

# **COURSE STRUCTURE**

For

**B.Tech.**

**Electronics and Communication Engineering**

*(from 2024 Admitted batch onwards)*



**PRAGATI ENGINEERING COLLEGE**

**(An Autonomous Institution)**

ADB Road, Surampalem, Kakinada District, A.P.-533 437

**(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada)**

**(Recognized by UGC under sections 2 (f) and 12 (b) of UGC act, 1956)**



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(Autonomous)  
**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**COURSE STRUCTURE**

**INDUCTION PROGRAMME**

S.No.	Course Name	Category	L	T	P	Credits
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0	0	6	0
2	Career Counselling	MC	2	0	2	0
3	Orientation to all branches -- career options, tools, etc.	MC	3	0	0	0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2	0	3	0
5	Proficiency Modules & Productivity Tools	ES	2	1	2	0
6	Assessment on basic aptitude and mathematical skills	MC	2	0	3	0
7	Remedial Training in Foundation Courses	MC	2	1	2	0
8	Human Values & Professional Ethics	MC	3	0	0	0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2	1	2	0
10	Concepts of Programming	ES	2	0	2	0



## 2024-2025 Admitted Batch COURSE STRUCTURE I YEAR – I SEMESTER

## I YEAR – II SEMESTER

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<b>Course Category</b>	Humanities	<b>Course Code</b>	24BE101T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	2-0-0-2
<b>Prerequisites</b>	LSRW Skills.	<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

<b>1</b>	The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students.
<b>2</b>	It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary.
<b>3</b>	This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Understand the context, topic, and pieces of specific information from social or Transactional dialogues.	K2
CO2	Apply grammatical structures to formulate sentences and correct word forms.	K3
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions.	K4
CO4	Evaluate reading/listening texts and to write summaries based on glob	K5
CO5	Create a coherent paragraph, essay, and resume.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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## **COURSE CONTENT**

### **UNIT I**

#### **Lesson: HUMAN VALUES: Gift of Magi (Short Story)**

**Listening:** Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

**Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

**Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.

**Writing:** Mechanics of Writing- Capitalization, Spellings, Punctuation-Parts of Sentences.

**Grammar:** Parts of Speech, Basic Sentence Structures- forming questions.

**Vocabulary:** Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

### **UNIT II**

#### **Lesson: NATURE: The Brook by Alfred Tennyson (Poem)**

**Listening:** Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

**Speaking:** Discussion in pairs/ small groups on specific topics followed by short structure talks.

**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

**Writing:** Structure of a paragraph - Paragraph writing (specific topics)

**Grammar:** Cohesive devices – linkers, use of articles and zero article; Prepositions.

**Vocabulary:** Homonyms, Homophones, Homographs.

### **UNIT III**

#### **Lesson: BIOGRAPHY: ElonMusk**

**Listening:** Listening for global comprehension and summarizing what is listened to.

**Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed.

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

**Writing:** Summarizing, Note-making, paraphrasing.

**Grammar:** Verbs-tenses; subject-verb agreement; Compound words, Collocations.

**Vocabulary:** Compound words, Collocations.

### **UNIT IV**

#### **Lesson: INSPIRATION: The Toys of Peace by Saki**

**Listening :** Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

**Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

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

**Writing:** Letter Writing: Official Letters, Resumes

**Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice

**Vocabulary :** Words often confused, Jargons.



## **UNIT V**

**Lesson: MOTIVATION : The Power of Intrapersonal Communication (An Essay)**

**Listening:** Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

**Speaking:** Formal oral presentations on topics from academic contexts.

**Reading:** Reading comprehension.

**Writing:** Writing structured essays on specific topics.

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

**Vocabulary :** Technical Jargons.

## **TEXT BOOKS**

1. Path finder: Communicative English for Undergraduate Students, 1<sup>st</sup> Edition, Orient Black Swan, 2023. (Units1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023(Units4 &5).

## **REFERENCE BOOKS**

1. Dubey, Shamji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press,2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

## **WEB RESOURCES**

1. [www.bbc.co.uk/learningenglish](http://www.bbc.co.uk/learningenglish)
2. <https://dictionary.cambridge.org/grammar/british-grammar/>
3. [www.eslpod.com/index.html](http://www.eslpod.com/index.html)
4. <https://www.learngrammar.net/>
5. <https://english4today.com/english-grammar-online-with-quizzes/>
6. <https://www.talkenglish.com/grammar/grammar.aspx>

## **VOCABULARY**

1. <https://www.youtube.com/c/DailyVideoVocabulary/videos>
2. [https://www.youtube.com/channel/UC4cmBAit8i\\_NJZE8qK8sfpA](https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA)



## COURSE OBJECTIVES

## COURSE OUTCOMES

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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## **COURSE CONTENT**

### **UNIT I - Matrices:**

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, **System of linear equations:** Solving system of Homogeneous linear equations and solving Non-Homogeneous linear equations by Gauss elimination method, Gauss Jacobi and Gauss Seidel Iteration Methods.

### **UNIT II - Eigen values, Eigenvectors and Orthogonal Transformation:**

Eigen values, Eigenvectors and their properties, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Diagonalization of a matrix, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### **UNIT III - Calculus:**

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems. Taylor's and Maclaurin series.

### **UNIT IV - Partial differentiation and Applications (Multi variable calculus):**

**Functions of several variables:** Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

### **UNIT V - Multiple Integrals (Multi variable Calculus):**

Double integrals, change of order of integration, triple integrals, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

## **TEXT BOOKS**

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10<sup>th</sup> Edition.

## **REFERENCE BOOKS**

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5<sup>th</sup> Edition.
4. Advanced Engineering Mathematics, Michael Greenberg, , Pearson publishers, 9<sup>th</sup> edition.
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)
6. Advanced Engineering Mathematics by H. K Dass, S. Chand Publications, 2022, 22<sup>nd</sup> Edition (Reprint 2022).

