

**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)**

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

**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
<b>TOTAL</b>			<b>15</b>	<b>4</b>	<b>13</b>	<b>--</b>	<b>32</b>	<b>180</b>	<b>420</b>	<b>600</b>	<b>19.5</b>
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
<b>TOTAL</b>			<b>17</b>	<b>5</b>	<b>9</b>	<b>2</b>	<b>33</b>	<b>195</b>	<b>455</b>	<b>650</b>	<b>19.5</b>
HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core, PE-Professional Elective, OE-Open Elective, OC-Online Course											

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

**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)											
<b>TOTAL</b>			<b>18</b>	<b>5</b>	<b>12</b>	<b>0</b>	<b>35</b>	<b>195</b>	<b>505</b>	<b>700</b>	<b>21.5</b>
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
<b>TOTAL</b>			<b>16</b>	<b>5</b>	<b>13</b>	<b>0</b>	<b>34</b>	<b>295</b>	<b>505</b>	<b>800</b>	<b>25.5</b>
Internship 2 Months (Mandatory) after 2-2 (during summer vacation)											
<b>MINOR COURSE</b>			<b>3</b>	<b>--</b>	<b>2</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>4</b>
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											

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

**Year: III 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
PC	22UCY07	Design and Analysis of Algorithms	3	1	--	--	4	30	70	100	3
PC	22UIT04	IoT Architecture and its Protocols	3	1	--	--	4	30	70	100	3
PC	22UAI13	Computer Networks	3	1	--	--	4	30	70	100	3
OE	22UIT10	Open Elective-I Open Electives offered by other departments/Natural Language Processing (Job oriented course)	3	1	--	--	4	30	70	100	3
PE-I	22UIT05	Computer Graphics	3	1	--	--	4	30	70	100	3
	22UIT06	Advanced Computer Architecture									
	22UIT07	Compiler Design									
	22UIT08	Software Engineering									
	22UIT09	Principles of Programming Languages									
PC	22UCY13	Network Programming lab	--	--	3	--	3	15	35	50	1.5
PC	22UIT11	Applications of IOT lab	--	--	3	--	3	15	35	50	1.5
SC	22UCY15	Web Application Development Using Full Stack –Frontend Development –Module -I	1	--	3	--	4	--	50	50	2
MC	22UEN16	Employability Skills-II	2	--	--	--	2	--	--	-	0
MC	22U0C02	Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)	--	--	--	--	--	--	--	-	1.5
<b>TOTAL</b>			<b>18</b>	<b>5</b>	<b>9</b>	<b>0</b>	<b>32</b>	<b>180</b>	<b>400</b>	<b>650</b>	<b>21.5</b>
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: III 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
PC	22UIT12	Embedded System Design	3	1	--	--	4	30	70	100	3
PC	22UIT13	Machine Learning	3	1	--	--	4	30	70	100	3
PC	22UIT14	Wireless Sensor Networks	3	1	--	--	4	30	70	100	3
PE-II	22UIT15	Cloud Computing	3	1	--	--	4	30	70	100	3
	22UNPO1	NPTEL/SWAYAM COURSE(12 WEEKS)	--	--	--	--	--	--	--	---	
OE		Open Elective-II Open Electives offered by other departments/ Social Network and Semantic Web (Job Oriented Course)	3	1	--	--	4	30	70	100	3
PC	22UIT16	Embedded System Design Lab	--	--	3	--	3	15	35	50	1.5
PC	22UIT17	Machine Learning Lab	--	--	3	--	3	15	35	50	1.5
PC	22UIT18	Advanced IoT Lab	--	--	3	--	3	15	35	50	1.5
SC	22UCY23	Web Application Development Using Full Stack -Frontend Development – Module -II	1	--	3	--	4	--	50	50	2
MC	22UEN15	Employability Skills-I	2	--	--	--	2	--	--	-	0
<b>TOTAL</b>			<b>18</b>	<b>5</b>	<b>12</b>	<b>0</b>	<b>35</b>	<b>195</b>	<b>505</b>	<b>700</b>	<b>21.5</b>
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											

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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-dimensional 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 –



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

<b>Year &amp; Sem</b>	<b>I Year – I Semester</b>					
<b>Course Code</b>	<b>22UPH01</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>APPLIED PHYSICS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

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 Clausius- 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	-	-

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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 with paragraphs
- 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.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

**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](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
<b>CO1</b>	-	-	-	-	-	-	-	<b>1</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>
<b>CO2</b>	-	-	-	-	-	-	-	-	-	<b>3</b>	-	-
<b>CO3</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO4</b>	-	-	-	-	-	-	-	-	-	<b>2</b>	-	-
<b>CO5</b>	-	-	-	-	-	-	-	-	-	<b>2</b>	-	-

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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 computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C
- To learn about the design concepts of arrays, strings
- 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 way Selection, 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, String Manipulation 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:**

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

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							

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

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	-	-



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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	-	-	-	-	-	-	-

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

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 six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.

**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.  $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$  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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

<b>Year &amp; Sem</b>	<b>I Year – I Semester</b>					
<b>Course Code</b>	<b>22UCS03</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>IT WORKSHOP</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>3</b>

**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, Disassembling 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, Header and 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



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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](https://nptel.ac.in/courses/109104074/8)
2. [nptel.ac.in/courses/109104045/](https://nptel.ac.in/courses/109104045/)
3. [nptel.ac.in/courses/101104065/](https://nptel.ac.in/courses/101104065/)
4. [www.hss.iitb.ac.in/en/lecture-details](http://www.hss.iitb.ac.in/en/lecture-details)
5. [www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution](http://www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution)

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

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

**CO – PO MAPPING:**

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



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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 fullerenes, carbon nanotubes (types, preparation and applications).

**Super conductors:** Type I, Type II, 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 (H<sub>2</sub>-O<sub>2</sub>, CH<sub>3</sub>OH-O<sub>2</sub>, 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. Jain and 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).

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

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
<b>CO1</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO2</b>	<b>1</b>	-	-	-	-	-	-	-	-	-	-	-
<b>CO3</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO4</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO5</b>	-	-	-	-	<b>2</b>	-	-	-	-	-	-	<b>1</b>

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

<b>Year &amp; Sem</b>	<b>I Year – II Semester</b>					
<b>Course Code</b>	<b>22UCS04</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>DATA STRUCTURES</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**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 efficient algorithms
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented 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 (radix sort), 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 Trees using 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 Prim's & Kruskal's Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm.



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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 runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object-oriented programming

**Course Outcomes:**

**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 overloading operators, Adding and retrieving dynamic attributes of classes, Programming using OOps support **Design with Classes:** Objects and Classes, Data modeling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

**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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

<b>Year &amp; Sem</b>	<b>I Year – II Semester</b>					
<b>Course Code</b>	<b>22UEC01</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>DIGITAL LOGIC DESIGN</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**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:**

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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 Na<sub>2</sub>CO<sub>3</sub> solution.
2. Determination of alkalinity of a sample containing Na<sub>2</sub>CO<sub>3</sub> and NaOH.
3. Determination of Mn<sup>+2</sup> using standard oxalic acid solution.
4. Determination of ferrous iron using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
5. Determination of Cu<sup>+2</sup> using standard hypo solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Fe<sup>+3</sup> 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<sup>+2</sup> present in an antacid.
13. Determination of CaCO<sub>3</sub> 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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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)**

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

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

**Exercise -3(Sorting-II)**

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

**Exercise -4(Singly Linked List)**

- Write a C program that uses functions to create a singly linked list
- Write a C program that uses functions to perform insertion operation on a singly linked list
- Write a C program that uses functions to perform deletion operation on a singly linked list
- Write a C program to reverse elements of a single linked list.

