self-introduction and introducing others. **Reading:** Skimming text to get the main idea. Scanning to look for specific pieces of information. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices, linkers, signposts and transition signals; mechanics of writing - punctuation, capital letters.

Vocabulary: Synonyms and Antonyms, Affixes.

Grammar: Content words and function words, word forms.

Unit-2

Lesson-1: Nehru's letter to his daughter Indira on her birthday from "**Infotech English**", Maruthi Publications.

Listening: Answering a series of questions about the main idea and supporting ideas after listening to audio texts, both in speaking and writing.

Speaking: Discussion in pairs / small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings. **Reading**: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing**: Summarizing - identifying main idea and rephrasing what is read; avoiding redundancies and repetitions. **Vocabulary**: Synonyms and Antonyms, Root words **Grammar**: Parts of Speech.

Unit- 3

Lesson-1: Telephone Conversation by Wole Soyinka

Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing. **Speaking:** Discussing specific topics in pairs or 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. Critical reading. **Writing**: Letter writing-types, format and principles of letter writing. E-mail etiquette, Writing CV's.
Vocabulary: Synonyms and Antonyms, Word Formation

Grammar: **Verbs, Subject Verb agreement, Common Errors.**

Unit 4

Lesson-1: Water the Elixir of life by C.V.Raman

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, Inviting. **Reading**: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.
Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs / tables, writing for media. **Vocabulary**: Synonyms and Antonyms, Phrasal verbs.

Grammar: Tenses, correction of sentences.

Unit 5

Lesson-1: Stay Hungry-Stay foolish from "**Infotech English**", Maruthi Publications

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing, TEDX Videos. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPTslides. Functional English: Suggesting/Opinion giving. **Reading**: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques. **Reading for Writing**: Writing academic proposals-writing research articles: format and style. **Vocabulary**: Synonyms and Antonyms, Idioms and Phrases. **Grammar**: Voices, Degrees of comparison & Reported speech.

Suggested books:

1. **Infotech English**", Maruthi Publications.
2. **"Panorama, a course on reading", Oxford publications**
3. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
4. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
5. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
6. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012
7. https://onlinecourses.nptel.ac.in/noc20_hs19/preview
8. https://nptel.ac.in/courses/109106094
9. https://news.stanford.edu (Steve Jobs' Speech)

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's)) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	1	1	3	1	1
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-

Year & Sem	I Year – I Semester					
Course Code	22UCS01	L	T	P	SS	C
Course Name	PROGRAMMING FOR PROBLEM SOLVING USING C	3	1	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 computerprogram 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
- To assimilate about pointers, dynamic memory allocation
- To assimilate about File, I/O and significance of functions

Course Outcomes:

Upon the completion of the course the student will learn

CO1: To write algorithms and to draw flowcharts for solving problems and to convert flowcharts/algorithms to C Programs, compile and debug programs

CO2: To use different operators, data types and write programs that use two-way/ multi-way selection

CO3: To select the best loop construct for a given problem

CO4: To design and implement programs to analyze the different pointer applications

CO5: To decompose a problem into functions and to develop modular reusable code and to apply File I/O operations

UNIT-I

Introduction to Computers: Computer Systems - Block Diagram of Computer, Hardware,Software, Algorithms, Flow Charts, Pseudocode **Introduction to the C Language:** Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples. **Structure of a C Program:** Expressions, types of expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion Statements, Simple Programs.

UNIT-II

Bitwise Operators: Logical Bitwise Operators, Shift Operators, Programming Examples. **Selection & Making Decisions:** Logical Data and Operators, Two Way Selection, Multi waySelection, Programming examples. **Repetition:** Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Looping Applications, Programming Examples.

UNIT-III

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays,Multidimensional Arrays, Programming Examples. **Strings:** String Concepts, C String, String Input / Output Functions, Arrays of Strings, StringManipulation Functions, Programming Examples.

UNIT-IV

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Types of functions, Standard Functions, Passing Array to Functions and Passing Pointers to Functions, Recursion, Scope - Global Scope, Local Scope, Function Scope, and Storage Classes. **Pointers:** Introduction - Definition, Declaration, Initialization, Accessing, Benefits of Pointers, Why Pointers, Pointers to pointers, Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application.

UNIT-V

Structures and Union: Structure- Definition, Declaration, Accessing, Initialization, Arrays in Structures, Array of Structures, Structure Pointers, structures and functions, Unions and Programming Examples. **Files:**

Files, Streams, Types of Files- Text and Binary Files, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions, Programming Examples

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.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	1	2									
CO3	3		1									
CO4		2	3	2	3							
CO5		1		2	3							

Year & Sem	**I Year – I Semester**					
Course Code	**22UEN02**	**L**	**T**	**P**	**SS**	**C**
Course Name	**ENGLISH COMMUNICATION SKILLS LAB**	**0**	**0**	**3**	**0**	**1.5**

Course Objectives

- Learners learn the basics of phonetics- recognize phonetic symbols and facilitates the learners' use of dictionary for pronunciation.
- To enhance the articulation of the sounds and pronunciation of words.
- To improve the communication skills and clarity of speech.
- To enhance effective communication skills.
- Enables learners to speak and communicate confidently.

Course Outcomes:

By the end of the semester the learners develop

1. Proper and accurate articulation of the sounds by following standard pronunciation of words and communicate intelligibly.
2. Speaking fluently with neutral accent.
3. Clarity of speech.
4. To communicate in various contexts using choice of appropriate expressions.
5. To acquire several communicative functions. Thereby enable to interact in different social and work situations.

The course material is divided into five units.

Unit 1:

Introduction and importance of phonetics. Letters and Sounds, Sounds of English (Consonant Sounds, Vowel Sounds)

Unit 2

Pronunciation and pronunciation rules, Plural and past tense marker rules.

Unit 3:

Syllable, word stress, stress in mono, di, and poly syllabic words, stress in compound words, contrastive, word stress, Rhythm and Intonation.

Unit 4:

Just A Minute (JAM)

Unit 5:

Group Discussions and Interview Skills

Suggested books:

1. Infotech English, Maruthi Publications (with Compact Disc).
2. English Pronunciation in use- Mark Hancock, Cambridge University Press.
3. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
4. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.

5. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju
6. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
7. Cornerstone, Developing soft skills, Pearson Education Technical Communication- Meenakshi Raman, Sangeeta Sharma, Oxford University Press.
8. https://nptel.ac.in/courses/109106067

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	1
CO5	-	-	-	-	-	-	-	-	-	3	-	-

Year & Sem	I Year – I Semester					
Course Code	22UPH02	L	T	P	SS	C
Course Name	APPLIED PHYSICS LABORATORY	0	0	3	0	1.5

(Any 10 of the following listed experiments)

List of Applied Physics Experiments

1. Determination of thickness of thin object by wedge method.
2. Determination of radius of curvature of a given plano convex lens by Newton's rings.
3. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
4. Determination of dispersive power of the prism.
5. Determination of dielectric constant using charging and discharging method.
6. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
7. Determination of numerical aperture and acceptance angle of an optical fiber.
8. Determination of wavelength of Laser light using diffraction grating.
9. Estimation of Planck's constant using photoelectric effect.
10. Determination of the resistivity of semiconductor by four probe method.
11. To determine the energy gap of a semiconductor using p-n junction diode.
12. Magnetic field along the axis of a current carrying circular coil by Stewart &Gee's Method
13. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.
14. Measurement of resistance of a semiconductor with varying temperature.
15. Resistivity of a Superconductor using four probe method & Meissner effect.

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text Book of Practical Physics"- S Chand Publishers, 2017

Course learning objectives

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory. 2. To learn the usage of electrical and optical systems for various measurements.
3. Apply the analytical techniques and graphical analysis to the experimental data.
4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

Course Outcomes (COs)

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

1. Apply the various procedures and techniques for the experiments.
2. Use the different measuring devices and meters to record the data with precision.
3. Apply the mathematical concepts/equations to obtain quantitative results.
4. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	3	-	-	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-
CO3	2	-	-	-	3	-	-	-	-	-	-	-
CO4	3	-	-	-	3	-	-	-	-	-	-	-

Year & Sem	I Year – I Semester					
Course Code	22UCS02	L	T	P	SS	C
Course Name	PROGRAMMING FOR PROBLEM SOLVING USING C LAB	0	0	3	0	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.

Course Outcomes:

By the end of the Lab, the student

CO1: Gains Knowledge on various concepts of a C language.
CO2: Able to draw flowcharts and write algorithms.
CO3: Able design and development of C problem solving skills.
CO4: Able to design and develop modular programming skills.
CO5: Able to 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 sixcharacters 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 7inches and width of 5 inches.

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, 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 program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
2.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 harmonic series and their sum. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.
2.Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1.Write a program to display all prime numbers less than n
2.Write a program to display the following output format

```
1
2   2
3   3   3
4   4   4   4

5   5   5   5   5
```

Exercise 6:

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

Exercise 7:

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

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 read and display the details of an employee using structure
2. Write a c program to demonstrate array of structures

Exercise 10:

1.Write a program in C to demonstrate the use of & (address of) and *(value at address)operator.
2.Write a C program to find sum of n elements entered by user using pointers
3.Write a C Program to Store Information Using Structures with Dynamically MemoryAllocation

Exercise 11:

1.Write a program in C to swap elements using call by reference
2.Find factorial of given number using recursion
3. Write a program in C to get the largest element of an array using the function

Exercise 12:

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

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2							1
CO2	3			2	3							1
CO3		3		2	3							1
CO4	3	2		2	3							1
CO5	3		2	2	3							1

Year & Sem	I Year – I Semester					
Course Code	22UCS03	L	T	P	SS	C
Course Name	IT WORKSHOP	1	0	4	0	3

Course Objectives:
The objective of this lab is to

- Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
- Demonstrate basic DOS commands
- Describe about Antivirus tools
- Demonstrate Office Tools such as Word processors, Spreadsheets and Presentationtools

Course Outcomes:
CO1: By the end of this lab the student is able to Assemble and disassemble components of a Personal Computer
CO2: By the end of this lab the student is familiar with DOS commands
CO3: By the end of this lab the student is familiar Viruses
CO4: By the end of this lab the student is able to work on Word, Power Point and MS Excel

List of Experiments:

UNIT-1
Block diagram of a computer, Identification of peripherals of a PC, Laptop, Server, 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 Devices, Digital Storage Basics, Networking Components and Speeds.
Experiment -1: Identification of peripherals.
Experiment -2: Assembling, Dissembling of a computer.