## **WEB RESOURCES**

1. [https://en.wikipedia.org/wiki/System\\_of\\_linear\\_equations](https://en.wikipedia.org/wiki/System_of_linear_equations)
2. [https://en.wikipedia.org/wiki/Eigenvalues\\_and\\_eigenvectors](https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors)
3. <https://www.math.hmc.edu/calculus/tutorials/eigenstuff/>
4. [https://en.wikipedia.org/wiki/Quadratic\\_form](https://en.wikipedia.org/wiki/Quadratic_form)
5. <https://en.wikipedia.org/wiki/Calculus>
6. [https://en.wikipedia.org/wiki/Partial\\_derivative](https://en.wikipedia.org/wiki/Partial_derivative)
7. [https://www.whitman.edu/mathematics/calculus\\_online/section14.03.html](https://www.whitman.edu/mathematics/calculus_online/section14.03.html)
8. [https://en.wikipedia.org/wiki/Multiple\\_integral](https://en.wikipedia.org/wiki/Multiple_integral)
9. <http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx>



**I Year I Semester**  
**CHEMISTRY**  
(Common to ECE, CSE (AIML) CSE (DS) CSE(CS) and IT)

<b>Course Category</b>	Basic Sciences	<b>Course Code</b>	24BC201T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	3-0-0-3
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

<b>1</b>	To familiarize chemistry and its applications
<b>2</b>	To train the students on the principles and applications of electrochemistry and polymers
<b>3</b>	To introduce instrumental methods and to explain the Green Principles and applications

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		<b>Cognitive Level</b>
<b>CO1</b>	To introduce the quantum mechanical concepts of measurements for physical systems	K2
<b>CO2</b>	Apply the principle of Band diagrams in the application of conductors and semiconductors	K2
<b>CO3</b>	Compare the materials of construction for battery and electrochemical sensors	K2
<b>CO4</b>	Explain the preparation, properties, and applications of thermoplastics & Thermosetting & elastomers conducting polymers.	K3
<b>CO5</b>	Summarize the concepts of Instrumental methods.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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



## **COURSE CONTENT**

### **UNIT -I**

#### **Structure and Bonding Models:**

*Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of  $\Psi$  and  $\Psi^2$ . Molecular orbital theory – bonding in homo- and hetero nuclear diatomic molecules – energy level diagrams of  $O_2$  and  $CO$ , etc.  $\pi$ -molecular orbital of benzene, calculation of bond order.*

### **UNIT - II**

#### **Modern Engineering materials**

Semiconductors – Introduction, types and applications.

Super Conductors-Introduction, types and applications.

Super capacitors: Introduction, Classification–Applications.

*Nano materials: Introduction, classification, properties and applications of Fullerenes, Carbon Nano tubes- Arc-Discharge & Chemical Vapour deposition method and Graphines Nano particles.*

### **UNIT - III**

#### **Electrochemistry and Applications**

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry-potentiometric titrations (red ox titrations), concept of conductivity, conductivity cell, conduct metric titrations (acid-base titrations).

*potentiometric sensors with examples. Reference electrodes: Normal Hydrogen Electrode(NHE) and Calomel Electrode. Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells- hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC)*

### **UNIT - IV**

#### **Polymer Chemistry**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation. Free radical, Cationic and Anionic Mechanisms.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of

– PVC, Teflon, Bakelite, Nylon-6,6, Urea-Formaldehyde resin. Elastomers –Buna-S, Buna-N–preparation, properties and applications.

*Conducting polymers – Types, Polyacetylene, – Mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).*

### **UNIT -V**

#### **Instrumental Methods its Applications and Non-conventional energy sources and Green Chemistry**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV Visible Spectroscopy electronic transition, Instrumentation, IR spectroscopy, fundamental modes and selection rules, Chromatography-Basic Principles,

Non-conventional energy sources: Solar energy- introduction to PV cell / Solar cell- construction, working and applications. Hydro power plant and Geo-thermal energy.

Green chemistry: Principles and applications.



### **TEXT BOOKS**

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

### **REFERENCE BOOKS**

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5<sup>th</sup> Edition, Wiley Publications, Feb. 2008
3. Text book of Polymer Science, Fred W. Billmeyer Jr, 3<sup>rd</sup> Edition

### **WEB RESOURCES**

#### ***UNIT -I***

**Structure and Bonding Models:** <https://archive.nptel.ac.in/courses/104/106/104106096/>

#### ***UNIT - II***

**Modern Engineering materials :** <https://nptel.ac.in/courses/118/104/008>

#### ***UNIT - III***

**Electrochemistry and Applications:** <https://archive.nptel.ac.in/courses/113/105/113105102/>

#### ***UNIT - IV***

**Polymer Chemistry :** <https://archive.nptel.ac.in/courses/104/105/104105124/>

#### ***UNIT -V***

**Instrumental Methods & Applications:** [https://onlinecourses.nptel.ac.in/noc22\\_cy45/preview](https://onlinecourses.nptel.ac.in/noc22_cy45/preview)



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(Autonomous)  
**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year I Semester**  
**BASIC CIVIL AND MECHANICAL ENGINEERING**  
(Common to ECE, CSE (AIML) CSE (DS) CSE(CS) and IT)

<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24CM101T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	3-0-0-3
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**PART-A : BASIC CIVIL ENGINEERING**

<b>COURSE OBJECTIVES</b>	
<b>1</b>	Get familiarized with the scope and importance of Civil Engineering sub-divisions
<b>2</b>	Introduce the preliminary concepts of surveying.
<b>3</b>	Acquire preliminary knowledge on Transportation and its importance in nation's economy.
<b>4</b>	Get familiarized with the importance of quality, conveyance and storage of water.
<b>5</b>	Introduction to basic civil engineering materials and construction techniques.

<b>COURSE OUTCOMES</b>		
<b>Upon successful completion of the course, the student will be able to:</b>		<b>Cognitive Level</b>
<b>CO1</b>	Enlist various basic characteristics and sub-divisions of Civil Engineering, pre-fabricated materials and technology to appreciate their role in ensuring better society.	K2
<b>CO2</b>	Illustrate the concepts of surveying and basics of Foundation Engineering.	K3
<b>CO3</b>	Know the significance of various domains in transportation engineering and be acquitted with types of pavements. Get an overview about Environmental Engineering and Water Resource Engineering.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

<b>Contribution of Course Outcomes towards achievement of Program Outcomes</b> (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	1
CO3	1	1	1	-	-	2	-	-	1	-	-	1



## **COURSE CONTENT**

### **UNIT I**

**Basics of Civil Engineering:** Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering -Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement- Aggregate -Bricks-Stones-Sand-Cement Concrete-Steel-Timber. Introduction to Prefabricated construction Techniques.

### **UNIT II**

**Surveying :** Objectives of Surveying- Horizontal Measurements- Angular MeasurementsIntroduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.

**Foundations:** Types of foundations — Bearing capacity and settlement — Requirement of good foundations.

### **UNIT III**

**Transportation Engineering:** Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.

**Water Resources and Environmental Engineering:** Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

### **TEXT BOOKS**

1. Basic Civil Engineering, M.S.Palanisamy, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, SatheeshGopi, Pearson Publications, 2009, First Edition.