Exercise -5(Stack)

- Write C program that implement stack (its operations) using arrays
- Write C program that implement stack (its operations) using Linked list
- Write a C program that uses Stack operations to evaluate postfix expression

**Exercise -6(Queue)**

- Write C program that implement Queue (its operations) using arrays.
- Write C program that implement Queue (its operations) using linked lists

**Exercise -7(Binary Tree)**

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

**Exercise -8(Binary Search Tree)**

- Write a C program to Create a BST

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

- 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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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 runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object-oriented programming

**Course Outcomes:**

**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. The program should print out the user's name the specified number of times.
- 5) Use a for loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.  

```
*
**
***
****
```
- 6) Generate a random number between 1 and 10. Ask the user to guess the number and print a message based on whether they get it right or not.
- 7) Write a program that asks the user for two numbers and prints Close if the numbers are within .001 of each other and not close otherwise.
- 8) Write a program that asks the user to enter a word and prints out whether that word contains any vowels.
- 9) Write a program that asks the user to enter two strings of the same length. The program should then check to see if the strings are of the same length. If they are not the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters abcde and ABCDE the program should print out AaBbCcDdEe.
- 10) Write a program that asks the user for a large integer and inserts commas into it according to the standard American convention for commas in large numbers. For instance, if the user enters 1000000, the output should be 1,000,000.
- 11) In algebraic expressions, the symbol for multiplication is often left out, as in  $3x+4y$  or  $3(x+5)$ . 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.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

- (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 [1,0,1,1,0,0,0,1,0,0] is 4.
- 15) Write a program that removes any repeated items from a list so that each item appears at most once. For instance, the list [1,1,2,3,4,3,0,0] would become [1,2,3,4,0].
- 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 to inches, if they enter a 2, then the program converts to yards, etc. While this can be done with if statements, it is much shorter with lists and it is also easier to add new conversions if you use lists.
- 17) Write a function called sum\_digits that is given an integer num and returns the sum of the digits of num.
- 18) Write a function called first\_diff that is given two strings and returns the first location in which the strings differ. If the strings are identical, it should return -1.
- 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  $x^{1/n}$ . 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, and the regular price of the product. There should be a method get\_price that receives the number of items to be bought and returns the cost of buying that many items, where the regular price is charged for orders of less than 10 items, a 10% discount is applied for orders of between 10 and 99 items, and a 20% discount is applied for orders of 100 or more items. There should also be a method called make\_purchase that receives the number of items to be bought and decreases amount by that much.
- 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. For example, using the Converter object created above, the user could call `c.feet()`





**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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-spots 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, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
3. Environmental Studies, P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

### Reference:

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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

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

**CO – PO MAPPINGS:**

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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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

**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**

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

Numerical Integration - Trapezoidal rule– Simpson's 1/3<sup>rd</sup> and 3/8<sup>th</sup> 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, 44<sup>th</sup> 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, 10<sup>th</sup> 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
<b>CO1</b>	2	3	3	1	-	-	-	-	-	-	-	1
<b>CO2</b>	3	3	3	2	-	-	-	-	-	-	-	2
<b>CO3</b>	2	3	3	1	-	-	-	-	-	-	-	2
<b>CO4</b>	2	3	3	1	-	-	-	-	-	-	-	3
<b>CO5</b>	3	3	3	2	-	-	-	-	-	-	-	2

<b>Year &amp; Sem</b>	<b>II Year – I Semester</b>							
<b>Course Code</b>	<b>22UAI06</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>OPERATING SYSTEMS</b>			<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

The objectives of this course is to

1. Introduce to the internal operation of modern operating systems

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

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 Scheduling 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.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

**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. Dhamdhare 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:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
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.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

**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](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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

<b>Year &amp; Sem</b>	<b>II Year – I Semester</b>					
<b>Course Code</b>	<b>22UCS18</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**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**



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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

**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 of inputs.
- 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,

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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**

	<b>PO 1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO1 0</b>	<b>PO1 1</b>	<b>PO1 2</b>
<b>CO1</b>	1	2	3	3	3	2	3	2	3	2	3	2
<b>CO2</b>	1	3	2	2	3	2	2	3	2	2	3	3
<b>CO3</b>	1	3	3	3	3	2	3	3	1	3	3	2
<b>CO4</b>	1	1	2	1	3	2	1	3	2	2	3	3
<b>CO5</b>	1	1	1	3	3	1	1	2	2	1	3	3

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

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

**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.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

---

6. Find total, average and grade using the following rules:
  - a.  $Avg \geq 80$  then grade A
  - b.  $Avg < 80 \&\& Avg \geq 70$  then grade B
  - c.  $Avg < 70 \&\& Avg \geq 60$  then grade C
  - d.  $Avg < 60 \&\& Avg \geq 50$  then grade D
  - e.  $Avg < 50 \&\& Avg \geq 40$  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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
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



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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

**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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

**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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
<b>CO1</b>	1	2	3	-	-	2	-	1	1	1	-	1
<b>CO2</b>	1	2	3	-	-	-	2	1	1	1	-	1
<b>CO3</b>	1	2	3	-	-	-	-	1	1	1	-	1
<b>CO4</b>	2	3	-	2	-	-	-	1	1	1	-	1
<b>CO5</b>	-	-	-	-	-	-	-	1	1	1	-	1

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

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

**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 dropping 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.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

---

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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
<b>CO1</b>	3	3	3	3	3	-	-	-	-	-	-	-
<b>CO2</b>	-	3	3	3	3	-	-	-	2	-	1	2
<b>CO3</b>	3	3	-	-	3	-	2	-	-	-	2	2
<b>CO4</b>	-	3	3	-	2	-	-	-	-	-	-	2

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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

**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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

---

- 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", 4<sup>th</sup> 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			

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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

**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, Kalpa, Nirukha, Vyakaran, 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, Bharatiya Vidya
4. Swami Jitatanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan
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](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](https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_21/wipo_grtkf_ic_21_ref_facilitators_text.pdf)



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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

**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,  $\chi^2$  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]

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

**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**

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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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**

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

**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, Zvonko Vranesic, Safwat Zaky, 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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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

**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.

**UNIT I**

Finite Automata: Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automata, 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  $\epsilon$ -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-Elimination of Useless Symbols,  $\epsilon$ -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.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

---

**UNIT V**

Turning Machine: Definition, Model, Representation of TMs-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a TM, Design of TMs, Types of TMs, Church's Thesis, Universal and Restricted TM, Decidable and Un-decidable Problems, Halting 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, 3<sup>rd</sup> Edition, Pearson, 2008
- 2) Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N. Chandrasekharan, 3<sup>rd</sup> Edition, PHI, 2007

**Reference Books:**

- 1) Elements of Theory of Computation, Lewis H.P. & Papadimitriou 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:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IOT - UG – R22**

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", 4<sup>th</sup> 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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
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



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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.