UNIT-2
Software: Definition, Software types, Application Software, System Software**.**
Experiment -1: DOS Commands.

UNIT-3
MSWord: Creating a Document, Formatting, Bullets and Numbering, Page Settings, Headerand Footer, Insert Word Art, Clip Art, Tables.
Experiment -1: Demonstrate and practice on word Formatting **(**Bold, Italic, Underline, Alignments, Fonts, Sizes, Headings etc.,**)**
Experiment -2: Demonstrate and Practice on Page Settings, Margins, Header and Footer**.Experiment -3:** Demonstrate and Practice on WordArt, ClipArt.
Experiment -4: Demonstrate and Practice on Table Creation.

UNIT-4
MS Excel: Create work sheet and work book, Search for data with in a Web, Insert Rows, Columns, Hiding of Rows and Columns, Renaming of Worksheet, Adjust Row Height and Column Width, Create Tables.
Experiment -1: Create a Table, Perform sum and average of a sheet.
Experiment -2: Adjust Row height and Column width of a Table as per the Requirements

UNIT-5
MS Power Point: Create and Manage Presentation, Slide transition and Animation, WWW,Web Browser, Virus, Antivirus, Creating mails.
Experiment -1: Create a PPT on a Topic of your Choice.
Experiment -2: Create a mail id with your Roll Number

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1									1
CO2	3	1	1									1
CO3	3	1	1	2	3							2
CO4	3	3	3	2	3							2

Year & Sem	I Year – I Semester					
Course Code	22UEN03	L	T	P	SS	C
Course Name	CONSTITUTION OF INDIA	2	0	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 semester/course, the student will be able to have a clear knowledge on the following:

- Understand Historical Background of the Constitution Making and its importance for building a Democratic India.
- Understand the functioning of three wings of the Government i.e., Executive, Legislative and Judiciary.
- Understand the value of the Fundamental Rights and Duties for becoming good citizen of India.
- Analyze the decentralization of power between Central, State and local Self-Government.
- 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: Organization, Structure and Functions

Learning outcomes: -After completion of this unit student will
- Understand the structure of State Government
- Analyze the role of 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 Pachayati Raj: Functions PRI: Zilla Panchayat, Elected Officials and their roles, CEO Zilla Panchayat: 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 Mayor and elected representatives of Municipalities
- Evaluate Zilla panchayat block level organization

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.. NewDelhi
2. Subash Kashyap, 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 Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice –Hall of India Pvt. Ltd. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

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

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	1	-	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	-

Year & Sem	I Year – II Semester					
Course Code	22UMT02	L	T	P	SS	C
Course Name	MATHEMATICS-II	3	1	0	0	3

Course Objectives:

- To illuminate the different numerical methods to solve nonlinear algebraic equations.
- To give a definition of Interpolation as it relates to mapping / surveying.
- To familiarize the Laplace, transform techniques in solving the Differential Equations.
- To familiarize the Fourier Series expansions for periodic functions.
- To furnish the learners with basic concepts Fourier Transform techniques to lead them into advanced level by handling various real-world applications.

Course Outcomes:

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

CO1: Evaluate the approximate roots of polynomial and Transcendental equations by different algorithms

CO2: Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals.

CO3: Apply the Laplace transform for solving differential equations.

CO4: Find or compute the Fourier series of periodic signals.

CO5: Apply integral expressions for the forwards and inverse Fourier transform to arrange of non - Periodic wave forms.

UNIT-I Iterative Methods (12 Hours)

Introduction– Bisection method–Secant method – Method of false position– Iteration method –Newton - Raphson method (One variable only) – Jacobi and Gauss-Seidel methods for solving system of equations numerically.

Learning Resources: Text Book – 1

UNIT-II Interpolation (12 Hours)

Introduction – Errors in polynomial interpolation – Finite differences – Forward differences–Backward differences –Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with un equal intervals –Lagrange's interpolation formula – Newton's divide difference formula.

Learning Resources: Text Book - 1

UNIT-III Laplace Transforms and Inverse Laplace Transforms (14 Hours)

Laplace transforms –Definition and Laplace transforms of some certain functions – Shifting theorems – Transforms of derivatives and integrals – Unit step function –Dirac's delta function Periodic function – Inverse Laplace transforms – Convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Learning Resources: Text Book – 1

UNIT IV Fourier Series (12 Hours)

Introduction– Periodic functions – Fourier series of periodic function – Dirichlet's conditions– Even and

odd functions–Change of interval– Half - range sine and cosine series.

Learning Resources: Text Book – 1

UNIT V Fourier Transforms (14 Hours)

Fourier integral theorem (without proof) – Fourier sine and cosine integrals –Sine and cosine transforms – Properties – inverse transforms –Convolution theorem (without proof) – Finite Fourier transforms.

Learning Resources: Text Book - 1

Text Books:

1. **B.S.Grewal,**Higher Engineering Mathematics, 44thEdition, Khanna Publishers.

Reference Books:

1. **Dr.T.K.V. Iyengar, Dr. B. Krishna Gandhi, S. Ranganadham, Dr. M.V.S.S.N. Prasad**, A text book of Engineering Mathematics, S. Chand Publications.
2. **B.V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
3. **N.P. Bali, Manish Goyal**, A text book of Engineering Mathematics, Lakshmi Publications
4. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10thEdition, Wiley-India.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	-	-	-	-	-	-	3
CO2	3	2	3	2	-	-	-	-	-	-	-	3
CO3	2	2	2	2	-	-	-	-	-	-	-	2
CO4	2	3	3	2	-	-	-	-	-	-	-	2
CO5	3	3	2	2	-	-	-	-	-	-	-	3

Year & Sem	I Year – II Semester					
Course Code	22UCH01	L	T	P	SS	C
Course Name	APPLIED CHEMISTRY	3	1	0	0	3

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

COURSE OBJECTIVES

1. Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
2. Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented
3. Explain the preparation of nanomaterials, engineering applications of nanomaterials, superconductors, preparation of semiconductors and applications of Hall effect.
4. Importance of Non-conventional Energy Resources, its design and working along with Fuel cells and Spectroscopic techniques.
5. Outline the basics of computational chemistry and molecular switches.

COURSE OUTCOMES:

CO1. Analyze types of plastics, methods of fabrication, the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.
CO2. Understand the theory of construction of electrodes, batteries in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
CO3. Understand synthesis of nanomaterials for modern advances of engineering technology analyze the applications of super conductors. Summarize the preparation of semiconducting; analyse the applications of Hall effect.
CO4. Analyze different models of energy harnessing from different natural sources and also working and applications of Fuel cells and Spectroscopic Techniques.
CO5. Understand the knowledge of computational chemistry and molecular machines.

UNIT I: POLYMER TECHNOLOGY **(8hrs)**

Polymerization: -Introduction, types and methods of polymerization (emulsion and suspension), mechanical properties.

Plastics: Types, Compounding, Fabrication (compression, injection, blowing and extrusion moldings), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste (waste to wealth).

Elastomers: -Introduction, vulcanization of rubber, advantages of vulcanized rubber, preparation, properties and applications (Buna S, Thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics, conducting polymers, biodegradable and biomedical polymers.

Course Outcomes: At the end of this unit, the students will be able to **Analyze** types of plastics, methods of fabrication, the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.

UNIT II: ELECTRO CHEMICAL CELLS AND CORROSION **(10hrs)**

Electrochemical cell, Single electrode potential, standard hydrogen electrode, calomel electrode, construction of glass electrode, electrochemical series and uses of series, galvanic series, differentiation between electrochemical series and galvanic series, batteries (Dry cell, Li ion battery and zinc air cells).**Corrosion**: -Definition, factors influencing rate of corrosion, theories of corrosion (direct chemical attack and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, corrosion control (proper

designing and cathodic protection), Protective coatings (surface preparation, cathodic coatings, anodic coatings, electroplating and electroless plating [nickel]),Paints(constituents and special paints).

Course Outcomes: At the end of this unit, the students will be able to **Utilize** the theory of construction of electrodes, batteries in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.

UNIT III: MATERIAL CHEMISTRY **(10hrs)**

PART I:

NANOMATERIALS:

Introduction, sol-gel method, characterization by (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerences, carbon nanotubes (types, preparation and applications).

Super conductors: TypeI, TypeII, characteristics and applications

PART II:

Non–elemental semiconducting materials:

Stoichiometric, controlled valency& chalcogen photo / semiconductors-preparation of semi conducting (distillation, zone refining, czochralski crystal pulling, epitaxy, diffusion, ion implantation) – semiconducting devices (p-n junction diode as rectifier, junction transistor).

Magnetic materials: ferro and ferri magnetism – Hall effect and its applications.

Course outcomes: at the end of this unit, the students will be able to

- **Synthesis** nanomaterials for modern advances of engineering technology analyze the applications of superconductors.
- **Summarize** the preparation of semiconducting; analyze the applications of Hall effect.