### **REFERENCE BOOKS**

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

### **WEB RESOURCES**

1. <https://nptel.ac.in/courses/105101087>
2. <https://nptel.ac.in/courses/105104101>
3. <https://nptel.ac.in/courses/105104103>



**PART – B: BASIC MECHANICAL ENGINEERING**

<b>COURSE OBJECTIVES</b>	
<b>1</b>	Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
<b>2</b>	Explain different engineering materials and different manufacturing processes.
<b>3</b>	Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

<b>COURSE OUTCOMES</b>		
Upon successful completion of the course, the student will be able to:		Cognitive Level
<b>CO1</b>	Understand the different manufacturing processes.	K2
<b>CO2</b>	Explain the basics of thermal engineering and its applications.	K3
<b>CO3</b>	Describe the working of different mechanical power transmission systems, power plants and basics of robotics and its applications.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

<b>Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)</b>												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	-	-	-	-	-	-	-	-	-	2	-

**COURSE CONTENT**

**UNIT –I -**

**Introduction to Mechanical Engineering:** Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

**Engineering Materials** - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

**UNIT - II**

**Manufacturing Processes:** Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

**Thermal Engineering** – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

**UNIT - III**

**Power plants** – working principle of Steam, Diesel, Hydro, Nuclear power plants.

**Mechanical Power Transmission** - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

**Introduction to Robotics** - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

**Textbooks:**

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A Text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

**Reference Books:**

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I.
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications.
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

**Web References:**

1. <https://ocw.mit.edu/courses/2-000-how-and-why-machines-work-spring-2002/>
2. <https://ocw.mit.edu/courses/2-008-design-and-manufacturing-ii-spring-2004/>
3. <https://ocw.mit.edu/courses/2-12-introduction-to-robotics-fall-2005/>



**I Year I Semester**  
**INTRODUCTION TO PROGRAMMING**  
(Common to All Branches)

<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24CS101T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	3-0-0-3
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

<b>1</b>	To introduce students to the fundamentals of computer programming.
<b>2</b>	To provide hands-on experience with coding and debugging.
<b>3</b>	To foster logical thinking and problem-solving skills using programming.
<b>4</b>	To familiarize students with programming concepts such as data types, control structures, functions and arrays.
<b>5</b>	To encourage collaborative e learning and team work in coding projects.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to :		<b>Cognitive Level</b>
<b>CO1</b>	Understand basics of computers, the concept of algorithm and algorithmic thinking.	K3
<b>CO2</b>	Analyze a problem and develop an algorithm to solve it.	K4
<b>CO3</b>	Implement various algorithms using the C programming language.	K5
<b>CO4</b>	Understand more advanced features of C language.	K3
<b>CO5</b>	Develop problem-solving skills and the ability to debug and optimize the code.	K4

K1-Remembering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6-Creating

**Contribution of Course Outcome towards achievement of Program Outcomes (1– Low, 2 -Medium, 3– High)**

<b>CO</b>	<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	3	1	-	-	-	-	-	-	-
<b>CO2</b>	3	3	3	3	1	-	-	-	-	-	-	-
<b>CO3</b>	3	3	3	2	1	-	-	-	-	-	-	-
<b>CO4</b>	2	3	3	3	1	-	-	-	-	-	-	-
<b>CO5</b>	3	3	3	3	1	-	-	-	-	-	-	-



## **COURSE CONTENT**

### **UNIT-I**

#### **Introduction to Programming and Problem Solving**

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables and Constants, Basic Input and Output, Operations, Type Conversion and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

### **UNIT-II**

#### **Control Structures**

Simple sequential programs, Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue, Programming Examples.

### **UNIT-III**

#### **Arrays and Strings**

Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Arrays Applications, Introduction to Strings, String input and output functions, String handling functions.

### **UNIT-IV**

#### **Pointers & User Defined Data types**

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

### **UNIT-V**

#### **Functions & File Handling**

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Life time of Variables, Storage Classes, Basics of File Handling.

**Note:** The syllabus is designed with C Language as the fundamental language of implementation.

### **TEXTBOOKS**

1. "The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice-Hall, 2005, 2<sup>nd</sup> Edition
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 4<sup>th</sup> edition, 2018

### **REFERENCEBOOKS**

1. Computing fundamentals and C Programming, Balaguruswamy, E., Mc Graw-Hill Education, 7<sup>th</sup> Edition, 2017
2. Programming in C, Rema Theraja, Oxford, 2016, 2<sup>nd</sup> edition
3. C Programming, A Problem Solving Approach, Forouzan, Gilbert, Prasad, CENGAGE, 3<sup>rd</sup> edition, 2009

### **WEB RESOURCES**

1. <http://nptel.ac.in/courses/106104128/>
2. <http://students.iitk.ac.in/programmingclub/course/#notes>
3. <http://c-faq.com/~scs/cclass/cclass.html>



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(Autonomous)  
**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year I Semester**  
**ENGINEERING WORKSHOP**  
(Common to ECE, CSE (AIML), CSE (DS) CSE (CS) and IT)

<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24ME102P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-3-1.5
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		<b>Cognitive Level</b>
<b>CO1</b>	Identify workshop tools and their operational capabilities.	K2
<b>CO2</b>	Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.	K3
<b>CO3</b>	Apply knowledge in preparation of pipe joints and practice of Plumbing tools.	K3
<b>CO4</b>	Apply basic electrical engineering knowledge for House Wiring Practice	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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



## **COURSE CONTENT**

1. **Demonstration:** Safety practices and precautions to be observed in workshop.
  2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.  
a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
  3. **Sheet Metal Working:** Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.  
a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
  4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.  
a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tire
  5. **Electrical Wiring:** Familiarity with different types of basic electrical circuits and make the following connections.  
a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires
  6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
  7. **Welding Shop:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
  8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
- Note:** Minimum of 12 Experiments to be conducted from the above covering all the trades.

### **Textbooks:**

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuvanshi, Dhanpath Rai & Co., 2015 & 2017.

### **Reference Books:**

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

**I Year I Semester**  
**COMMUNICATIVE ENGLISH LABORATORY**  
**(Common to ECE, CSE (AIML) CSE (DS) CSE (CS) and IT)**

<b>Course Category</b>	Humanities	<b>Course Code</b>	24BE101P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-2-1
<b>Prerequisites</b>	LSRW Skills	<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

COURSE OBJECTIVES	
1	The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning.
2	The students will get trained in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Understand the different aspects of the English language proficiency with emphasis on LSRW skills.	K2
CO2	Apply communication skills through various language learning activities.	K3
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.	K4
CO4	Evaluate and exhibit professionalism in participating in debates and group discussions.	K5
CO5	Able to present ideas effectively and manage interviews confidently.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-



## **COURSE CONTENT**

### **UNIT - I**

Vowels & Consonants.  
Neutralization/Accent Rules.

### **UNIT - II**

Communication Skills & JAM.  
Role Play or Conversational Practice.

### **UNIT - III**

E-mail Writing.  
Resume Writing, Cover letter, SOP.