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IOT - UG – R22**

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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
<b>CO1</b>	3	3	3	2	2	-	-	-	-	-	-	3
<b>CO2</b>	3	3	3	2	2	-	-	-	-	-	-	2
<b>CO3</b>	3	3	3	2	2	-	-	-	-	-	-	2
<b>CO4</b>	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:

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

Week 3:

- Implement R Script to generate first N natural numbers.
- Implement R Script to check given number is palindrome or not.
- Implement R script to print factorial of a number.
- Implement R Script to check given number is Armstrong or not.

Week 4:

- Implement R Script to perform various operations on string using string libraries.
- Implement R Script to check given string is palindrome or not.
- Implement R script to accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
- 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 Golemund, 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
<b>CO.1</b>	3	2	2	2	2	2	-	-	-	1	1	1
<b>CO.2</b>	3	3	2	3	3	2	-	-	-	2	1	1
<b>CO.3</b>	3	3	3	3	3	3	-	-	-	2	1	1
<b>CO.4</b>	3	2	3	3	3	3	-	-	-	2	1	1
<b>CO.5</b>	3	2	2	3	3	3	-	-	-	2	1	1
<b>CO.6</b>	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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
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](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**

	<b>PO 1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO1 0</b>	<b>PO1 1</b>	<b>PO1 2</b>
<b>CO1</b>	--	--	3	--	2	2	--	--	--	1	2	--
<b>CO2</b>	--	--	3	--	2	2	--	--	--	1	2	--
<b>CO3</b>	--	--	3	--	2	2	--	--	--	1	2	--

<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UCY07</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

The main objective of the course is, students have to build the following:

- Ability to understand, analyze and denote time complexities of algorithms
- To introduce the different algorithmic approaches for problem solving through numerous example problems
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
- To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness

**Course Outcomes:**

After the completion of the course, student will be able to

- Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
- List and describe various algorithmic approaches and Solve problems using divide and conquer & greedy Method
- Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.
- Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches
- Demonstrate NP- Completeness theory ,lower bound theory and String Matching

**UNIT I:**

**Introduction:** Algorithm Definition, Algorithm Specification, performance Analysis, Performance measurement, asymptotic notation, Randomized Algorithms.

**UNIT II:**

**Divide and Conquer:** General Method, Defective chessboard, Binary Search, finding the maximum and minimum, Merge sort, Quick sort.

**The Greedy Method:** The general Method, knapsack problem, minimum-cost spanning Trees, Optimal Merge Patterns, Single Source Shortest Paths.

**UNIT III:**

**Dynamic Programming:** The general method, multistage graphs, All pairs-shortest paths, optimal Binary search trees, 0/1 knapsack, The traveling salesperson problem.

**UNIT IV:**

**Backtracking:** The General Method, The 8-Queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, knapsack problem.

**UNIT V:**

**NP-Hard and NP-Complete problems:** Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

**Text Books:**

1. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, “Fundamentals of Computer Algorithms”, 2<sup>nd</sup> Edition, Universities Press.
2. Introduction to Algorithms Thomas H. Cormen, PHI Learning
3. Harsh Bhasin, “Algorithms Design & Analysis”, Oxford University Press.

**Reference Books:**

1. Horowitz E. Sahani S: “Fundamentals of Computer Algorithms”, 2<sup>nd</sup> Edition, Galgotia Publications,2008.
2. S. Sridhar, “Design and Analysis of Algorithms”, Oxford University Press.

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UIT04</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>IoT Architecture and its Protocols</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course objectives:**

- 1.To introduce new technologies into internet of things
- 2.To understand the design methodologies
- 3.To gain knowledge on communication protocols
- 4.To understand the security aspects of IOT

**Course outcomes:**

1. Understand about M2M, SDN, NFV
2. Understand about different layered systems in iot and data management
3. understand about the different protocols in IOT
- 4.understand about internet connectivity principles and iot system management
- 5.understand about iot privacy, security, and vulnerabilities

**Unit-I**

**Introduction to IoT:** IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT, M2M Communication, Examples of IoT. **Learning Resource:** Text Book-1

**IoT and M2M:** M2M — Differences between IoT and M2M — Software Defined Networking (SDN) — Network Function Virtualization (NFV) — Difference between SDN and NFV.

**Learning Resource:** Text Book-2

**Unit-II**

**Design Principles for Connected Devices:** Introduction — IoT/M2M Systems Layers and Design Standardization — Communication Technologies — Data Enrichment, Data Consolidation and Device Management at Gateway — Ease of Designing and Affordability. **Learning Resource:** Text Book-1

**Unit-III**

**Web Communication Protocols:** Communication Environments — Constrained Application Protocol (CoAP) — Lightweight Machine-to-Machine Communication Protocol — JSON Format — MIME Type.

**Learning Resource:** Text Book-1

**Message Communication Protocols:** Introduction — CoAP-SMS Protocol — CoAP-MQ Protocol — MQTT Protocol — XMP Protocol.

**Learning Resource:** Text Book-1

**Unit-IV**

**Internet Connectivity Principles:** Internet Connectivity — Internet-based Communication — IPv6, LoWPAN and LoRaWAN — IP Addressing in the IoT — Media Access Control — Application Layer Protocols: HTTP, HTTPS, FTP and Telnet.

**Learning Resource:** Text Book-1

**IoT System Management:** Need for IoT System Management — Simple Network Management Protocol (SNMP) — NETCONF Protocol — YANG — IoT System Management with NETCONF-YANG and NETOPEER Tools.

**Learning Resource:** Text Book-2

**Unit-V**

**IoT Privacy, Security and Vulnerabilities Solutions:** Introduction — Privacy — Vulnerabilities of IoT Security Requirements — Threat Analysis — Use Cases and Misuse Cases — Security Tomography — Layered Attacker Model — Identity Management and Establishment — Access Control — Secure Message Communication — Security Models, Profiles and Protocols.

**Text Books**

1. Raj Kamal, "Internet of Things: Architecture and Design Principles", McGraw Hill Education, 2017.
2. Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2015.

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

**CO – PO MAPPINGS:**

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

<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UAI13</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>COMPUTER NETWORKS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- To provide insight about networks, topologies, and the key concepts.
- To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities.
- To understand the principles, key protocols, design issues, and significance of each layers in ISO and TCP/IP.
- To know the basic concepts of network services and various network applications.

**Course Outcomes:**

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

- CO1.** Demonstrate different network models for networking links OSI, TCP/IP, and get knowledge about various communication techniques, methods, protocol standards and Transmission media.
- CO2.** Discuss different ways to deal with transmission errors, regulating the flow of data and communication modes.
- CO3.** Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
- CO4.** Illustrate different routing mechanisms, routing algorithms and IP addressing methods.
- CO5.** Determine Transport layer services, application layer services and client server protocols working with the client server paradigms like WWW and e-mail.

**UNIT I:**

**Introduction:** Network Types, LAN, MAN, WAN, Network Topologies Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models.

**Physical Layer** –Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and unguided media: Wireless-Radio waves, microwaves, infrared.