UNIT IV: NON–CONVENTIONAL ENERGY SOURCES & FUEL CELLS **(8hrs)**

NON–CONVENTIONAL ENERGY SOURCES:

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

Fuel cells: Construction, Working and Applications (H2-O2, CH3OH-O2, phosphoric acid and molten carbonate).

Spectroscopic techniques: Electromagnetic spectrum, UV laws of absorption, instrumentation, chromophores and auxochromes, intensity shifts and applications. FTIR instrumentation and applications.

Course outcomes: At the end of this unit, the students will be able to

- **Design** models for energy by different natural sources.
- **Analyze** the working of and applications of Fuel cells.

UNIT V: ADVANCED CONCEPTS / TOPICS IN CHEMISTRY **(8 hrs)**

Computational chemistry: Introduction to computational chemistry, molecular modelling and docking 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.

Course out comes: At the end of this unit, the students will be able to

- **Obtain** the knowledge of computational chemistry and molecular machines.

Standard books:

1. P.C. Jainand M.Jain "**Engineering Chemistry**", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Shikha Agarwal, "**Engineering Chemistry**", Cambridge University Press, New Delhi, (2019).
3. Shashi Chawla, "**Engineering Chemistry**", Dhanpat Rai Publication Co. (Latest edition).

Reference Books:

1. K. Sesha Maheshwaramma and Mridula Chugh, "**Engineering Chemistry**", Pearson India Edn.
2. O.G. Palana, "**Engineering Chemistry**", Tata Mc. Graw Hill Education Private Limited, (2009).

3. CNR Rao and JM Honig (Eds) "**Preparation and characterization of materials**" Academic press, NewYork (latest edition).
4. B.S. Murthy, P. Shankar and others, "**Text book of Nano science and Nano technology**", University press (latest edition).

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	2	-	-	-	-	-	-	1

Year & Sem	I Year – II Semester					
Course Code	22UCS04	L	T	P	SS	C
Course Name	DATA STRUCTURES	3	1	0	0	3

Course Objectives:

The objective of the course is to

- Introduce the fundamental concept of data structures and abstract data types
- Emphasize the importance of data structures in developing and implementing efficientalgorithms
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs arerepresented in memory and used by algorithms

Course Outcomes:

After completing this course, a student will be able to:

CO1: Discuss various sorting & searching Techniques

CO2: Use linked structures in writing programs

CO3: Use Stacks and Queues in Writing Programs

CO4: Use Trees in writing programs and demonstrate different methods for traversing trees

CO5: Demonstrate Graphs and Graph Traversals.

UNIT I

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures,Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.

Searching - Linear search, Binary search, Fibonacci search.

Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radixsort), merging (Merge sort) algorithms.

UNIT II

Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal, Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation, Addition, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT III

Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, linked list Representation of Stacks, Operations on Linked Stack, Applications-Reversing list, Factorial Calculation, Infix to Postfix Conversion, Evaluating Postfix Expressions.

Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues- Circular Queues, Deques, Priority Queues.

UNIT IV

Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Treesusing Arrays and Linked lists. Tree Traversal – In order, Preorder, Post order. Heaps –Definition,Max Heap, Min Heap, Insertion and Deletion from Max Heap, Heap sort, Binary Search Trees – Basic Concepts, BST Operations: Insertion and Deletion.

UNIT V

Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims & Kruskals Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm.

Text Books:

1) Data Structures Using C. 2nd Edition. Reema Thareja, Oxford.
2) Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:

1) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, UniversitiesPress.
2) Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon,Cengage.
3) Data Structures with C, Seymour Lipschutz TMH

e-Resources:

1) http://algs4.cs.princeton.edu/home/
2) https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3							2
CO2	3	1	2	2	3							1
CO3	3	1	2	2	3							2
CO4	3	3	2	2	3							2
CO5					1							2

Year & Sem	I Year – II Semester					
Course Code	22UCS05	L	T	P	SS	C
Course Name	PYTHON PROGRAMMING	3	1	0	0	3

Course Objectives:

The Objectives of Python Programming are

- To learn about Python programming language syntax, semantics, and the runtimeenvironment
- 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:

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
CO5: Design applications using GUI and Handle Exceptions

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 CharacterSets, Using functions and Modules.

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

Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops

UNIT II

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 Text Files.

UNIT III

List and Dictionaries: Lists, Defining Simple Functions, Dictionaries

Design with Function: Functions as Abstraction Mechanisms, Problem Solving with Top-Down Design, Design with Recursive Functions, Case Study Gathering Information from a File System, Managing a Program's Namespace, Higher Order Function.

Modules: Modules, Standard Modules, Packages.

UNIT IV

File Operations: Reading config files in python, Writing log files in python, Understanding read functions, read (), readline () and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloadingoperators, 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.

Programming: Introduction to Programming Concepts with Scratch.

Text Books

1) Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
2) Python Programming: A Modern Approach, Vamsi Kurama, Pearson.

Reference Books:

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

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2							1
CO2	2	2	1	1	2							1
CO3	2	2	1	1	2							1
CO4	3	2	1	1	2							1
CO5	2	2	1	1	2							1

Year & Sem	I Year – II Semester					
Course Code	22UEC01	L	T	P	SS	C
Course Name	DIGITAL LOGIC DESIGN	3	1	0	0	3

Course Learning Objectives: This course will enable the students to

- Study about the number systems, complements, signed binary numbers and binary codes.
- Study about Boolean algebra; illustrate map method for minimization of switching functions.
- Design combinational logic circuits like Adders, Subtractors, Decoders, and Encoders.
- Describe Latches and Flip-Flops
- Learn about counters and registers.

Course Outcomes:

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

CO1: Define different number representation and conversion from one radix to other.
CO2: Explain the minimization techniques using Boolean algebra and K-map method.
CO3: Analyze and design the combinational logic circuits.
CO4: Design the sequential circuits using Flip-Flops.
CO5: Design the registers and counters.

UNIT- I: Number Systems

Number Systems: Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction, 4-bit binary codes: BCD, EXCESS 3, alphanumeric codes, 9's complement, 2421, etc.

UNIT -II: **Boolean algebra**

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical Forms, Minterms and Maxterms, Karnaugh Maps-3,4 variables, don't – Care terms, POS and SOP Simplification, NAND/ NOR Implementation, Logic gates.

UNIT –III: **Combinational Logic**

Analysis and design procedure for combinational logic, Adders and Subtractors, Binary Multiplier, Decoders, Encoders, Multiplexers, Demultiplexers, Priority Encoder, Code Converters, Magnitude Comparator.
Programmable logic devices: PROM, PAL, PLA

UNIT- IV: Synchronous Sequential Logic

Introduction to Sequential Circuits: Latches, Flip-Flops, RS- Latch Using NAND and NOR Gates, Truth Tables. RS, JK, T and D Flip Flops, Truth and Excitation Tables, Conversion of Flip Flops.

UNIT -V: Registers and Counters

Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter.

TEXT BOOKS:

1. Digital Design, M.Morris Mano, Michael D Ciletti, PEA.
2. Switching and finite automata theory Zvi.KOHAVI, Niraj.K.Jha 3rdEdition,Cambridge UniversityPress,2009
3. Switching theory and logic design by Hill and Peterson**,** Mc-Graw Hill TMH edition, 2012.

REFERENCE BOOKS:

1. Modern Digital Electronics, R.P. Jain, TMH.
2. Switching Theory and Logic Design by A. Anand Kumar, PHI Learning pvt ltd, 2016.
3. Digital fundamentals by Thomas L. Floyd, Pearson EDU India.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	-	-	-	-	-	-	-	1
CO2	3	3	2	2	-	-	-	-	-	-	-	1
CO3	3	3	3	1	2	-	-	-	-	-	-	2
CO4	3	3	3	1	2	-	-	-	-	-	-	2
CO5	3	3	3	1	2	-	-	-	-	-	-	2

Year & Sem	I Year – II Semester					
Course Code	22UCH02	L	T	P	SS	C
Course Name	APPLIED CHEMISTRY LABORATORY	0	0	3	0	1.5

Introduction to Chemistry laboratory – Molarity, normality, primary, secondary standard solutions, volumetric titrations, quantitative analysis

1. Determination of HCl using standard Na2CO3 solution.
2. Determination of alkalinity of a sample containing Na2CO3 and NaOH.
3. Determination of Mn+2 using standard oxalic acid solution.
4. Determination of ferrous iron using standard K2Cr2O7 solution.
5. Determination of Cu+2 using standard hypo solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Fe+3 by a colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
9. Determination of pH by using pH-meter.
10. Determination of the concentration of strong acid vs strong base (by conductometric method).
11. Determination of strong acid vs strong base (by potentiometric method).
12. Determination of Mg+2 present in an antacid.
13. Determination of CaCO3 present in an egg shell.
14. Estimation of Vitamin C.
15. Determination of phosphoric content in soft drinks.
16. Adsorption of acetic acid by charcoal.
17. Preparation of nylon-6, 6 and Bakelite (demonstration only).

Of the above experiments at-least 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.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	-	-	-	-	-	-	-	1
CO2	3	3	2	2	-	-	-	-	-	-	-	1
CO3	3	3	3	1	2	-	-	-	-	-	-	2
CO4	3	3	3	1	2	-	-	-	-	-	-	2
CO5	3	3	3	1	2	-	-	-	-	-	-	2

Year & Sem	I Year – II Semester					
Course Code	22UCS06	L	T	P	SS	C
Course Name	DATA STRUCTURES USING C LABORATORY	0	0	3	0	1.5

Course Objectives:

The objective of this lab is to

- Demonstrate the different data structures implementation.

Course Outcomes:

By the end of this lab the student is able to

CO1: Use various searching and sorting algorithms

CO2: Use basic data structures such as arrays and linked list.