### **UNIT - IV**

Group Discussions-methods & practice.  
Debates-Methods & Practice.

### **UNIT - V**

PPT Presentations/ Poster Presentation.  
Interviews Skills.

### **Laboratory Manual Lab Book**

1. Strengthen Your Steps: A Multi-Model Course in Communication Skills published by Maruti Publications

## **REFERENCE BOOKS**

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw- Hill Education India,2016
3. Hewing's, Martin. Cambridge Academic English (B2).CUP,2012.
4. J.Sethi & P.V.Dhamija. A Course in Phonetics and Spoken English,(2<sup>nd</sup>Ed),Kindle, 2013

## **WEB RESOURCES**

### **Spoken English:**

1. [www.esl-lab.com](http://www.esl-lab.com)
2. [www.englishmedialab.com](http://www.englishmedialab.com)
3. [www.englishinteractive.net](http://www.englishinteractive.net)
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. [https://www.youtube.com/c/mmmEnglish\\_Emma/featured](https://www.youtube.com/c/mmmEnglish_Emma/featured)
7. <https://www.youtube.com/c/ArnelsEverydayEnglish/featured>
8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. [https://www.youtube.com/channel/UCV1h\\_cBE0Drdx19qkTM0WNw](https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw)

### **Voice & Accent:**

1. <https://www.youtube.com/user/letstalkaccent/videos>
2. <https://www.youtube.com/c/EngLanguageClub/featured>
3. [https://www.youtube.com/channel/UC\\_OskgZBoS4dAnVUgJVexc](https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc)
4. [https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp\\_IA](https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA)

### **Suggested Software:**

1. Walden Infotech
2. Young India Films



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**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year I Semester**  
**COMPUTER PROGRAMMING LABORATORY**  
(Common to All Branches)

<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24CS101P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-3-1.5
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

The course aims to give students hands-on experience and train the students on the concepts of the C-programming language.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		Cognitive Level
<b>CO1</b>	Read, understand, and trace the execution of programs written in C language.	K3
<b>CO2</b>	Select the right control structure for solving the problem.	K3
<b>CO3</b>	Develop C programs which utilize memory efficiently using programming Constructs like pointers.	K3
<b>CO4</b>	Develop, Debug and Execute programs to demonstrate the Applications of arrays, functions, basic concepts of pointer in C.	K5

K1-Remembering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6-Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1- Low, 2 -Medium, 3- High)

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



## **COURSE CONTENT**

### **WEEK 1**

**Objective:** Getting familiar with the programming environment on the computer and writing the first program.

**Suggested Experiments/Activities:**

**Tutorial 1 :** Problem-solving using Computers.

**Lab1:** Familiarization with programming environment

- i. Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- ii. Exposure to Turbo C, gcc
- iii. Writing simple programs using printf(), scanf()

### **WEEK 2**

**Objective:** Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

**Suggested Experiments/Activities:**

**Tutorial 2:** Problem-solving using Algorithms and Flowcharts.

**Lab 2:** Converting algorithms /flowcharts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

- i) Sum and average of 3 numbers
- ii) Conversion of Fahrenheit to Celsius and vice versa
- iii) Simple interest calculation

### **WEEK 3**

**Objective:** Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

**Suggested Experiments/Activities:**

**Tutorial 3:** Variable types and type conversions:

**Lab3:** Simple computational problems using arithmetic expressions.

- i) Finding the square root of a given number
- ii) Finding compound interest
- iii) Area of a triangle using heron's formulae
- iv) Distance travelled by an object

### **WEEK4**

**Objective :** Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

**Suggested Experiments/Activities:**

**Tutorial 4:** Operators and the precedence and as associatively:

**Lab 4:** Simple computational problems using the operator's precedence and associatively

- i) Evaluate the following expressions.
  - a.  $A+B*C+(D*E)+F*G$
  - b.  $A/B*C-B+A*D/3$
  - c.  $A+++B---A$
  - d.  $J=(i++)+(++i)$
- ii) Find the maximum of three numbers using conditional operator
- iii) Take marks of 5 subjects in integers, and find the total, average in float

### **WEEK5**

**Objective:** Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if\*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

**Suggested Experiments/Activities:**

**Tutorial 5:** Branching and logical expressions:

**Lab 5:** Problems involving if-then-else structures.

- i) Write a C program to find whether a number is odd or even using if-else.
- ii) Write a C program to generate electricity bill.
- iii) Find the roots of the quadratic equation.
- iv) Write a C program to simulate a calculator using switch case.
- v) Write a C program to find the given year is a leap year or not.



#### **WEEK6**

**Objective :** Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

#### **Suggested Experiments/Activities:**

**Tutorial 6:** Loops, while and for loops

**Lab 6:** Iterative problems e.g., the sum of series

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) Computes in e and cos series
- iv) Checking a number palindrome
- v) Construct a pyramid of numbers.

#### **WEEK7**

**Objective:** Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

#### **Suggested Experiments/Activities:**

**Tutorial 7:** 1D Arrays: searching.

**Lab 7:** 1D Array manipulation, linear search

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 1 D array.
- iii) Reverse of a 1 D integer array
- iv) Find 2's complement of the given binary number.
- v) Eliminate duplicate elements in an array.

#### **WEEK8**

**Objective:** Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

#### **Suggested Experiments/Activities:**

**Tutorial 8:** 2 D arrays, sorting and Strings.

**Lab 8:** Matrix problems, String operations, Bubble sort

- i) Addition of two matrices
- ii) Multiplication two matrices
- iii) Sort array elements using bubble sort
- iv) Concatenate two strings without built-in functions
- v) Reverse a string using built-in and without built-in string functions

#### **WEEK9**

**Objective:** Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

#### **Suggested Experiments/Activities:**

**Tutorial 9:** Pointers, structures and dynamic memory allocation

**Lab 9:** Pointers and structures, memory dereference.

- i) Write a C program to find the sum of a 1D array using malloc()
- ii) Write a C program to find the total, average of n students using structures
- iii) Enter students data using calloc() and display failed students list
- iv) Read student name and marks from the command line and display the student details along with the total.
- v) Write a C program to implement realloc ()

#### **WEEK10**

**Objective :** Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

#### **Suggested Experiments/Activities:**

**Tutorial 10:** Bit fields, Self-Referential Structures, Linked lists

**Lab 10:** Bit fields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields

- i) Create and display a singly linked list using self-referential structure.
- ii) Demonstrate the differences between structures and unions using a C program.
- iii) Write a C program to shift/rotate using bit fields.
- iv) Write a C program to copy one structure variable to another structure of the same type.