**UNIT II:**

**Data link layer:** Design issues, **Framing:** fixed size framing, variable size framing, flow control, error control, Error detection and correction: Hamming code, CRC, Checksum: One's complement internet checksum, **Elementary Data Link Layer protocols:** Simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.

**Sliding window protocol:** One bit, Go back N, Selective repeat, Bit oriented protocol: HDLC.

**UNIT – III:**

**Media Access Control: Random Access:** ALOHA, Carrier sense multiple access (CSMA), CSMA with Collision Detection, **Controlled Access:** Reservation, Polling, Token Passing, **Channelization:** frequency division multiple Access (FDMA), time division multiple access (TDMA), code division multiple access(CDMA).

**Wired LANs:** Ethernet, Ethernet Protocol, Standard Ethernet, Fast Ethernet (100 Mbps), Gigabit Ethernet, 10 Gigabit Ethernet.

**UNIT – IV:**

**The Network Layer Design Issues** – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms- Shortest path, Flooding, Distance vector, Link state, Hierarchical, Congestion Control algorithms- General principles of congestion control, Congestion prevention policies, Approaches to Congestion Control- Admission Control- Choke packet and hop by hop choke packet.

**Internet Working:** How networks differ, how networks can be connected, Tunneling, Fragmentation, IP protocols, IPV4 Header Format, IP addresses, IPV6 header format, Internet control protocols- ICMP.

**UNIT –V:**

**The Transport Layer:** Internet Transport layer protocols: Introduction to User datagram protocol, User datagram format, Transmission control protocol: TCP introduction, TCP Segment format, TCP connection establishment, TCP connection release, TCP sliding window, TCP congestion control.

**Application Layer:** Introduction to DNS, Resource records, Name servers, E-mail: User agent, MIME. WWW: Architecture, URL, Web documents.

**Text Books:**

1. Computer Networks, Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
2. Data Communications and Networks, Behrouz A. Forouzan, Fifth Edition TMH.

**References Books:**

1. Data Communications and Networks- Achut S Godbole, AtulKahate
2. Computer Networks, Mayank Dave, CENGAGE

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

**CO – PO MAPPINGS:**

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



## Job Oriented Elective Subjects

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UIT10</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>NATURAL LANGUAGE PROCESSING</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web.

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

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms
- Able to design different language modeling Techniques.

**UNIT I:**

Finding the Structure of Words:

Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents:

Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

**UNIT II : Syntax Analysis:**

Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

**UNIT III : Semantic Parsing:**

Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

**UNIT IV:**

Predicate-Argument Structure, Meaning Representation Systems, Software.

Discourse Processing: Cohension, Reference Resolution, Discourse Cohesion and Structure

**UNIT V: Language Modeling:**

Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling

**Text Books:**

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

**Reference Books:**

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UIT07</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>COMPILER DESIGN</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:** Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.

1. Understanding different phases of compiler
2. Understanding syntax analysis, top down and LL(1) grammar
3. To understand and construct LR Parser
4. To understand syntax directed translation schemes
5. To generate code for target machine

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

- CO1. Demonstrate phases in the design of compiler
- CO2. Organize Syntax Analysis, Top Down and LL(1) grammars
- CO3. Design Bottom Up Parsing and Construction of LR parsers
- CO4. Analyze synthesized, inherited attributes and syntax directed translation schemes
- CO5. Determine algorithms to generate code for a target machine

#### UNIT I:

Language Processors, the structure of a compiler, the science of building a compiler, programming language basics. Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

#### UNIT II :

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Recursive and Non recursive top down parsers, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators.

#### UNIT III :

Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Back patching, Switch-Statements, Intermediate Code for Procedures.

#### UNIT IV:

Run-Time Environments: Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace Based Collection. Machine-Independent Optimizations: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial Redundancy Elimination, Loops in Flow Graphs.

#### UNIT V:

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target

Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator. Machine-dependent Optimizations: Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

Text Books:

- 1) Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson.
- 2) Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.

Reference Books:

- 1) Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
- 2) The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
- 3) Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition.

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UIT09</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>PRINCIPLES OF PROGRAMMING LANGUAGES</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

## Course Objectives:

- To understand and describe syntax and semantics of programming languages
- To understand data, data types, and basic statements
- To understand call-return architecture and ways of implementing them
- To understand object-orientation, concurrency, and event handling in programming languages
- To develop programs in non-procedural programming paradigms

## Course Outcomes:

- Describe the syntax and semantics of programming languages and gain practical knowledge in lexical analysis and parsing phases of a compiler
- Make use of different constructs in programming languages with merits and demerits
- Design and implement sub programs in various programming languages
- Developing the knowledge on different programming language features like object- orientation, concurrency, exception handling and event handling
- Analyzing functional paradigm and ability to write small programs using Scheme and ML and Develop programs logic paradigm and ability to write small programs using Prolog

## UNIT I:

Syntax and semantics: Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing.

## UNIT II :

Data, data types, and basic statements: Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and Boolean expressions, assignment statements, mixed mode assignments, control structures – selection, iterations, branching, guarded Statements.

## UNIT III :

Subprograms and implementations: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping.

## UNIT IV:

Object- orientation, concurrency, and event handling: Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, Monitors, message passing, threads, statement level concurrency, exception handling, event handling.

## UNIT V:

Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, Programming with ML

Logic programming languages: Introduction to logic and logic programming, Programming with Prolog, multi - paradigm languages.

## Text Books:

- 1) Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley, 2012.
- 2) Programming Languages, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH.

## Reference Books:

- 1) R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press, 2009.
- 2) Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall, 1998.
- 3) Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
- 4) W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UIT08</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>SOFTWARE ENGINEERING</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. Give exposure to phases of Software Development, common process models including Waterfall, and the Unified Process, and hands-on experience with elements of the agile process
2. Give exposure to a variety of Software Engineering practices such as requirements analysis and specification, code analysis, code debugging, testing, traceability, and version control
3. Give exposure to Software Design techniques

**COURSE OUTCOMES:**

- **CO1:** Able to Understand Conventional Methods
- **CO2:** Able to Understand Agile software methods.
- **CO3:** Able to Analyze and Build Requirements Model
- **C04:** Able to Elaborate and Build Design Model.
- **C05:** Able to Create Software Quality Assurance Tasks & Activities and Software Testing methods

**UNIT I:**

The Nature of Software, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths. A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology.

**UNIT II :**

Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, A Tool Set for the Agile Process, Software Engineering Knowledge, Core Principles, Principles That Guide Each Framework Activity, Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

**UNIT III :**

Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling, Requirements Modeling Strategies, Flow Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modelling, Requirements Modeling for Web Apps.

**UNIT IV:**

Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model, Software Architecture, Architectural Genres, Architectural Styles, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow, Components, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for Web Apps, Designing Traditional Components, Component-Based Development.

**UNIT V:**

The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Web App Interface Design, Design Evaluation, Elements of Software Quality Assurance, SQA Tasks, Goals & Metrics, Statistical SQA, Software Reliability, A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for

Web Apps, Validation Testing, System Testing, The Art of Debugging, Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing.

Text Books:

- 1) Software Engineering a practitioner's approach, Roger S. Pressman, Seventh Edition, McGraw Hill Higher Education.
- 2) Software Engineering, Ian Sommerville, Ninth Edition, Pearson.