CO3: Programs to demonstrate fundamental algorithmic problems including Stacks, Queues and Tree Traversals.

List of Experiments:

Exercise -1 (Searching)

a) Write C program that use both recursive and non-recursive functions to perform Linearsearch for a key value in a given list.

b) Write C program that use both recursive and non-recursive functions to perform Binarysearch for a key value in a given list.

Exercise -2 (Sorting-I)

a) Write C program that implement Bubble sort, to sort a given list of integers in ascendingorder

b) Write C program that implement Quick sort, to sort a given list of integers in ascendingorder

c) Write C program that implement Insertion sort, to sort a given list of integers in ascendingorder

Exercise -3(Sorting-II)

a) Write C program that implement radix sort, to sort a given list of integers in ascendingorder

b) Write C program that implement merge sort, to sort a given list of integers in ascendingorder

Exercise -4(Singly Linked List)

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

d) Write a C program to reverse elements of a single linked list.

Exercise -5(Stack)

a) Write C program that implement stack (its operations) using arrays

b) Write C program that implement stack (its operations) using Linked list

c) Write a C program that uses Stack operations to evaluate postfix expression

Exercise -6(Queue)

a) Write C program that implement Queue (its operations) using arrays.

b) Write C program that implement Queue (its operations) using linked lists

Exercise -7(Binary Tree)

d) Write a recursive C program for traversing a binary tree in preorder, in order and post order.

Exercise -8(Binary Search Tree)

a) Write a C program to Create a BST

b) Write a C program to insert a node into a BST.
c) Write a C program to delete a node from a BST.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3							2
CO2	3	1	2	2	3							2
CO3	3	1	2	2	3							2

Year & Sem	I Year – II Semester					
Course Code	22UCS07	L	T	P	SS	C
Course Name	PYTHON PROGRAMMING LABORATORY	0	0	3	0	1.5

Course Objectives:

The Objectives of Python Programming are

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

Course Outcomes:

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

List of Experiments:

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. Theprogram 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 howhigh the triangle should be.

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6) Generate a random number between 1 and 10. Ask the user to guess the number andprint 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 arewithin .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. Theprogram 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) In algebraic expressions, the symbol for multiplication is often left out, as in 3x+4yor 3(x+5). Computers prefer those expressions to include the multiplication symbol, like 3*x+4*y or 3*(x+5). Write a program that asks the user for an algebraic expression and then inserts multiplication symbols where appropriate.
12) 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.

13) Write a program that asks the user for an integer and creates a list that consists of the factors of that integer.
14) Write a program that generates 100 random integers that are either 0 or 1. Then find the longest run of zeros, the largest number of zeros in a row. For instance, the longest run of zeros in [1,0,1,1,0,0,0,0,1,0,0] is 4.
15) Write a program that removes any repeated items from a list so that each item appearsat most once. For instance, the list [1,1,2,3,4,3,0,0] would become [1,2,3,4,0].
16) 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 toinches, 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.
17) Write a function called sum digits that is given an integer num and returns the sum ofthe digits of num.
18) Write a function called first_diff that is given two strings and returns the first locationin which the strings differ. If the strings are identical, it should return -1.
19) Write a function called number_of_factors that takes an integer and returns how many factors the number has.
20) Write a function called is_sorted that is given a list and returns True if the list is sorted and False otherwise.
21) Write a function called root that is given a number x and an integer n and returns x1/n. In the function definition, set the default value of n to 2.
22) Write a function called primes that is given a number n and returns a list of the first n primes. Let the default value of n be 100.

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.

23) 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.
24) 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.
25) 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.
26) 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, andthe regular price of the product. There should be a method get_price that receives the numberof 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 tobe bought and decreases amount by that much.
27) 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.
28) Write a class called Converter. The user will pass a length and a unit when declaring an object from the class—for example, c = Converter(9,'inches'). The possible units are inches, feet, yards, miles, kilometers, meters, centimeters, and millimeters. For each of these units there should be a method that returns the length converted into those units. Forexample, using the Converter object created above, the user could call c.feet()

and shouldget 0.75 as the result.

29) Write a Python class to implement pow (x, n).

30) Write a Python class to reverse a string word by word.

31) Write a program that opens a file dialog that allows you to select a text file. The program then displays the contents of the file in a textbox.

32) Write a program to demonstrate Try/except/else.

33) Write a program to demonstrate try/finally and with/as.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2							1
CO2	2	2	1	1	2							1
CO3	2	2	1	1	2							1
CO4	3	2	1	1	2							1

Year & Sem	I Year – II Semester					
Course Code	22UCH03	L	T	P	SS	C
Course Name	ENVIRONMENTAL SCIENCE	2	0	0	0	0

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

COURSE OBJECTIVES

The objectives of the course are to impart:

- Overall understanding of the natural resources.
- Basic understanding of the ecosystem and its diversity.
- Acquaintance on various environmental challenges induced due to unplanned Anthropogenic activities.
- An understanding of the environmental impact of developmental activities.
- Awareness on the social issues, environmental legislation and global treaties.

COURSE OUTCOMES

CO1: The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources

CO2: The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web

CO3: The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity

CO4: Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices

CO5: About environmental assessment and the stages involved in EIA and the environmental audit.

UNIT-I:

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects; Role of information technology in environment and human health.
Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II:

Natural Resources: 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, water logging, salinity. Energy resources: Growing energy needs, renewable and non-

renewable energy sources use of alternate energy sources.
Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III:

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man- wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: 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, Sustainable Life Studies. Impact of Fire Crackers on Men and his wellbeing.
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.

UNIT – V:

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting - Resettlement and rehabilitation of people; its problems and concerns.

Environmental ethics: Issues and possible solutions. 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. **Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and green politics. The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers,Vijayawada
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford UniversityPress.
3. EnvironmentalStudies,P.N.Palanisamy,P.Manikandan, A.Geetha,andK.Manjula Rani; PearsonEducation,Chennai

Reference:

1. TextBook of Environmental Studies, Deeshita Dave & P.UdayaBhaskar, CengageLearning.
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, NewAge InternationalPublishers,2014

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3			2	3					
CO2			3			2	3					
CO3			3			2	3					
CO4			3			2	3					
CO5			3			2	3					

Year & Sem	II Year – I Semester					
Course Code	22UMT03	L	T	P	SS	C
Course Name	MATHEMATICS-III (Partial Differential Equations and Vector Calculus)	3	1	0	0	3

Course Objectives:

1. To develop the students to solve real time engineering problems using partial differential equations.
2. To familiarize the techniques in partial differential equations to describe a wide range of natural processes and other areas of mathematics such as analysis and differential geometry.
3. To understand the properties of Beta and Gamma functions with their integral representations.
4. To prepare the students to learn the concepts of Vector Calculus.
5. To spread out the use of different numerical techniques for carrying out numerical integration.

Course Outcomes:

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

CO1: Solve problems related to basic linear and non-linear partial differential equations.
CO2: Identify solution methods for partial differential equations that model physical processes.
CO3: Explain the applications and the usefulness of the Beta and Gamma functions by their integral representations and symmetries.
CO4: Interpret the physical meaning of different operators such as gradient, curl, divergence and estimates the work done against a field, circulation and flux using vector calculus.
CO5: Apply Numerical Integration techniques to different engineering problems.

UNIT-I First Order PDE

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –Solutions of first order linear (Lagrange) equation and non linear (standard types) equations.
[Test Book (1) : Sections – 17.2, 17.3, 17.5, 17.6]

UNIT II Higher Order Linear PDE and Applications

Solutions of linear partial differential equations with constant coefficients – non-homogeneous term of the type e^{ax+by}, $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.
Applications of PDE: Method of separation of Variables –Solution of One – dimensional Wave, Heat and two – dimensional Laplace equation.
[Test Book (1) : Sections – 17.8, 17.9, 17.10, 17.11, 18.2, 18.5, 18.6, 18.7]

UNIT III Beta and Gamma Functions

Beta and Gamma functions – Properties – Relation between Beta and Gamma functions – Evaluation of improper integrals.

[Test Book (1) : Sections – 7.14, 7.15, 7.16]

UNIT IV Vector Calculus

Vector Differentiation: Gradient – Directional derivative – Divergence –Curl – Scalar Potential

Vector Integration: Line integral – Work done – Area– Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and problems on above

theorems.
[Test Book (1) : Sections – 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16]

UNIT-V Numerical Integration and Solution of Ordinary Differential Equations

Numerical Integration - Trapezoidal rule– Simpson's 1/3rd and 3/8th rules – Solution of initial value problems by Taylor's series – Picard's method of successive approximations – Euler's method – Runge - Kutta method (fourth order only).
[Test Book (1) : Sections –30.4, 30.6, 30.7, 30.8, 32.2, 32.3, 32.4, 32.5, 32.6, 32.7,]

Text Books:

2. **B.S.Grewal,** Higher Engineering Mathematics, 44th Edition, Khanna Publishers.

Reference Books:

1. **Dr.T.K.V.Iyengar, Dr. B. Krishna Gandhi, S. Ranganadham, Dr. M.V.S.S.N. Prasad**, A text book of Engineering Mathematics, S.Chand Publications.
2. **B.V.Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc.Graw Hill Education.
3. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley - India.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs): (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

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

Year & Sem	II Year – I Semester					
Course Code	22UAI06	L	T	P	SS	C
Course Name	OPERATING SYSTEMS	3	1	0	0	3

Course Objectives:

The objectives of this course is to

1. Introduce to the internal operation of modern operating systems
2. Define, explain, processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems
3. Understand File Systems in Operating System like UNIX/Linux and Windows
4. Understand Input Output Management and use of Device Driver and Secondary Storage (Disk) Mechanism
5. Analyze Security and Protection Mechanism in Operating System

Course Outcomes:

After learning, the course the students should be able to:

CO1. Describe various generations of Operating System and functions of Operating System
CO2. Describe the concept of program, process and thread and analyze various CPU Schedulings and to solve IPC related issues.
CO3. Apply different Memory management strategies.
CO4. Solve Deadlock and file related issues.
CO5. Compare different security mechanisms.