### WEEK 11

**Objective:** Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

**Suggested Experiments/Activities:**

**Tutorial 11:** Functions, call by value, scope and extent,

**Lab 11:** Simple functions using call by value, solving differential equations using Eulers theorem.

- i) Write a C function to calculate NCR value.
- ii) Write a C function to find the length of a string.
- iii) Write a C function to transpose of a matrix.
- iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

### WEEK 12

**Objective:** Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

**Suggested Experiments/Activities:**

**Tutorial 12:** Recursion, the structure of recursive calls

**Lab12:** Recursive functions

- i) Write a recursive function to generate Fibonacci series.
- ii) Write a recursive function to find the lcm of two numbers.
- iii) Write a recursive function to find the factorial of a number.
- iv) Write a C Program to implement Ackermann function using recursion.
- v) Write a recursive function to find the sum of series.

### WEEK13

**Objective:** Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

**Suggested Experiments/Activities:**

**Tutorial 13:** Call by reference, dangling pointers

**Lab 13:** Simple functions using Call by reference, Dangling pointers.

- i) Write a C program to swap two numbers using call by reference.
- ii) Demonstrate Dangling pointer problem using a C program.
- iii) Write a C program to copy one string into another using pointer.
- iv) Write a C program to find no of lower case, uppercase, digits and other characters using pointers.

### WEEK14

**Objective :** To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

**Suggested Experiments/Activities:**

**Tutorial 14:** File handling

**Lab 14:** File operations

- i) Write a C program to write and read text into a file.
- ii) Write a C program to write and read text into a binary file using `f read()` and `f write()`
- iii) Copy the contents of one file to another file.
- iv) Write a C program to merge two files into the third file using command-line arguments.
- v) Find no. of lines, words and characters in a file
- vi) Write a C program to print last n characters of a given file.

### TEXT BOOKS

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGrawHill

### REFERENCEBOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

### WEB RESOURCES

1. [https://www.researchgate.net/publication/322908864\\_C\\_Programming\\_Lab\\_Manual](https://www.researchgate.net/publication/322908864_C_Programming_Lab_Manual)
2. <https://www.javatpoint.com/c-programs>



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
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**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year I Semester**  
**CHEMISTRY LABORATORY**  
(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)

<b>Course Category</b>	Basic Sciences	<b>Course Code</b>	24BC102P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-2-1
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

Verify the fundamental concepts with experiments.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		Cognitive Level
<b>CO1</b>	Determine the cell constant and conductance of solutions.	K3
<b>CO2</b>	Prepare advanced polymer Bakelite materials.	K2
<b>CO3</b>	Estimate the given amount of dissolved compounds in a solution by using volumetric analysis and preparation of Nano particles	K3
<b>CO4</b>	Analyze the IR spectra of some organic compounds.	K4
<b>CO5</b>	Determine the concentration of different metal ions present in water by complex metric titrations.	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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

**List of Experiments:**

1. Determination of Hardness of a groundwater sample
2. Conduct metric titration of strong acid vs. strong base
3. Conduct metric titration of weak acid vs. strong base
4. Preparation of Nano particles. (Cu/Zn)
5. Determination of Vitamin-C
6. Estimation of  $\text{KMnO}_4$  by using standard oxalic acid solution
7. Preparation of Phenol-formaldehyde resin (Bakelite)
8. Determination of total alkalinity of given sample of water
9. Wave length measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nano materials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

**Reference:**

"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
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**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year I Semester**  
**HEALTH AND WELLNESS, YOGA AND SPORTS**  
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

<b>Course Category</b>	Humanities	<b>Course Code</b>	24MH101P
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	0-0-1-0.5
<b>Prerequisites</b>		<b>Continuous Evaluation</b>	90
		<b>Viva Voce</b>	10
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		
<b>CO1</b>	Understand the importance of yoga and sports for physical fitness and sound health.	
<b>CO2</b>	Demonstrate an understanding of health-related fitness components.	
<b>CO3</b>	Compare and contrast various activities that help enhance their health.	
<b>CO4</b>	Assess current personal fitness levels.	
<b>CO5</b>	Develop Positive Personality	

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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



## **COURSE CONTENT**

**UNIT – I:** Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

### **Activities:**

- i) Organizing health awareness programmes in community
- ii) Preparation of health profile
- iii) Preparation of chart for balance diet for all age groups

**UNIT – II:** Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asana as- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

### **Activities:**

Yoga practices Asana, Kriya, Mudra, Bandha, Dhyana, SuryaNamaskar

**UNIT – III:** Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Common wealth games.

### **Activities:**

- i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.  
Practicing general and specific warm up, aerobics
- ii) Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

### **Reference Books:**

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc. 2014

### **General Guidelines:**

1. Institutes must assign slots in the Time table for the activities of Health/Sports/Yoga.
2. Institutes must provide field /facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

### **Evaluation Guidelines:**

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.





## **COURSE CONTENT**

### **UNIT – I -WAVE OPTICS**

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

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

### **UNIT - II - CRYSTALLOGRAPHY AND X-RAY DIFFRACTION**

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

**X - ray diffraction:** Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

### **UNIT – III - DIELECTRIC AND MAGNETIC MATERIALS**

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - 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.

### **UNIT – IV - QUANTUM MECHANICS AND FREE ELECTRON THEORY**

Quantum Mechanics: Introduction-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: Introduction-Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

### **UNIT - V - BAND THEORY OF SOLIDS & SEMICONDUCTOR PHYSICS**

#### **BAND THEORY OF SOLIDS**

Bloch's Theorem (Qualitative) - Kronig Penny Model(Qualitative)-E vs K diagram-V vs K diagram, Effective mass of electron- Classification of Crystalline Solids-Concept of hole

#### **SEMICONDUCTOR PHYSICS**

Semiconductors: Introduction-Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.



### **TEXT BOOKS**

“A Text book of Engineering Physics” by M.N.Avadhanulu, P.G.Kshir sagar -S.Chand Publications,  
“Engineering Physics” by Tirupati Naidu & Veeranjanyalu, V G S Publishers  
“Engineering Physics” by P.K Palanisamy, Sci Tech Publication

### **REFERENCE BOOKS**

Kettles Introduction to Solid state Physics-Charles Kittel, Wiley India Edition  
Solid State Physics ,AJ Dekker, I Edition, Macmillan Publishers India Private Limited  
“Engineering Physics” by M.R.Srinivasan, New Age international publishers.  
“Solid State Physics” by SO Pilai., - New age International Publishers

### **WEB RESOURCES**

Web Resources: <https://www.loc.gov/rr/scitech/selected-internet/physics.html>  
Unit I: <https://nptel.ac.in/courses/122/107/122107035/#>  
Unit II: <https://nptel.ac.in/courses/113/104/113104014/>  
Unit III: <https://nptel.ac.in/courses/113/104/113104090/>  
<https://youtu.be/DDLljK1ODeg>  
Unit IV : <https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.html>  
<https://nptel.ac.in/courses/115/101/115101107/>  
<https://nptel.ac.in/courses/115/105/115105122/>  
Unit V : [https://www.electronics-tutorials.ws/diode/diode\\_1.html](https://www.electronics-tutorials.ws/diode/diode_1.html)  
<https://nptel.ac.in/courses/115/105/115105099/>  
<https://nptel.ac.in/courses/108/108/108108122/>

**I Year II Semester**  
**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**  
**(Common to All Branches)**



## **COURSE CONTENT**

### **UNIT I**

#### **Differential equations of first order and first degree:**

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- Electrical circuits.