Reference Books:

- 1) Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
- 2) Software Engineering, Ugrasen Suman, Cengage.

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

**CO – PO MAPPINGS:**

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



<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UIT05</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>COMPUTER GRAPHICS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- Understand the fundamental concepts and theory of computer graphics
- Understand modelling, and interactive control of 3D computer graphics applications
- The underlying parametric surface concepts be understood
- Learn multimedia authoring tools.

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

- Use the principles and commonly used paradigms and techniques of computer graphics
- Write basic graphics application programs including animation
- Design programs for 2-D display viewing
- Able to perform 3D- Object representation
- Able to perform 3D- Geometric transformations

## UNIT I:

**INTRODUCTION:** Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

## UNIT II :

**OUTPUT PRIMITIVES:** Points and lines, line drawing algorithms, mid-point circle algorithm, Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm. 2-D GEOMETRICAL TRANSFORMATIONS: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates

## UNIT III :

**2-D VIEWING :** The viewing pipe-line, viewing coordinate reference frame, window to view-port coordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland Hodge man polygon clipping algorithm.

## UNIT IV:

**3-D OBJECT REPRESENTATION:** spline representation, Hermit curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, Solid modeling Schalar's – wire frame, CSG, B-rep. Bezier and B-spline surfaces, Basic illumination models, shading algorithms

## UNIT V:

**3-D GEOMETRIC TRANSFORMATIONS:** Translation, rotation, scaling, reflection and shear transformation and composite transformations. Visible surface detection methods: Classification, back-face detection, depth buffer, scan-line, depth sorting

**COMPUTER ANIMATION:** Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification

## Text Books:

1. Computer Graphics C version/ Donald Hearn and M. Pauline Baker/Pearson/PHI
2. Computer Graphics Principles & practice-second edition in C/ Foley, Van Dam, Fisher and Hughes / Pearson Education

## Reference Books:

1. Computer Graphics Second edition/ Zhigandxiang, Roy Plastock, Schaum's outlines/Tata Mc-Graw hill edition.
2. Procedural elements for Computer Graphics/David F Rogers/Tata Mc Graw hill, 2nd edition.
3. Principles of Interactive Computer Graphics/ Neuman and Sproul/TMH.
4. Computer Graphics/ Steven Harrington/TMH

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UIT06</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>ADVANCED COMPUTER ARCHITECTURE</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- Understand the Concept of Parallel Processing and its applications
- Implement the Hardware for Arithmetic Operations
- Analyze the performance of different scalar Computers
- Develop the Pipelining Concept for a given set of Instructions
- Distinguish the performance of pipelining and non pipelining environment in a processor

**Course Outcomes:**

After the completion of the course, student will be able to

- Illustrate the types of computers, and new trends and developments in computer architecture
- Outline pipelining, instruction set architectures, memory addressing
- Apply ILP using dynamic scheduling, multiple issue, and speculation
- Illustrate the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges
- Apply multithreading by using ILP and supporting thread-level parallelism (TLP)

**UNIT I:**

Computer Abstractions and Technology: Introduction, Eight Great Ideas in Computer Architecture, Below Your Program, Under the Covers, Technologies for Building Processors and Memory, Performance, The Power Wall, The Sea Change: The Switch from Uni-processors to Multiprocessors, Benchmarking the Intel Core i7, Fallacies and Pitfalls.

**UNIT II :**

Instructions: Language of the Computer: Operations of the Computer Hardware, Operands of the Computer Hardware, Signed and Unsigned Numbers, Representing Instructions in the Computer, Logical Operations, Instructions for Making Decisions, Supporting Procedures in Computer Hardware, Communicating with People, MIPS Addressing for 32-Bit Immediates and Addresses, Parallelism and Instructions: Synchronization, Translating and Starting a Program, A C Sort Example to Put It All Together, Arrays versus Pointers, ARMv7 (32-bit) Instructions, x86 Instructions, ARMv8 (64-bit) Instructions.

**UNIT III :**

Arithmetic for Computers: Introduction, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Subword Parallelism, Streaming SIMD Extensions and Advanced Vector Extensions in x86, Subword Parallelism and Matrix Multiply.

## UNIT IV:

The Processor: Introduction, Logic Design Conventions, Building a Data path, A Simple Implementation Scheme, An Overview of Pipelining, Pipelined Datapath and Control, Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, The ARM Cortex-A8 and Intel Core i7 Pipelines.

## UNIT V:

Large and Fast: Exploiting Memory Hierarchy: Introduction, Memory Technologies, The Basics of Caches, Measuring and Improving Cache Performance, Dependable Memory Hierarchy, Virtual Machines, Virtual Memory, A Common Framework for Memory Hierarchy, Using a Finite-State Machine to Control a Simple Cache, Parallelism and Memory Hierarchies: Cache Coherence, Parallelism and Memory Hierarchy: Redundant Arrays of Inexpensive Disks, Advanced Material: Implementing Cache Controllers, The ARM Cortex-A8 and Intel Core i7 Memory Hierarchies.

## Text Books:

- 1) Computer Organization and Design: The hardware and Software Interface, David A Patterson, John L Hennessy, 5th edition, MK.
- 2) Computer Architecture and Parallel Processing – Kai Hwang, Faye A.Brigs, Mc Graw Hill.

## Reference Books:

1. Modern Processor Design: Fundamentals of Super Scalar Processors, John P. Shen and Miikko H. Lipasti, Mc Graw Hill.
- 2) Advanced Computer Architecture – A Design Space Approach – DezsoSima, Terence Fountain, Peter Kacsuk , Pearson.

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UCY13</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>NETWORK PROGRAMMING LAB</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>1.5</b>

**Course Objectives:**

- Understand and apply different network commands
- Analyze different networking functions and features for implementing optimal solutions Apply different networking concepts for implementing network solution
- Implement different network protocols

**Course Outcomes:**

- Apply the basics of Physical layer in real time applications
- Apply data link layer concepts, design issues, and protocols
- Apply Network layer routing protocols and IP addressing
- Implement the functions of Application layer
- Implement the functions Presentation layer paradigms and Protocols

**Experiments:**

- 1) Implement the data link layer framing methods such as character stuffing and bit stuffing.
- 2) Write a C program to develop a DNS client server to resolve the given hostname.
- 3) Implement on a data set of characters the three CRC polynomials – CRC-12, CRC-16 and CRC-CCIP.
- 4) Implement Dijkstra's algorithm to compute the Shortest path in a graph.
- 5) Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm
- 6) Take an example subnet of hosts. Obtain broadcast tree for it.
- 7) Write a client-server application for chat using UDP
- 8) Implement programs using raw sockets (like packet capturing and filtering)
- 9) Write a C program to perform sliding window protocol.
- 10) Get the MAC or Physical address of the system using Address Resolution Protocol.
- 11) Simulate the Implementing Routing Protocols using border gate way protocol (BGP)
- 12) Simulate the OPEN SHORTEST PATH FIRST routing protocol based on the cost assigned to the path.

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UIT11</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>Applications of IoT Lab</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>1.5</b>

**Course objectives**

1. students are able to understand about usage of Raspberry Pi IOT development board.
2. Students are able to understand components interfacing with Raspberry Pi.