UNIT I:

Operating Systems Overview: Operating system structure, Operating systems operations, Computing environments.

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs

UNIT II:

Process Concept: Process scheduling, Operations on processes, Inter-process communication, **Multithreaded Programming**: Multithreading models, Thread libraries, Threading issues. **Process Scheduling**: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling.

Synchronization: Critical section problem, Peterson's solution, Mutex locks, Semaphores, Classical IPC Problems – Dining philosophers problem, Readers and writers problem, Monitors.

UNIT III:

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation.

Virtual Memory Management: Introduction, Demand paging, Page replacement, Frame allocation, Thrashing.

UNIT IV:

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.

File Systems: Files, Directories, File system implementation, management and optimization.

Secondary Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

UNIT V:

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.

System Security: Introduction, Program threats, System and network threats, Cryptography for security, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer security classification.

Text Books:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.

2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems.)

Reference Books:

1. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
2. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
3. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

e-Resources:

1) https://nptel.ac.in/courses/106/105/106105214/

Contribution of Course Outcomes (CO) towards the achievement of programme outcomes (PO)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

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

Year & Sem	II Year – I Semester					
Course Code	22UAI01	L	T	P	SS	C
Course Name	OBJECT ORIENTED PROGRAMMING WITH JAVA	3	1	0	0	3

Course Objectives: The learning objectives of this course are:

1. To understand the OOP concepts through java program structure.
2. To learn Data type, control statements, method/constructor overloading, and overriding.
3. To learn Arrays and different types of inheritances and interfaces.
4. To understand creating package and handling exception.
5. To learn producer-consumer problem and creating Table, Database and access using JDBC.

Course Outcomes: By the end of the course, the student will be

CO1. Able to **Demonstrate** OOP concepts through java program structure.
CO2. Able to **Practice** Data types, control statements to search for an element in a given list of elements, method/constructor overloading and method/constructor overriding.
CO3. Able to **Compare** different types of Inheritances and implement Interfaces.
CO4. Able to **Create**, User defined Package, and Handle different types of Exceptions.
CO5. Able to **Design** a solution for producer - consumer problem using multi-threading and Able Practice the Database connectivity.

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.

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/

   https://www.w3schools.com/java/java_data_types.asp

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

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

Year & Sem	II Year – I Semester					
Course Code	22UCS18	L	T	P	SS	C
Course Name	DATABASE MANAGEMENT SYSTEMS	3	1	0	0	3

Course Objectives:

1. To introduce about database management systems
2. To give a good formal foundation on the relational model of data and usage of Relational Algebra
3. To introduce the concepts of basic SQL as a universal Database language
4. To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
5. To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

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, ethical responsibility, 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, environment, Centralized and Client Server architecture for the database.

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), concept of surrogate key, 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, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Indexing Techniques: B+ Trees: Search, Insert, Delete algorithms, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes , Index data Structures, Hash Based Indexing: Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning.

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 Ramez Elmasri, 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/

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – POMAPPINGS

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	3
CO2	3	2	3	2	–	–	–	–	–	–	–	2
CO3	3	3	3	1	–	–	–	–	–	–	–	2
CO4	3	3	3	1	–	–	–	–	–	–	–	2
CO5	3	3	3	1	–	–	–	–	–	–	–	2

Year & Sem	II Year – I Semester					
Course Code	22UMB01	L	T	P	SS	C
Course Name	MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY	3	1	0	0	3

Course Objectives:

1. The Learning objectives of this paper are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting.
2. To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
3. To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
4. To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation.
5. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Course Outcomes:

- The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.
- The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination ofinputs.
- The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
- The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

UNIT-I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT – II:

Theories of Production and Cost Analyses:

Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs – Cost –Volume- Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

UNIT – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's

models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat
Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

UNIT – IV:

Introduction to Accounting & Financing Analysis:
Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

UNIT – V:

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and ProfitabilityIndex)

TEXT BOOKS:

A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

REFERENCES:

1. Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & CompanyLtd,
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New editionedition
3. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & CompanyLtd,
4. MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House PvtLtd
5. I.M Pandey, Financial Management , Vikas Publishing House PvtLtd
6. V. Maheswari, Managerial Economics, S. Chand & CompanyLtd,

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS

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

Year & Sem	II Year – I Semester					
Course Code	22UAI07	L	T	P	SS	C
Course Name	OPERATING SYSTEMS AND LINUX PROGRAMMING LAB	0	0	3	0	1.5

Course Objectives:

- To understand scheduling algorithms, memory management techniques, deadlocks, files and shell commands and script.

Course Outcomes:

After completion of this course, student will be able to

CO1. Implement scheduling algorithms
CO2. Implement Memory management techniques
CO3. Implement File allocation techniques
CO4. Implement Shell script

OPERATING SYSTEMS

1. Simulate the Following CPU Scheduling Algorithms

A) FCFS B) SJF C) Priority D) Round Robin

2. Multiprogramming-Memory Management- Implementation of fork(), wait(),

exec() and exit()

3. Write a program to implement first fit, best fit and worst fit algorithm for memory management.

4. Simulate Bankers Algorithm for Dead Lock Avoidance

5. Simulate Bankers Algorithm for Dead Lock Prevention.

6. Simulate The Following Page Replacement Algorithms.

a) FIFO b) LRU c) LFU

7. Simulate the Following File Allocation Strategies

a) Sequenced b) Indexed c) Linked

LINUX PROGRAMMING

1. Study of various general purpose commands
2. Write a Shell program to check whether given number is prime or not.
3. Write a shell script which will display Fibonacci series up to the given range.
4. Write a shell script to check whether the given number is Armstrong or not.
5. Write a shell script to accept student number, name, marks in 5 subjects.

6. Find total, average and grade using the following rules:
    a. Avg>=80 then grade A
    b. Avg<80&&Avg>=70 then grade B
    c. Avg<70&&Avg>=60 then grade C
    d. Avg<60&&Avg>=50 then grade D
    e. Avg<50&&Avg>=40 then grade E
7. Write a shell script to find minimum and maximum elements in the given list of elements.
8. Write a shell program to check whether the given string is palindrome or not.
9. Write an awk program to print sum, avg of students marks list
10. Write a shell script to compute no. of characters and words in each line of given file
11. Write a shell script to check whether the given input is a number or a string

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

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

Year & Sem	II Year – I Semester					
Course Code	22UAI02	L	T	P	SS	C
Course Name	OBJECT ORIENTED PROGRAMMING WITH JAVA LAB	0	0	3	0	1.5

Course Objectives: The aim of this lab is to

1. Understanding the basics such as Operators, expressions and control statements.
2. Performing operations using the class, object and methods.
3. Understanding various types of Inheritances, and exception handling
4. To create threads and running threads, and create package and importing packages.
5. To create table and fetching table from the database using JDBC

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

CO1: Able to perform basic operations, expression and use control statements.
CO2: Able to create class, object, methods and use them.
CO3: Able to implement various types of inheritances such as single, multiple, and multi-level
CO4: Able to create threads and run them and able to create packages and import them.
CO5: Able to create table and fetch table from the database using JDBC.

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 (Fetching the records from table and creating table using JDBC)

a) Write JAVA Program to connect to the database using JDBC and fetch the records from the table called 'student' and display all the records to console.
b) Write a JAVA Program to create a table called 'subjects' which contains three fields: name, author, and edition using JDBC.

Exercise - 14 (Inserting the values into table using the JDBC)

a) Write a JAVA program to insert values into the table called 'subjects' using the JDBC.
b) Write a JAVA program to insert values into 'employee' table which contains Id, First Name, Last Name and Mobile number using JDBC with the help of batch processing.

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)
(Strong – 3, Moderate – 2, Weak – 1)
CO – PO MAPPINGS:

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

Year & Sem	II Year – I Semester					
Course Code	22UCS23	L	T	P	SS	C
Course Name	DATABASE MANAGEMENT SYSTEMS LAB	0	0	3	0	1.5

Course Objectives:

This Course will enable students to

1. Populate and query a database using SQL DDL/DML Commands
2. Declare and enforce integrity constraints on a database
3. Writing Queries using advanced concepts of SQL
4. Programming PL/SQL including procedures, functions, cursors and triggers

Course Outcomes:

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

CO1: Utilize SQL to execute queries for creating database and performing data manipulation operations

CO2: Examine integrity constraints to build efficient databases

CO3: Apply Queries using Advanced Concepts of SQL

CO4: Build PL/SQL programs including stored procedures, functions, cursors and triggers

List of Exercises:

1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS,

UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4. 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)

5. i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in

PL/SQL block.

6. Develop a program that includes the features NESTED IF, CASE and CASE expression.

The program can be extended using the NULLIF and COALESCE functions.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

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

12. Create a table and perform the search operation on table using indexing and non-indexing techniques.

Text Books/Suggested Reading:

1) Oracle: The Complete Reference by Oracle Press

2) Nilesh Shah, "Database Systems Using Oracle", PHI, 2007

3) Rick F Vander Lans, "Introduction to SQL", Fourth Edit ion, Pearson Education, 2007

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	3	3	3	3	-	-	-	-	-	-	-
CO2	-	3	3	3	3	-	-	-	2	-	1	2
CO3	3	3	-	-	3	-	2	-	-	-	2	2
CO4	-	3	3	-	2	-	-	-	-	-	-	2

Year & Sem	II Year – I Semester					
Course Code	22UIT01	L	T	P	SS	C
Course Name	Introduction to Electronics Hardware and Software for IoT (Skill Course)	1	0	3	0	2

Course objectives:

1. Gain knowledge of electronic components.
2. Understand the concept on different digital electronics components and circuits.
3. Study about electronics and electrical devices.
4. Familiarize with the basic PCB designing concepts.
5. Study about different types of sensors.