### **UNIT II**

#### **Linear differential equations of higher order (Constant Coefficients):**

Definitions, homogenous and non-homogenous differential equations, complimentary function, particular integral, general solution, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

### **UNIT III**

#### **Partial Differential Equations:**

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients

### **UNIT IV**

#### **Vector differentiation:**

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient and applications, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

### **UNIT V**

#### **Vector integration:**

Line integral-circulation-work done by the force, Scalar potential, surface integral-flux, Green's theorem in a plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

## **TEXT BOOKS**

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

## **REFERENCE BOOKS**

1. Thomas Calculus, George B.Thomas, Maurice D.Weir and JoelHass, Pearson Publishers,2018, 14th Edition.
2. Advanced Engineering Mathematics, DennisG.Zill andWarrenS.Wright, Jones and Bartlett,2018.
3. Advanced Modern Engineering Mathematics,GlynJames, Pearson publishers, 2018,5th Edition.
4. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint)
5. Higher Engineering Mathematics, B.V.Ramana,, McGraw HillEducation,2017
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22<sup>nd</sup> Edition(Reprint 2022).

## **WEB RESOURCES**

1. <https://mathworld.wolfram.com/First-OrderOrdinaryDifferentialEquation.html>
2. [https://en.wikipedia.org/wiki/Differential\\_equation](https://en.wikipedia.org/wiki/Differential_equation)
3. [https://en.wikipedia.org/wiki/Partial\\_differential\\_equation](https://en.wikipedia.org/wiki/Partial_differential_equation)
4. [https://en.wikipedia.org/wiki/Vector\\_calculus](https://en.wikipedia.org/wiki/Vector_calculus)
5. [https://en.wikipedia.org/wiki/Vector\\_calculus](https://en.wikipedia.org/wiki/Vector_calculus)



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(Autonomous)  
**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year II Semester**  
**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**  
(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)

<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24EE201T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	3-0-0-3
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**PART-A: BASIC ELECTRICAL ENGINEERING**

**COURSE OBJECTIVES**

To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:			<b>Cognitive Level</b>
<b>CO1</b>	Know the fundamental laws, operating principles of motors, generators, MC and MI instruments		K2
<b>CO2</b>	Apply the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.		K3
<b>CO3</b>	Apply the mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.		K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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



## **COURSE CONTENT**

### **UNIT - I**

**DC Circuits:** Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

**AC Circuits:** A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

### **UNIT - II**

#### **Machines and Measuring Instruments**

**Machines:** Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

**Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

### **UNIT - III**

#### **Energy Resources, Electricity Bill & Safety Measures**

**Energy Resources:** Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

**Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

**Equipment Safety Measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

#### **Textbooks:**

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

#### **Reference Books:**

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition.

#### **Web Resources:**

1. <https://nptel.ac.in/courses/108105053>
2. <https://nptel.ac.in/courses/108108076>



**PART-B :BASIC ELECTRONICS ENGINEERING**

**COURSE OBJECTIVES**

<b>1</b>	To impart knowledge on semiconductor devices.
<b>2</b>	To introduce concepts of biasing and applications of diodes and transistors.
<b>3</b>	To introduce fundamentals of digital electronics.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		Cognitive Level
<b>CO1</b>	Understand the basic concepts of diodes and transistors	K2
<b>CO2</b>	Understand the working principles of semiconductor devices and applications	K2
<b>CO3</b>	Understand number system, Boolean algebra, basics of combinational and sequential circuits	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes  
(1 – Low, 2 - Medium, 3 – High)**

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

**COURSE CONTENT**

**UNIT – I - SEMICONDUCTOR DEVICES**

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

**UNIT -II - BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION**

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Block diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

**UNIT – III - DIGITAL ELECTRONICS**

Overview of Number Systems, BCD codes, Functionality of Logic Gates– NOT, OR, AND, NOR, NAND, XOR and XNOR. Excess-3 code, Graycode, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Simple combinational circuits– Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

**Textbooks:**

1. Robert.L. Boylestad & Louis Nashelsky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. Digital Design by Morris Mano, 3E, Prentice Hall, India, 2001

**Reference Books:**

1. R.S. Sedha, A Text book of Electronic Devices and Circuits, S.Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

**Web References:**

1. NPTEL- <https://archive.nptel.ac.in/courses/108/108/108108122/>
2. Neso Academy- <https://www.nesoacademy.org/ec/05-digital-electronics>



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(Autonomous)  
**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year II Semester**  
**ENGINEERING GRAPHICS**  
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24ME201T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	1-0-4-3
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

<b>1</b>	To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
<b>2</b>	To impart knowledge on the projection of points, lines and plane surfaces.
<b>3</b>	To improve the visualization skills for better understanding of projection of solids.
<b>4</b>	To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
<b>5</b>	To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		<b>Cognitive Level</b>
<b>CO1</b>	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.	K2
<b>CO2</b>	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.	K3
<b>CO3</b>	Understand and draw projection of solids in various positions in first quadrant.	K3
<b>CO4</b>	Explain principles behind development of surfaces.	K2
<b>CO5</b>	Prepare isometric and perspective sections of simple solids.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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



## **COURSE CONTENT**

### **UNIT - I**

**Introduction:** Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

**Curves:** construction of ellipse, parabola and hyperbola by general, Cycloids, Involute, Normal and tangent to Curves.

**Scales:** Plain scales, diagonal scales and vernier scales.

### **UNIT - II**

**Orthographic Projections:** Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

**Projections of Straight Lines:** Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

**Projections of Planes:** regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

### **UNIT - III**

**Projections of Solids:** Types of solids: Polyhedral and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

### **UNIT - IV**

**Sections of Solids:** Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

**Development of Surfaces:** Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

### **UNIT - V**

**Conversion of Views:** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

**Computer graphics:** Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

#### **Textbook:**

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

#### **Reference Books:**

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

#### **Web References:**

1. <http://nptel.ac.in/courses/112103019/>
2. <https://www.cadtutor.net/tutorials/autocad/>



<b>(Course Category)</b>	Professional Core	<b>Course Code</b>	24EC201T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	3-0-0-3
<b>Prerequisites</b>	Basic knowledge about resistor, inductor and capacitor.	<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

1	To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
2	To impart knowledge on applying appropriate theorem for electrical circuit analysis
3	To explain transient behavior of circuits in time and frequency domains
4	To teach concepts of resonance
5	To introduce open circuit, short circuit, ABCD, h parameters and their interrelationship.