**Course outcomes**

1. To introduce raspberry pi understand how Linux operates on PI
  2. Understand about interface of LEDs, motors, camera modules
  3. Understand about taking still picture and video with PI
  4. Understand about how PI connects with the internet
  5. understand about cloud connection with Pi
1. Getting started with Raspberry Pi, Install Raspian on SD card.
  2. Execute various Linux commands in command terminal window on Raspberry Pi: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.
  3. a. Light an LED through Python program.  
b. Get input from two switches and switch on corresponding LEDs.
  4. Controlling a DC Motor using Raspberry Pi.
  5. Controlling Servo Motors with a Raspberry Pi.
  6. Access an image through a Raspberry Pi web cam.
  7. Control a light source using web page.
  8. Implement an intruder system that sends an alert to the given email.
  9. Get an alarm from a remote area (through LAN) if smoke is detected.
  10. Sending Data to ThingSpeak Cloud using Raspberry Pi.

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UCY15</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>Web Application Development Using Full Stack -Frontend Development – Module -I</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>2</b>

**COURSE OBJECTIVES:**

- 1 To construct basic websites using HTML and Cascading Style Sheets.
2. To understand the concepts and architecture of the World Wide Web.
3. To understand markup languages
4. To gain the skills and project-based experience needed for entry into web application and development careers.
5. To Differentiate how various web markups and languages work together to create graphic and interactive web page elements.

**COURSE OUTCOMES:**

- **CO1:** Understand the basics of full stack web development
- **CO2:** Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
- **CO3:** Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's
- **CO4:** Create responsive web pages using HTML and Cascading Style Sheets.
- **CO5:** Understand, analyze and apply the role of languages like HTML,CSS in the workings of the web and web applications

Perform experiments related to the following concepts:

**A) HTML**

- 1) Introduction to HTML
- 2) Browsers and HTML
- 3) Editor's Offline and Online
- 4) Tags, Attribute and Elements
- 5) Doctype Element
- 6) Comments
- 7) Headings, Paragraphs ,and Formatting Text
- 8) Lists and Links
- 9) Images and Tables

**B) CSS**

- 1) Introduction CSS
- 2) Applying CSS to HTML
- 3) Selectors, Properties and Values
- 4) CSS Colours and Backgrounds
- 5) CSS Box Model
- 6) CSS Margins, Padding, and Borders

- 7) CSS Text and Font Properties
- 8) CSS General Topics

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

**CO – PO MAPPINGS:**

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



<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – I Semester</b>					
<b>Course Code</b>	<b>22UEN16</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>Employability Skills-II</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Course Objectives:**

The main objective of this course is to assist students in developing employability skills and personal qualities related to gaining and sustaining employment.

**Course Outcomes:** After completion of this course

- Solve various Basic Mathematics problems by following different methods
- Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems
- Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.
- Analyze, summarize and present information in quantitative forms including table, graphs and formulas

**UNIT I:**

**Numerical ability I:** Number system, HCF & LCM, Average, Simplification, Problems on numbers

**Numerical ability II:** Ratio & Proportion, Partnership, Percentages, Profit & Loss

**UNIT II:**

**Arithmetical ability I:** Problems on ages, Time & Work, Pipes & Cistern, Chain Rule.

**Arithmetical ability II:** Time & Distance, Problems on boats & Steams, Problems on Trains

**UNIT III:**

**Arithmetical ability III:** Allegation, Simple interest and compound interest, Races & Games of skills, Calendar and Clock,

**Logical ability:** Permutations and Combination and Probability.

**UNIT IV:**

**Mensuration:** Geometry, Areas, Volumes

**UNIT V:**

**Data interpretation:** Tabulation, Bar graphs, Pie charts, line graphs

**Text Books and Reference Books:**

1. R. S. Aggarwal “Quantitative Aptitude”, Revised ed., S Chand publication, 2017 ISBN:8121924987

**E- resources:**

1. [https://blog.feedspot.com/aptitude\\_youtube\\_channels/](https://blog.feedspot.com/aptitude_youtube_channels/)
2. [https://www.tutorialspoint.com/quantitative\\_apititude/](https://www.tutorialspoint.com/quantitative_apititude/)
3. <https://www.careerbless.com/aptitude/qa/home.php>

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>	<b>22UIT12</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>EMBEDDED SYSTEM DESIGN</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course objectives:**

- To introduce the Building Blocks of Embedded System
- To Educate in Various Embedded Development Strategies
- To Introduce Bus Communication in processors, Input/output interfacing.
- To impart knowledge in various processor scheduling and safety techniques
- To introduce Basics of Real time operating system and example tutorials to discuss on one real time operating system tool

**Course Outcomes:**

- Explain the functional blocks of an embedded system and its software development processes
- Explain the theoretical background and practical experience in the design and development of sophisticated embedded system
- Familiarize the importance of safety and reliability in Contemporary Embedded system design
- Describe the Embedded system design techniques for performance optimization
- Enumerate the knowledge of Embedded system in the areas of Distributed Embedded System

**UNIT I:**

**FUNDAMENTALS OF EMBEDDED SYSTEM** - Introduction of embedded system – Processor-Memory-Peripherals- Software Algorithms-Microcontroller-Microprocessor based – board based .Compilation Process in Embedded System: Compiling code-pre processor- compilation-linking and loading-Symbols, references and relocation-linker/loader. Debugging Techniques: High Level language simulation – low level simulation – onboard debugger – task level debugging – symbolic debug- Emulation.

**UNIT II :**

**HARDWARE SOFTWARE CO-DESIGN** Introduction and Motivation, Co-design Process Overview, Development Lifecycles - Specification, Modelling Tools and Languages, Techniques of Hardware Software Co - design -Partitioning, Co Simulation, Co-Synthesis, Co-Verification.

**UNIT III :**

**SAFETYANDRELIABILITY** Techniques, Proactive Approach - Software Solutions – Approaches, Hardware Solutions– Approaches, Steps to a Safe Design, Extreme Reliability - Long Life Applications, Critical Components, Dealing with Failure, Specification.

**UNIT IV:**

**OPTIMIZATION AND PERFORMANCE ANALYSIS** Introduction, Basic Measures, Real time Considerations – Hard, Soft, Firm , Time Loading – Simulation, Instrumentation, Response Time, Memory Loading, Performance Evaluation, Performance Optimization, Hardware Accelerators, Hardware Platforms - Microprocessors and FPGAS, Optimizing Power Consumption ,Trade-offs.

**UNIT V:**

**DISTRIBUTED SYSTEMS** Introduction, Local and Remote Models, Intra and Inter System Communication, Protocols, Error Management – Failure Detection, Reconfiguration, Recovery idempotent Systems, Pipes, Streams, and Sockets, Remote Services and Procedures, Design Issues, Synchronous and Asynchronous Procedures

## Text Books:

1. Steve Heath "Embedded Systems Design" Second Edition ,Elsevier.
2. Frank Vahid& Tony Givargis "Embedded System Design-A Unified Hardware/Software Introduction" Third Edition, John Wiley & Sons Inc.Reprint 2010.
3. Michael Barr & Anthony Massa "Programming Embedded Systems-with C & GNU Development tools" Second Edition, O'REILLY,Reprint-2007.
4. Arnold S.Berger "Embedded Systems Design", CMP Books

## Reference Books:

1. David E.Simon "An Embedded Software primer" Pearson Publication.

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

**CO – PO MAPPINGS:**

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

<b>Programme</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>	<b>22UIT13</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>MACHINE LEARNING</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- Identify problems that are amenable to solution by ML methods.
- Formalize a given problem in the language/framework of different ML methods and their solutions.