Course Outcomes:

1. Identify and differentiate electronic components and designing simple analog circuits.
2. Identify digital electronic components and designing simple digital circuits.
3. Demonstrate the purpose of supply units and control of motor circuits.
4. Describe the process of preparing PCB as per standards.
5. Use of sensors to sense real world variables.

List of Experiments

- Resistors: Resistance and Ohms Law, Types, Resistance calculation using color code
- Capacitors: Capacitance, Types of capacitors, Value of capacitance
- Inductors: Inductance, Types of Inductors
- Study the characteristics of LEDs, Photoresistors, Photodiodes, Solar Cells, Phototransistors.
- Study of rectifier circuits, Amplifiers, Regulator ICs, Operational Amplifiers, Oscillators, ADC and DAC.
- Study the working of Buzzer, Microphones, Speakers used to Drive Speakers
- Identify various types of switches and relays
- Control a load (LED/Buzzer/DC motor) using relays and Switches
- Study the use of LED Display, 7-segment Display, LCDs, OLEDs
- Study of RPS, CROs, Digital Multimeters, Analog Meters
- Measure Resistance using multimeter and compare with calculated value using colour code
- Interface DC motors, servos motors, stepper motors to understand their working.
- Interface different sensors to observe their sensing mechanism and verify the functionality.
- Soldering Practice and Preparation of PCB
    - Soldering components on to general PCB as per the circuit diagram
    - Technique of de-soldering using de-soldering pump and wick
    - Draw PCB for simple circuits and etch them onto a copper clad sheet
    - Preparing PCB for soldering and soldering components on the PCB

Software's used:

- **For PCB Designing:** PCBWeb Designer, ZenitPCB, TinyCAD, Osmond PCB, BSch3V, Express PCB, Kicad, Fritzing, DesignSpark PCB, EasyEDA.

- **For Simulation:** ORCAD PSPICE, Tina Pro

References:

- Paul Scherz and Simon Monk, "Practical Electronics for Inventors", 4th Edition, McGraw Hill Education, 2016.
- Jacob Fraden, "Handbook of Modern Sensors: Physics, Designs, and Applications", Fourth Edition, Springer.
- Bernard Grob, Basic Electronics, 4th Edition, Tata McGraw Hill.

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2				1			
CO2	2	2	2	2	2				1			
CO3	2	2	2	2	2				1			
CO4	2	2	2	2	2				3			
CO5	2	2	2	2	2				2			

Year & Sem	II Year – I Semester					
Course Code	22UEN04	L	T	P	SS	C
Course Name	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2	0	0	0	0

Course Objectives:

1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.

2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.

3. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific worldview and basic principles of Yoga and holistic health care system

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

CO1: Understand the significance of Indian Traditional Knowledge
CO2: Classify the Indian Traditional Knowledge
CO3: Compare Modern Science with Indian Traditional Knowledge system.
CO4: Analyze the role of Government in protecting the Traditional Knowledge
CO5: Understand the impact of Philosophical tradition on Indian Knowledge System.

Unit I
Introduction to Traditional Knowledge: Define Traditional Knowledge- Nature and Characteristics-Scope and Importance- kinds of Traditional Knowledge- The historical impact of social change on Traditional Knowledge Systems- Value of Traditional knowledge in global economy.

Unit II
Basic structure of Indian Knowledge System: Astadash Vidya- 4 Ved - 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi), 6 vedanga (Shisha, Kalppa, Nirukha,Vykaran, Jyothisha & Chand),4 upanga (Dharmashastra, Meemamsa, purana & Tharka Shastra).

Unit III
Modern Science and Indian Knowledge System-Indigenous Knowledge, Characteristics- Yoga and Holistic Health care-cases studies.

Unit IV
Protection of Traditional Knowledge: The need for protecting traditional knowledge -Significance of Traditional knowledge Protection-Role of government to harness Traditional Knowledge.

Unit V
Impact of Traditions: Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain & Boudh - Indian Artistic Tradition - Chitrakala, Moorthikala, Vasthukala , Sthapthya, Sangeetha, NruthyaYevamSahithya

Reference Books :
1. Traditional Knowledge System in India, by AmitJha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, PratibhaPrakashan 2012.
3. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, BharatiyaVidya
4. Swami Jitatmanand, Holistic Science and Vedant, BharatiyaVidyaBhavan

5. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.
6. Pramod Chandra, India Arts, Howard Univ. Press, 1983.
7. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.

Web Resources:

1. https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html
2. http://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf
3. https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_21/wipo_grtkf_ic_21_ref_facilitators_text.pdf

Year & Sem	II Year – II Semester					
Course Code	22UMT04	L	T	P	SS	C
Course Name	Probability and Statistics	3	1	0	0	3

Course Objectives:

1. To impart understanding of fundamental knowledge in probability and statistical techniques for gathering, organizing, displaying, and analyzing the significant data.
2. To infuse the importance of random variables and distributions in decision making in order to carry out the necessary random experiments and identify the potential outcomes in a specific instance
3. To provide the knowledge of Fitting the Appropriate Curves, Correlation and Regression Analysis to the data and estimate the future values.
4. To enable the students for comprehending the Sampling Theory to estimate unknown population parameters using sample studies with the aid of statistical methodologies
5. To analyze the concepts of Sampling, tests based on hypothesis to make an inference about the population of interest on the basis of a Random sample taken from the population.

Course Outcomes:

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

CO1: Demonstrate the basic knowledge on fundamental probability concepts, and various statistical methods of collecting data to interpret.
CO2: Understand the basic principles of distribution theory, mathematical expectation and various applications.
CO3: Interpret the association of Characteristics and through Correlation and Regression tools.
CO4: Estimate the confidence intervals for the mean of a population and Test a Hypothesis concerning means.
CO5: Design the components of a classical Hypothesis tests and Derive the statistical inferential methods based on Small and Large Sampling tests.

UNIT-I Probability and Introductory Statistical Methods

Probability – Probability Axioms – Addition Law and Multiplicative Law of Probability - Conditional probability - Baye's theorem.Measures of Central Tendency – Measures of Dispersion – Skewness– Kurtosis.

[Text Book (2): Sections- 4.5, 4.6, 4.6.2, 4.7, 4.8, 3.3, 3.13, 3.14,]

UNIT-II Random Variables and Probability Distributions

Random variables (Discrete and continuous) – Probability Density Function - Probability Distribution function - Binomial, Poisson and Normal distribution – Related properties.

[Text Book (1) : Sections - 2.2, 2.3, 2.4, 2.4.1, 2.4.2, 2.5, 2.6, 2.7, 3.4, 3.7, 3.10]

UNIT-III Correlation, Regression

Correlation – Correlation Coefficient – Rank Correlation – Regression - Lines of Regression – Regression Coefficients – Method of Least Squares - Straight Line - Parabola - Exponential - Power Curves.

[Text Book(1): Sections – 10.2, 10.8, 10.9, 10.10, 10.13, 11.1, 11.11, 11.15, 9.1, 9.2, 9.3]

UNIT-IV Sampling Theory and Estimation

Sampling Theory Introduction – Population and Samples – Sampling Distribution of Means and Variance (Definitions Only) – Central Limit Theorem (Without Proof) - Introduction to t, χ^2 Distributions. Estimation: Point Estimation - Interval Estimation.

[Text Book (1): Sections – 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 6.2, 6.4, 6.5, 8.2, 8.3, 8.4, 8.5, 8.6]

UNIT-V Tests of Hypothesis

Tests of Hypothesis Introduction – Hypothesis - Null Hypothesis - Alternative Hypothesis – Type-I and Type-II Errors - Level of Significance – One Tail and Two Tail Tests – Tests concerning one mean and two means (Large and Small Samples) – Tests on Proportions.

[Text Book(1): Sections – 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 8.8, 8.9, 8.11, 8.12]

Text Books:

1. Probability and Statistics by Dr.T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganadham, Dr. M.V.S.S.N. Prasad, S.Chand Publications.
2. Fundamentals of Mathematical Statistics, S.C.Gupta and V.K.Kapoor, Sultan Chand Publications, Tenth revised edition, 2002.

Reference Books:

1. Probability and Statistics for Engineers**,** Miller and John E. Freund, Prentice Hall of India, Eighth Edition, 2011.
2. Probability and Statistics (Schaum's Outline Series) by Murray Spiegel, John Schiller, McGraw Hill Education, 2005.
3. Probability, Statistics and Random processes. T. Veerrajan, Tata Mc.Graw Hill, India, Third Edition, 2009.

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)
(Strong – 3, Moderate – 2, Weak – 1)
CO – POMAPPINGS

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO1	3	3	3	2	2	-	-	-	-	-	-	2
CO2	3	3	3	2	2	-	-	-	-	-	-	2
CO3	3	3	3	2	2	-	-	-	-	-	-	2
CO4	3	3	3	3	3	-	-	-	-	-	-	1
CO5	3	3	3	3	2	-	-	-	-	-	-	1

Year & Sem	II Year – II Semester					
Course Code	22UCS09	L	T	P	SS	C
Course Name	COMPUTER ORGANIZATION	3	1	0	0	3

Course Objectives:

The course objectives of Computer Organization are to discuss and make student familiar with

1. Principles and the Implementation of Computer Arithmetic
2. Operation of CPUs including RTL, ALU, Instruction Cycle and Busses
3. Fundamentals of different Instruction Set Architectures and their relationship to the CPU Design
4. Memory System and I/O Organization
5. Principles of Operation of Multiprocessor Systems and Pipelining

Course Outcomes:

By the end of the course, the student will

CO1. Develop a detailed understanding of computer systems
CO2. Cite different number systems, binary addition and subtraction, standard, floating-point, and micro operations
CO3. Develop a detailed understanding of architecture and functionality of central processing unit
CO4. Exemplify in a better way the I/O and memory organization
CO5. Illustrate concepts of parallel processing, pipelining and inter processor communication

UNIT I

Basic Structure of Computers: Basic Organization of Computers, Historical Perspective, Bus Structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating Point Representation.