Upon successful completion of the course, the student will be able to:		Cognitive Level
<b>CO1</b>	Analyze RLC network to solve network parameters using Mesh and Nodal and Apply star-delta transformations wherever necessary.	K4
<b>CO2</b>	Analyze a network, solve parameters using Network Theorems, Laplace Transform	K4
<b>CO3</b>	Analyze transient circuit using Differential equation and Laplace Transform techniques	K4
<b>CO4</b>	Analyze resonant circuit and coupled circuit.	K4
<b>CO5</b>	Analyze two-port network to compute Z, Y, ABCD and h parameters.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

[illegible]



## **COURSE CONTENT**

### **UNIT-I**

Types of circuit components, Types of Sources and Source Transformations, Mesh analysis and Nodal analysis, problem solving with resistances only including dependent sources also. Principal of Duality examples.

**Steady State Analysis of A.C Circuits:** Impedance concept, phase angle, series R-L, R-C, R-L- C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion.

### **UNIT-II**

**Network Theorems:** Thevenin's, Norton's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, problem solving using dependent sources also.

**Laplace transform:** introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, problem solving using Laplace transform.

### **UNIT-III**

**Transients:** First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots.

### **UNIT-IV**

**Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case-resistance present in both branches, anti-resonance at all frequencies.

**Coupled Circuits:** Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.

### **UNIT-V**

**Two-port Networks:** Relationship of two port networks, Z-parameters, Y-parameters, ABCD-parameters, h- parameters, Relationships Between parameter Sets, Parallel & series connection of two port networks, cascading of two port networks, problem solving using dependent sources also, Image and iterative impedances (Qualitative treatment only)

### **Text Books**

1. Network Analysis — ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017

### **Reference Books**

1. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.
2. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku, McGraw-Hill Education

### **Web References:**

1. NPTEL Lectures-  
<https://youtube.com/playlist?list=PLbRMhDVUMngfNnABo5mre45ZbHqJE2sUn&feature=shared>



**I Year II Semester**  
**ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP**  
(Common to ECE, CSE (AI&ML), CSE (DS), CSE(CS) and IT)

<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24EE201P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-3-1.5
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**PART-A: ELECTRICAL ENGINEERING WORKSHOP**

**COURSE OBJECTIVES**

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		Cognitive Level
<b>CO1</b>	Know the Electrical circuit design concepts; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.	K2
<b>CO2</b>	Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.	K3
<b>CO3</b>	Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.	K3
<b>CO4</b>	Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.	K4
<b>CO5</b>	Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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

**List of experiments:**

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Measurement of Three- phase power in Three-phase induction motor using two wattmeter method
5. Speed control of DC shunt motor
6. Measurement of Power and Power factor using Single-phase wattmeter
7. Measurement of Earth Resistance using Megger
8. Calculation of Electrical Energy for Domestic Premises

**Reference Books:**

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

**Note:** Minimum Six Experiments to be performed.



**PART B: ELECTRONICS ENGINEERING LABORATORY**

**COURSE OBJECTIVES**

To impart knowledge on the principles of digital electronics and fundamental of electronic devices & its applications.

**COURSE OUTCOMES**

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

**Cognitive Level**

<b>CO6</b>	Identify & testing of various electronic components.	K3
<b>CO7</b>	Understand the usage of electronic measuring instruments.	K3
<b>CO8</b>	Plot and discuss the characteristics of various electron devices.	K3
<b>CO9</b>	Explain the operation of a digital circuit.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**

(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO6</b>	2	2		2	2							
<b>CO7</b>	2	2		2	2							
<b>CO8</b>	2	2		2	2							
<b>CO9</b>	2	2		2	2							

**List of experiments:**

1. Introduction to Active and Passive devices must be experiment-1 (includes Resistors, Capacitors, Inductors, Diodes, Transistors, Power supplies, Ammeter(s), Voltmeter(s), necessary devices)
2. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
3. Plot V– I characteristics of Zener Diode and its application as voltage Regulator.
4. Determine ripple factor of full wave rectifier.
5. Plot Input & Output characteristics of BJT in CE and CB configurations.
6. Determining CE Amplifier input and output impedance with and without bypass capacitor.
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K & D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multimeters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices. Multi sim /PSPICE software for Simulation.

**References:**

1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation, 2021.
2. R.P.Jain, Modern Digital Electronics, 4<sup>th</sup> Edition, Tata McGraw Hill,2009
3. R.T.Paynter,IntroductoryElectronicDevices&Circuits– ConventionalFlowVersion,PearsonEducation,2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.



<b>Course Category</b>	Professional Core	<b>Course Code</b>	24EC201P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-3-1.5
<b>Prerequisites</b>	Basic knowledge about resistor, inductor and capacitor.	<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

1	To gain hands on experience in verifying Kirchoff's laws and network theorems
2	To study RLC elements behavior of circuits (transient and resonant)
3	To determine 2-port network parameters

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Verify Kirchoff's laws and network theorems.	K3
CO2	Measure time constants, Analyze behavior of RLC circuits	K3
CO3	Characterize and model the network in terms of all network parameters.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**(1 – Low, 2 - Medium, 3 – High)**

[illegible]



**PART-A**

*The following experiments need to be performed using Hardware:*

1. Study of Components of a circuit and verification of KCL and KVL
2. Perform Mesh and Nodal Analysis of a given circuit.
3. Verification of principle of Superposition theorem for linear bilateral and unilateral networks.
4. Verification of principle of Maximum power transfer theorem
5. Verification of Thevenin and Norton theorems.
6. Find the Bandwidth, then determine the Q Factor of a Series Resonance circuit.
7. Verification of Z and Y Parameters of a simple T-two-port network (Only Hardware Implementation).
8. Verification of h-parameters of a simple T-two-port network (Only Hardware Implementation).
9. Verification of ABCD Parameters for a simple T-two-port network (Only Hardware Implementation).

**PART-B**

*The experiments need to be simulated using software*

1. Determination of transient response of current in RL and RC circuits with step voltage input.
2. Determination of transient response of current in RLC circuit with step voltage input for under damp, critically damp and over damp cases.
3. To study frequency response of 1<sup>st</sup> order RL and RC networks

**Hardware Requirements:**

1. Regulated Power supplies
2. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

**Software requirements:**

- i. Multisim/ Pspice/Equivalent simulation software tool.
- ii. Computer Systems with required specifications.