**Course Outcomes:** After the completion of the course, student will be able to

**CO1.** Understand Machine Learning system and statistical techniques.

**CO2.** Demonstrate various supervised learning techniques.

**CO3.** Analyze the Ensemble Learning Methods.

**CO4.** Illustrate the Clustering Techniques in Machine Learning.

**CO5.** Discuss Dimensionality reduction techniques and basic concepts of Neural networks.

**Unit I:**

**Introduction-** Artificial Intelligence, Machine Learning, Deep learning, Types of Machine Learning Systems, Main Challenges of Machine Learning.

**Statistical Learning:** Introduction, Supervised and Unsupervised Learning, Training and Test Loss, Tradeoffs in Statistical Learning, Estimating Risk Statistics, Sampling distribution of an estimator, Empirical Risk Minimization.

**Unit II:**

**Supervised Learning**(Regression/Classification):Basic Methods: Distance based Methods, Nearest Neighbours, Decision Trees, Naive Bayes, **Linear Models:** Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, **Binary Classification:** Multiclass/Structured outputs, MNIST, Ranking.

**Unit III:**

**Ensemble Learning and Random Forests:** Introduction, Voting Classifiers, Bagging and Pasting, Random Forests, Boosting, Stacking.

**Support Vector Machine:** Linear SVM Classification, Nonlinear SVM Classification SVM Regression, Naïve Bayes Classifiers.

**Unit IV:**

**Unsupervised Learning Techniques:** Clustering, K-Means, Limits of K-Means, Using Clustering for Image Segmentation, Using Clustering for Preprocessing, Using Clustering for Semi-Supervised Learning, DBSCAN, Gaussian Mixtures.

**Unit V:**

**Dimensionality Reduction and Neural networks:** The Curse of Dimensionality, Main Approaches for Dimensionality Reduction, PCA, Using Scikit-Learn, Randomized PCA, Kernel PCA, brief introduction to Artificial Neural Networks.

**Text Books:**

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition, O'Reilly Publications, 2019
2. Data Science and Machine Learning Mathematical and Statistical Methods, Dirk P. Kroese, Zdravko I. Botev, Thomas Taimre, Radislav Vaisman, 25th November 2020

**Reference Books:**

1. Machine Learning Probabilistic Approach, Kevin P. Murphy, MIT Press, 2012.

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

**CO – PO MAPPINGS:**

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

<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>	<b>22UIT14</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>WIRELESS SENSOR NETWORKS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course objectives :**

- To make students understand the basics of Wireless sensor Networks.
- To familiarize with learning of the Architecture of WSN.
- To understand the concepts of Networking and Networking in WSN.
- To study the design consideration of topology control and solution to the various problems.
- To introduce the hardware and software platforms and tool in WSN

**Course outcomes:**

- Understand challenges and technologies for wireless networks
- Understand architecture and sensors
- Describe the communication, energy efficiency, computing, storage and transmission
- Establishing infrastructure and simulations
- Explain the concept of programming the in WSN environment

**UNIT-I**

Introduction and overview of sensor network architecture and its applications, sensor network comparison with Ad Hoc Networks, Sensor node architecture with hardware and software details.

**Unit II**

**Hardware:** Examples like mica2, micaZ, telosB, cricket, Imote2, tmote, btnode, and Sun SPOT, Software (Operating Systems): tiny OS, MANTIS, Contiki, and RetOS.

**Unit III**

**Programming tools:** C, nesC. Performance comparison of wireless sensor networks simulation and experimental platforms like open source (ns-2) and commercial (QualNet, Opnet)

**Unit IV**

**Overview of sensor network protocols** (details of atleast 2 important protocol per layer): Physical, MAC and routing/ Network layer protocols, node discovery protocols, multi-hop and cluster based protocols, Fundamentals of 802.15.4, Bluetooth, BLE (Bluetooth low energy), UWB.

**Unit V**

Data dissemination and processing; differences compared with other database management systems, data storage; query processing.

**Specialized features:** Energy preservation and efficiency; security challenges; fault- tolerance, Issues related to Localization, connectivity and topology, Sensor deployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research, and Enabling technologies in wireless sensor network.

**TEXT BOOKS:**

1. H. Karl and A. Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, India, 2012.
2. C. S. Raghavendra, K. M. Sivalingam, and T. Znati, Editors, "Wireless Sensor Networks", Springer Verlag, 1<sup>st</sup> Indian reprint, 2010.

**REFERENCES:**

1. F. Zhao and L. Guibas, "Wireless Sensor Networks: An Information Processing Approach", Morgan Kaufmann, 1st Indian reprint, 2013.

2. YingshuLi, MyT. Thai, Weili Wu, “Wireless sensor Network and Applications”, Springer series on signals and communication technology,2008.

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

**CO – PO MAPPINGS:**

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

<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>	<b>22UIT15</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>CLOUD COMPUTING</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- To implement Virtualization
- To implement Task Scheduling algorithms
- Apply Map-Reduce concept to applications
- To build Private Cloud
- Broadly educate to know the impact of engineering on legal and societal issues involved

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

- Interpret the key dimensions of the challenge of Cloud Computing
- Examine the economics, financial, and technological implications for selecting cloud computing for own organization
- Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications
- Evaluate own organizations' needs for capacity building and training in cloud computing related IT areas
- Illustrate Virtualization for Data- Center Automation

**UNIT I:**

Introduction: Network centric computing, Network centric content, peer-to-peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing. Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, and model concurrency with Petri Nets.

**UNIT II :**

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing, Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, HPC on cloud.

**UNIT III :**

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades, Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feedback control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling.



## UNIT IV:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2), Cloud

Security: Cloud security risks, security – a top concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks.

## UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming ( Text Book 1), Google: Google App Engine, Google Web Toolkit (Text Book 2), Microsoft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

## Text Books:

- 1) Cloud Computing, Theory and Practice, 1st Edition, Dan C Marinescu, MK Elsevier publisher ,2013
- 2) Cloud Computing, A Practical Approach, 1st Edition, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH,2017

## Reference Books:

- 1) Mastering Cloud Computing, Foundations and Application Programming, 1st Edition, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH,2013
- 2) Essential of Cloud Computing, 1st Edition, K Chandrasekharan, CRC Press, 2014.  
Cloud Computing, A Hands on Approach, ArshdeepBahga, Vijay Madiseti, Universities Press, 2

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

**CO – PO MAPPINGS:**

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

<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>SOCIAL NETWORK AND SEMANTIC WEB</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

## Course Objectives:

Explain the fundamentals of Semantic Web technologies. Implementation of semantic web applications and the architectures of social networking Social network performance analysis

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

1. Understand the limitations of World wide web and concepts of Next generation web
2. Learn the various semantic web applications
3. Demonstrate the semantic web technologies like RDF Ontology and others
4. Identify the architectures and challenges in building social networks
5. Analyze the performance of social networks using electronic sources

## UNIT I:

Web Intelligence Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

## UNIT II :

Knowledge Representation for the Semantic Web Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema

## UNIT III :

Ontology Engineering, Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

## UNIT IV:

Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

## UNIT V:

Social Network Analysis and semantic web What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

Text Books:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley inter science, 2008.
1. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

Reference Books:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group).
3. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, O'Reilly.