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms.

UNIT II

Register Transfer Language and Microoperations: Register Transfer language. Register Transfer Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Instruction Codes, Computer Register, Computer Instructions, Instruction Cycle, Memory – Reference Instructions. Input –Output and Interrupt.

UNIT III

Central Processing Unit: General Register Organization, STACK Organization. Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

Microprogrammed Control: Control Memory, Address Sequencing, Micro Program example, Design of Control Unit.

UNIT IV

Memory Organization: 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.

UNIT V

Multi Processors: Introduction, Characteristics of Multiprocessors, Interconnection Structures, Inter Processor Arbitration.

Pipeline: Parallel Processing, Pipelining, Instruction Pipeline, RISC Pipeline, Array Processor.

Text Books:

1) Computer System Architecture, M. Morris Mano, Third Edition, Pearson, 2008.
2) Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5/e, McGraw Hill, 2002.

Reference Books:

1) Computer Organization and Architecture, William Stallings, 6/e, Pearson, 2006.
2) Structured Computer Organization, Andrew S. Tanenbaum, 4/e, Pearson, 2005.
3) Fundamentals of Computer Organization and Design, Sivarama P. Dandamudi, Springer, 2006.

Web Resources:

1) https://nptel.ac.in/courses/106/105/106105163/

2) http://www.cuc.ucc.ie/CS1101/David%20Tarnoff.pdf

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

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

Year & Sem	II Year – II Semester					
Course Code	22UCS20	L	T	P	SS	C
Course Name	FORMAL LANGUAGES AND AUTOMATA THEORY	3	1	0	0	3

Course Objectives:

1. To learn fundamentals of Regular and Context Free Grammars and Languages
2. To understand the relation between Regular Language and Finite Automata and machines
3. To learn how to design Automata's and machines as Acceptors, Verifiers and Translators
4. To understand the relation between Contexts free Languages, PDA and TM
5. To learn how to design PDA as acceptor and TM as Calculators

Course Outcomes:

By the end of the course students can

CO1. Design deterministic and non-deterministic finite automata
CO2. Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy.
CO3. Derive and simplify CFG and specify normal forms.
CO4. Design PDA and find equivalent CFG.
CO5. Design Turing machine and analyse the problems.

UNITI

Finite Automata: Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT II

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion.

UNIT III

Formal Languages, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Eliminat ion of Useless Symbols, Є-Productions and Unit Productions, Normal Forms-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

UNIT IV

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description, Language Acceptance of Pushdown Automata, Design of Pushdown Automata, Deterministic and Non –

Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars, Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

UNIT V

Turning Machine: Definition, Model, Representation of TMs-Instantaneous Descriptions, Transition Tables and Transit ion Diagrams, Language of a TM, Design of TMs, Types of TMs, Church's Thesis, Universal and Restricted TM, Decidable and Un-decidable Problems, Halt ing Problem of TMs, Post's Correspondence Problem, Modified PCP, Classes of P and NP, NP-Hard and NP-Complete Problems.

Text Books:

1) Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008

2) Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N. Chandrasekharan, 3rd Edition, PHI, 2007

Reference Books:

1) Elements of Theory of Computation, Lewis H.P. &Papadimition C.H., Pearson /PHI

2) Theory of Computation, V. Kulkarni, Oxford University Press, 2013

3) Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014

e-Resources:

1) https://nptel.ac.in/courses/106/104/106104028/

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

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

Year & Sem	II Year – II Semester					
Course Code	22UIT02	L	T	P	SS	C
Course Name	FUNDAMENTALS OF IOT AND ITS APPLICATIONS	3	1	0	0	3

Course Objectives:

- Understand the concept of Internet of Things.
- Recognise the factors that contributed to the emergence of IoT
- Able to design and develop IoT Devices.
- Understand the key components that make up an IoT system
- Able to understand the application areas of IOT

Course Outcomes

1. Learn IoT value chain structure (device, data cloud), and technologies involved.
2. Build a prototype using Arduino Uno
3. Interface the Raspberry Pi with external gadgets for IoT applications.
4. Infer the role of Cloud and Security in IoT.
5. Understand the role of IoT in various domains of Industry.

Unit I: Introduction to Internet of Things

Definition and Characteristics of IoT — Sensors and Actuators — Physical Design of IoT – Logical Design of IoT — IoT Communication Models — IoT Communication APIs — IoT Enabled Technologies — IoT Levels and Templates.

Learning Resource: Text Book-1

Unit II: IoT with Arduino

Introduction to Arduino, Creating Arduino Programming Environment, Using Arduino IDE, Creating Arduino Program, Using Libraries, Working with Digital Interfaces, Interfacing with Analog devices, Adding Interrupts, Communicating with Devices, Using Sensors, Working with Motors, Using an LCD.

Learning Resource: Text Book-3

Unit III: IoT Physical Devices and Endpoints

Introduction Raspberry Pi — Components and Ports — GPIO Header — Raspberry Pi Installation — Linux on Raspberry Pi — Raspberry Pi Interfaces — Controlling LED with Raspberry Pi — Interfacing an LED and Switch with Raspberry Pi — Interfacing a LDR with Raspberry Pi.

Learning Resource: Text Book-1

Unit IV:

Cloud for IoT: Concept of Cloud — Characteristics of Cloud Computing — Types of Cloud Models — Integration of Cloud and IoT — Cloud-IoT Architecture — Challenges of Cloud-IoT — Future Scope.
Learning Resource: Text Book-4

Security, Privacy, and Challenges in IoT: Introduction — Design Challenges — Development Challenges — Security Challenges — Privacy Challenges — Other Challenges — Trust Management.
Learning Resource: Text Book-4

Unit V: Applications of IoT

Domain Specific IoTs: Home Automation, Smart Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle. **Case Studies:** Smart Home, Smart City, Precision Agriculture, Weather Monitoring and Reporting, Air Pollution Monitoring.

Learning Resource: Text Book-1

Text Books

1. Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2015.
2. Paul Scherz and Simon Monk, "Practical Electronics for Inventors", 4th Edition, McGraw Hill Education, 2016.
3. Richard Blum, Arduino Programming in 24 Hours, Sams Teach Yourself, Pearson Education, 2017.
4. Dr Kamlesh Lakhwani, Dr Hemant Kumar Gianey, Joseph Kofi Wireko, K. K. Hiran, "Internet of Things (IoT): Principles, Paradigms and Applications of IoT", BPB Publications, 2020.

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS

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

Year & Sem	II Year – II Semester					
Course Code	22UCS11	L	T	P	SS	C
Course Name	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	3	1	0	0	3

Course Objectives:

This course is designed to:

1. To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning
2. To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science

Course Outcomes:

At the end of the course student will be able to

CO1: Demonstrate skills in solving mathematical problems
CO2: Comprehend mathematical principles and logic
CO3: Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
CO4: Manipulate and analyze data numerically and/or graphically using appropriate Software
CO5: Communicate effectively mathematical ideas/results verbally or in writing

UNIT-I

Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives. Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas. Duality Law. Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, statement functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT-II

Relations: Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams,

Algebraic Structures: Algebraic Systems, Properties, Semi Groups and Monoids, Group, Subgroup and Abelian Groups - Homomorphism, Isomorphism.

UNIT-III

Combinatorics: Basis of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Combinations.

Number Theory: Properties of Integers, Division Theorem, Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic, Fermat's and Euler's Theorems.

UNIT-IV

Recurrence Relations: Generating Functions, Function of Sequences, Calculating Coefficient of Generating Functions, Recurrence Relations. Formulation as Recurrence Relations. Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations.

UNIT-V

Graph Theory: Basic Concepts, Graph theory and its Applications, Sub graphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multi graphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Coloring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning trees.

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, P.Tremblay and P.Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics - A Computer Oriented Approach, C. L. Liu and D.P.Mohapatra, 3rd Edition, Tata McGraw Hill.

Reference Books :

1. Discrete Mathematics for Computer Scientists and Mathematicians, .L. Mott, A.Kandel and T.P. Baker, 2nd Edition, Prentice Hall of india.

2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby and Sharon Cutler Ross, PHI.

3. Discrete Mathematics and its Applications with Combinatories and Graph Theory, K.H.Rosen, 7th Edition, Tata McGraw Hill.

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – POMAPPINGS

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

Year & Sem	II Year – II Semester					
Course Code	22UCS25	L	T	P	SS	C
Course Name	COMPUTER ORGANIZATION LAB	0	0	3	0	1.5

Course Objectives:

Upon completion of the Course, the students will be able to:

- Know the characteristics of various components.
- Understand the utilization of components

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1: Understand working of logic families and logic gates.

CO2: Design and implement Combinational and Sequential logic circuits.

CO3: Solve elementary problems by assembly language programming

CO4: Implement assembly language program for given task for 8086 microprocessor.