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

**CO – PO MAPPINGS:**

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

<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>	<b>22UIT18</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>Advanced IoT Lab</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>1.5</b>

**Course objectives**

- 1.students are able to understand advanced technologies for the internet of things
- 2.students are able to understand NODE-Red open source programming tool

**Course outcomes**

- 1.understand about NODE MCU IOT platform with Arduino IDE
- 2.Understand about web connection with NODE-RED tool
- 3.Understand about usage of Message communication protocols
- 4.Understand about data logging with NODE-RED and Arduino
- 5.Understand about home automation and smart farming with different IOT platforms

**List of experiments**

1. Creating a simple ESP 8266 Node MCU web server in Arduino IDE for controlling LED.
2. IoT Based Temperature and Humidity Monitoring over Thing Speak using Arduino UNO and ESP8266.
3. ESP32 Data Logging to Google Sheets with Google Scripts.
4. Creating a Simple Web Dashboard with Node-RED.
5. Reading Analog Sensor using Arduino on Node-RED.
6. Data Logging with Node-RED and Arduino.
7. MQTT Broker Service (ESP32) on Node-RED with DHT11 Sensor Data.
8. IoT Monitoring System for Grain Storage with Node-RED and ESP8266.
9. Home Automation with Node-RED and Raspberry Pi.
10. Smart Urban Farming using Raspberry Pi, Arduino and Node-RED Platform.

Contribution of Course Outcomes (CO's) towards the achievement of program 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	2	1	2		3							
CO2	2		1		3							
CO3	1	2		1	3							
CO4	1		2	1	3							
CO5	2	2	2	1	3	2						



<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>	<b>22UIT17</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>MACHINE LEARNING LAB</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>1.5</b>

**Course Objectives:**

- The objective of this lab is to get an overview of the various machine learning techniques and Implement those using Python.

**Course Outcomes:**

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

- Understand complexity of Machine Learning algorithms and their limitations
- Understand modern notions in data analysis-oriented computing
- Perform experiments of Machine Learning Algorithms using real-world data

**Experiments:**

- The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
- Extract the data from database using python
- Implement k-nearest neighbors classification using python
- Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)  
VAR1 VAR2 CLASS  
1.713 1.586 0  
0.180 1.786 1  
0.353 1.240 1  
0.940 1.566 0  
1.486 0.759 1  
1.266 1.106 0  
1.540 0.419 1  
0.459 1.799 1  
0.7730.186 1
- The following training examples map descriptions of individuals onto high, medium and low creditworthiness.
  - medium skiing design single twenties no -> high Risk
  - high golf trading married forties yes -> low Risk
  - low speedway transport married thirties yes -> med Risk
  - medium football banking single thirties yes -> low Risk
  - high flying media married fifties yes -> high Risk
  - low football security single twenties no -> med Risk
  - medium golf media single thirties yes -> med Risk
  - medium golf transport married forties yes -> low Risk
  - high skiing banking single thirties yes -> high Risk
  - low golf unemployed married forties yes -> high Risk
Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf` and the conditional probability of `single` given `med Risk` in the dataset
- Implement linear regression using python.

7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

Text Books:

1. Machine Learning – Tom M. Mitchell, MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.

Reference Book:

1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

**Contribution of Course Outcomes (CO's) towards the achievement of program 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	2	3	2	2	1	3	3	2	3
CO2	3	3	3	2	3	2	2	1	3	3	2	3
CO3	3	2	3	2	3	2	2	1	3	3	2	3



**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IoT - UG – R22**

<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>	<b>22UCY23</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>Web Application Development Using Full Stack -Frontend Development – Module -II</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>2</b>

**COURSE OBJECTIVES:**

The objective of this lab is to build strong foundation of JavaScript which will help developer to apply JavaScript concepts for responsive web frontend development

**COURSE OUTCOMES:**

- **CO1:** Development of the major Web application tier- Client side development using Javascript.
- **CO2:** Participates in the active development of cross-browser applications through JavaScript
- **CO3:** Develop JavaScript applications that transition between states

Perform experiments related to the following concepts:

- 1) Introduction to JavaScript
- 2) Applying JavaScript (internal and external)
- 3) Understanding JS Syntax
- 4) Introduction to Document and Window Object
- 5) Variables and Operators
- 6) Data Types and Num Type Conversion
- 7) Math and String Manipulation
- 8) Objects and Arrays
- 9) Date and Time
- 10) Conditional Statements
- 11) Switch Case
- 12) Looping in JS
- 13) Functions

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

**CO – PO MAPPINGS:**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	3	3	3	2	3	-	-	2	3	3	2	3
<b>CO2</b>	3	3	3	2	3	-	-	2	3	3	2	3
<b>CO3</b>	2	2	3	2	3	-	-	2	3	3	2	3

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA  
(AUTONOMOUS)  
CSE - IoT - UG – R22**

<b>Program</b>	<b>CSE – INTERNET OF THINGS</b>					
<b>Year &amp; Sem</b>	<b>III Year – II Semester</b>					
<b>Course Code</b>	<b>22UEN15</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>Course Name</b>	<b>EMPLOYABILITY SKILLS-I</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Course Objectives:**

The main objective of this course is to assist students in developing employability skills and personal qualities related to gaining and sustaining employment.

**Course Outcomes:** The end of the course student will be able to

- Understand the corporate etiquette.
- Make presentations effectively with appropriate body language
- Be composed with positive attitude
- Understand the core competencies to succeed in professional and personal life

**UNIT I:**

**Analytical Thinking & Listening Skills:** Self-Introduction, Shaping Young Minds - A Talk by AzimPremji (Listening Activity), Self – Analysis, Developing Positive Attitude, Perception.

**Communication Skills:** Verbal Communication; NonVerbal Communication (Body Language)

**UNIT II:**

**Self-Management Skills:** Anger Management, Stress Management, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

**Etiquette:** Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

**UNIT III:**

**Standard Operation Methods:** Note Making, Note Taking, Minutes Preparation, Email & Letter Writing

**Verbal Ability:** Synonyms, Antonyms, One Word Substitutes-Correction of Sentences-Analogies, Spotting Errors, Sentence Completion, Course of Action -Sentences Assumptions, Sentence Arguments, Reading Comprehension, Practice work

**UNIT IV:**

**Job-Oriented Skills –I:** Group Discussion, Mock Group Discussions

**UNIT V:**

**Job-Oriented Skills –II:** Resume Preparation, Interview Skills, Mock Interviews

**Text Books and Reference Books:**

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.
3. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand& Company Ltd., 2018.
4. Raman, Meenakshi& Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

**ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA**  
**(AUTONOMOUS)**  
**CSE - IoT - UG – R22**

---

**e-resources:**

1. [www.Indiabix.com](http://www.Indiabix.com)
2. [www.freshersworld.com](http://www.freshersworld.com)