List of Experiments:

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Design a JK Flip-Flop, Edge triggered J-K NAND Flip Flop and show its functionality Handle race condition and clock gating in your circuit.
4. Design a 4 – bit Adder / Subtractor
5. Combinational logic circuits: Implementation of Boolean functions using logic gates
6. Arithmetic operations using logic gates; Implementation of Multiplexers, Demultiplexers, Encoders, Decoders; Implementation of Boolean functions using Multiplexers/Decoders
7. Study of sequential logic circuits: Implementation of flip flops, Verify the excitation tables of various FLIP-FLOPS.
8. Design and realization a Synchronous and Asynchronous counter using flip-flops
9. Design and realization of an 8-bit parallel load and serial out shift register using flipflops
10. Implementation of counters, Design and realization a Synchronous and Asynchronous counter using flip-flops
11. Design and realization of 4x1 mux, 8x1mux using 2x1 mux

    Write assembly language programs in 8086 for the following: (MASAM can also be used)
    1. To add two 8 bit number (A+B=RESULT with a carry and without a carry).
    2. To subtract one 8 bit number from another (A-B=RESULT with a borrow and without a borrow).
    3. To find out AND, OR, NOT, XOR, NAND, NOR, XNOR of two 8 bit number.
    4. To find out addition of two 16 bit numbers.
    5. To find out subtraction of two 16 bit numbers.
    6. To evaluate the expression a = b + c –d * e

    Considering 8-bit, 16 bit and 32-bit binary numbers as b, c, d, e.

    Take the input in consecutive memory locations and results also Display the results by using "int xx" of 8086. Validate program for the boundary conditions.
12. To take N numbers as input. Perform the following operations on them.
    a. Arrange in ascending and descending order.
    b. Find max and minimum
    c. Find average

Considering 8-bit, 16-bit binary numbers and 2-digit, 4 digit and 8-digit BCD numbers. Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

13. To implement the above operations as procedures and call from the main procedure.
14. To find the factorial of a given number as a Procedure and call from the main program which display the result.

Note: Experiments can be done using Logic board, Easy CPU, RT Slim, Little Man Computer (LMC), Assemblers for 8085 programming, 8086 based trainer kits, MIPS simulator PC Spim, Xilinx schematic editor and simulation tools or any other choice

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS

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

Year & Sem	II Year – II Semester					
Course Code	22UCS13	L	T	P	SS	C
Course Name	R PROGRAMMING LAB	0	0	3	0	1.5

Course Objectives:

After taking the c, students will be able to

1. Use R for doing basic Mathematical Operations on vectors, data frames, Arrays and Matrices.
2. Use R Programming Structures, Write functions in an efficient way.
3. Use R for doing calculus, set operations, linear algebra operations on vectors and matrices.
4. Use R for creating, editing and saving graphs.
5. Use R programming for probability and statistical distributions.
6. Use R for some basic types of statistical models.

Course Outcomes:

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

1. Able to perform mathematical operations on vectors, data frames, Arrays and Matrices using R programming.
2. Able to create functions effectively using R programming structures.
3. Able to use R programming for performing calculus, set and linear algebra operations on vectors and matrices.
4. Able to create, edit and save graphs using R programming.
5. Able to utilize R programming for probability & statistical distributions.
6. Ability to create basic statistical models.

LIST OF LAB PROGRAMS:

Week 1:

Installing R and R Studio
Basic functionality of R, variable, data types in R

Week 2:

a) Implement R script to show the usage of various operators available in R language.
b) Implement R script to read person's age from keyboard and display whether he is eligible for voting or not.
c) Implement R script to find biggest number between two numbers.
d) Implement R script to check the given year is leap year or not.

Week 3:

a) Implement R Script to generate first N natural numbers.
b) Implement R Script to check given number is palindrome or not.

c) Implement R script to print factorial of a number.
d) Implement R Script to check given number is Armstrong or not.

Week 4:

a) Implement R Script to perform various operations on string using string libraries.
b) Implement R Script to check given string is palindrome or not.
c) Implement R script to accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
d) Implement R script for Call-by-value and Call-by-reference

Week 5:

a) Implement R Script to create a list.
b) Implement R Script to access elements in the list.
c) Implement R Script to merge two or more lists. Implement R Script to perform matrix operation

Week 6:

Implement R script to perform following operations:
a) various operations on vectors
b) Finding the sum and average of given numbers using arrays.
c) To display elements of list in reverse order.
d) Finding the minimum and maximum elements in the array.

Week 7:

a) Implement R Script to perform various operations on matrices
b) Implement R Script to extract the data from data frames.
c) Write R script to display file contents.
d) Write R script to copy file contents from one file to another

Week 8:

a) Implement R Script to create a Pie chart, Bar Chart, scatter plot and Histogram.
b) Implement R Script to perform mean, median, mode, range, summary, variance, standard deviation operations.
c) Introduction to ggplot2 graphics

Week 9:

a) Implement R Script to perform Normal, Binomial distributions.
b) Implement R Script to perform correlation, Linear and multiple regression.

Week 10:

Introduction to Non-Tabular Data Types: Time series, spatial data, Network data. Data Transformations: Converting Numeric Variables into Factors, Date Operations, String Parsing, Geocoding

Week 11:

Introduction Dirty data problems: Missing values, data manipulation, duplicates, forms of data dates, outliers, spelling

Week 12:

Data sources: SQLite examples for relational databases, Loading SPSS and SAS files, Reading from Excel and Google Spreadsheets, API and web scraping examples

References:

1. R Cookbook Paperback – 2011 by Teetor Paul O Reilly Publications
2. Beginning R: The Statistical Programming Language by Dr. Mark Gardener, Wiley Publications
3. R Programming For Dummies by JorisMeysAndrie de Vries, Wiley Publications
4. Hands-On Programming with R by Grolemund, O Reilly Publications
5. Statistical Programming in R by KG Srinivas G.M. Siddesh, Chetan Shetty &Sowmya B.J. - 2017 edition
6. R Fundamentals and Programming Techniques, ThomasLumely.
7. R for Everyone Advanced Analytics and Graphics, Jared P. Lander- Addison WesleySeries
8. The Art of R Programming, Norman Matloff, CengageLearning
9. Maria DoloresUgarte,AnaF.Militino,AlanT.Arnholt-ProbabilityandStatisticswithR2nd Edition on, CRC Press,2016.
10. R-programming for Data science, RogerD.Peng.
11. An Introduction to statistical learning-with applications in R, Trevor Hastie and Rob Tibshirani.

Web Links

1. URL: https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf (Online Resources)
2. http://nptel.ac.in/courses/106104135/48
3. http://nptel.ac.in/courses/110106064/

Software requirements:

1. The R statistical software program. Available from: https://www.r-project.org/
2. R Studio an Integrated Development Environment (IDE) for R. Available from: https://www.rstudio.com/

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	2	2	2	2	2	-	-	-	1	1	1
CO.2	3	3	2	3	3	2	-	-	-	2	1	1
CO.3	3	3	3	3	3	3	-	-	-	2	1	1
CO.4	3	2	3	3	3	3	-	-	-	2	1	1
CO.5	3	2	2	3	3	3	-	-	-	2	1	1
CO.6	3	2	2	3	3	3	-	-	-	2	1	1

Year & Sem	II Year – II Semester					
Course Code	22UIT03	L	T	P	SS	C
Course Name	INTRODUCTION TO IOT LAB	0	0	3	0	1.5

Course Objectives:

1. To share in-depth knowledge of the IOT.
2. To deliver hand-on experience in the field.
3. To inculcate interest in different domain areas

Course Outcomes:

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

- Apply the knowledge gained for solving different problems.
- Demonstrate basics of IoT
- Analyse and evaluate the solutions and compare them.
- Create and implement mini project to solve real life problems.

List of Experiments:

1. Introduction to Arduino Uno Board.
2. To interface capacitor sensor (touch sensor) with smart phone and write a program to turn LED ON/OFF when '1'/'0 'is received from smart phone using Bluetooth.
3. To interface Arduino board with temperature and humidity sensor and print the output on LCD/serial monitor.
4. To interface LDR with Arduino Uno to control the street light.
5. To interface MQ-2 Gas Sensor with Arduino Uno for smoke detection.
6. To interface IR Sensor with Arduino Uno for obstacle detection.
7. To interface ultrasonic sensor with Arduino Uno to measure the distance.
8. To interface soil moisture sensor with Arduino Uno for smart irrigation.
9. To interface pulse sensor with Arduino Uno for heart rate monitoring.
10. To interface DC motor with Arduino Uno to control its speed.

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1

CO – PO MAPPINGS

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

Year & Sem	II Year – II Semester					
Course Code	22UCY04	L	T	P	SS	C
Course Name	ANDROID APPLICATION DEVELOPMENT (skill course)	1	0	3	0	2

Course Objectives:

1. To learn how to develop Applications in android environment.
2. To learn how to develop user interface applications.
3. To learn how to develop URL related applications.

Course Outcomes:

- Able to develop Applications in android environment.
- Able to learn how to develop user interface applications.
- Able to To learn how to develop URL related applications.

1. (a) Create an Android application that shows Hello + name of the user and run it on an emulator.
   (b) Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.

2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use
(a) Linear Layout , (b) Relative Layout and
(c) Grid Layout or Table Layout.

3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.

4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.

5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.

6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and

password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message.

7. Create a user registration application that stores the user details in a database table.

8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.

Note:
Android Application Development with MIT App Inventor:For the first one week, the student is advised to go through the App Inventor from MIT which gives insight into the various properties of each component. The student should pay attention to the properties of each components, which are used later in Android programming. Following are useful links:

1. http://ai2.appinventor.mit.edu
2. https://drive.google.com/file/d/0B8rTtW_91YclTWF4czdBMEpZcWs/view

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	--	--	3	--	2	2	--	--	--	1	2	--
CO2	--	--	3	--	2	2	--	--	--	1	2	--
CO3	--	--	3	--	2	2	--	--	--	1	2	--