**References:**

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(Autonomous)  
**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year II Semester**  
**IT WORKSHOP**  
(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)

<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24IT201P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-2-1
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

1. To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
2. To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
3. To teach basic command line interface commands on Linux.
4. To teach the usage of Internet for productivity and self-paced life-long learning.
5. To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		<b>Cognitive Level</b>
<b>CO1</b>	Perform Hardware trouble shooting.	K3
<b>CO2</b>	Understand Hardware components and inter dependencies.	K3
<b>CO3</b>	Safe guard computer systems from viruses/worms.	K3
<b>CO4</b>	Document/ Presentation preparation.	K3
<b>CO5</b>	Perform calculations using spreadsheets.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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



## **COURSE CONTENT**

### **PC Hardware & Software Installation**

**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3:** Every student should individually install MS windows, Linux / BOSS on the personal computer. This computer should have windows installed. The system should be configured as dual boot (VM Ware) with both Windows and Linux / BOSS Lab instructor should verify the installation and follow it up with a Viva.

### **Internet & World Wide Web**

**Task1:** Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Task2:** Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, book marks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task3:** Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4:** Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block popup, lock active x downloads to avoid viruses and/or worms.

## **WORD**

**Task 1:** Word Orientation: The mentor needs to give an overview of Microsoft (MS) office or equivalent (FOSS) tool word : Importance of MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using word–Accessing, over view of tool bars, saving files, Using help and resources, rulers, format painter in word.

**Task 2:** Using Word to create a project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

**Task 3:** Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Foot note, Hyperlink, Symbols, Spell Check, Track Changes.

**Task4:** Creating a Newsletter: Features to be covered:-Table of Content, News paper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Text boxes, Paragraphs and Mail Merge in word.

## **EXCEL**

**Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel–Accessing, overview of tool bars, saving excel files, Using help and resources.

**Task 1:** Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**Task 2:** Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function.



### **POWERPOINT**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, WordArt, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power Point.

**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

**Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting– Back ground, textures, Design Templates, Hidden slides.

### **AI TOOLS –ChatGPT**

**Task1:** Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are acknowledgeable AI. Please answer the following question: What is the capital of France?"

**Task2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

**Task 3:** Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

### **Reference Books:**

1. Comdex Information Technology course toolkit, Vikas Gupta, WILEY Dreamtech, 2--3.
2. The Complete Computer upgrade and repair book, Chery IAS chmidt, WILEY Dreamtech, 2-13, 3rd edition.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2-12, 2<sup>nd</sup> edition.
4. PC Hardware- A Handbook, Kate J.Chase, PHI (Microsoft).
5. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme.– CISCO Press, Pearson Education, 3<sup>rd</sup> edition.
6. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition.

### **Web References:**

1. PC Hardware & Software Installation: Peripheral Devices: [Computer Peripherals - Wikipedia](#)  
Components in a CPU: [CPU Components and Their Functions - Guru99](#)
2. Internet & World Wide Web: TCP/IP and Networking Basics: [TCP/IP Explained - Lifewire](#)  
Internet Browsing and Configuration: [How Web Browsing Works - HowStuffWorks](#)
3. Word: Microsoft Word Tutorials: [Microsoft Word Basics - GCFGlobal](#)
4. Excel: Excel Tutorial and Functions: [Excel Tutorial - Microsoft](#)
5. AI Tools - ChatGPT: GPT-3.5 and ChatGPT Information: [GPT-3.5 Guide - OpenAI](#)



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
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**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**I Year II Semester**  
**NSS / NCC / SCOUTS AND GUIDES / COMMUNITY SERVICE**  
(Common to ECE, CSE (AI&ML), CSE (DS), CSE (CS) and IT)

<b>Course Category</b>	Humanities	<b>Course Code</b>	24MH202P
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	0-0-1-0.5
<b>Prerequisites</b>		<b>Continuous Evaluation</b>	90
		<b>Viva Voce</b>	10
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

**COURSE OUTCOMES**

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

<b>CO1</b>	Understand the importance of discipline, character and service motto.	
<b>CO2</b>	Solve some societal issues by applying acquired knowledge, facts, and techniques.	
<b>CO3</b>	Explore human relationships by analyzing social problems.	
<b>CO4</b>	Determine to extend their help for the fellow beings and downtrodden people.	
<b>CO5</b>	Develop leadership skills and civic responsibilities.	

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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



## **COURSE CONTENT**

### **UNIT – I - Orientation**

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

- i) Conducting ice breaking sessions-expectations from the course-knowing personal talents and skills
- ii) Conducting orientations programs for the students future plans-activities-releasing road map etc.
- iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- iv) Conductingtalentshowinsingingpatrioticsongs-paintings-anyothercontribution.

### **UNIT – II - Nature &Care**

Activities:

- i) Best out of waste competition.
- ii) Poster and signs making competition to spread environmental awareness.
- iii) Recycling and environmental pollution article writing competition.
- iv) Organising Zero-waste day.
- v) Digital Environmental awareness activity via various social media platforms.
- vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
- vii) Write a summary on any book related to environmental issues.

### **UNIT – III - Community Service**

Activities:

- i) Conducting One Day Special Camp in a village contacting village- are a leaders-Survey in the village, identification of problems-helping them to solve via media-authorities- experts-etc.
- ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- iii) Conducting consumer Awareness. Explaining various legal provisions etc.
- iv) Women Empowerment Programmes-Sexual Abuse, Adolescent Health and Population Education.
- v) Any other programmes in collaboration with local charities, NGOs etc.

### **Reference Books:**

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;I, Vidya Kutir Publication, 2021 ( ISBN 978-81-952368-8-6)
2. Red Book - National Cadet Corps Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defense, NewDelhi
3. Davis M. L. and cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
4. Masters G. M. Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

### **General Guidelines:**

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

### **Evaluation Guidelines:**

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit.Eachactivityshallbeevaluatedbytheconcernedteacherfor15marks, totaling to 90marks.
- Astudentshallbeevaluatedbytheconcernedteacherfor10marksbyconductingviva voce on the subject.



**II YEAR I SEMESTER**  
**PROBABILITY THEORY AND STOCHASTIC PROCESS**

<b>Course Category</b>	Basic Science	<b>Course Code</b>	24EC301T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	3-0-0-3
<b>Prerequisites</b>	Basics of probability	<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

**The student will learn:**

<b>1</b>	The basic concepts of probability, theorems along with mathematical solution, and distribution of random variables
<b>2</b>	The operations that can be performed on random variables.
<b>3</b>	To know the temporal characteristics of random process
<b>4</b>	To know the spectral characteristics of random process.
<b>5</b>	This gives the concept of noise sources and information theory

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		<b>Cognitive Level</b>
<b>CO1</b>	Understand the concept of a Random variable and its classification	K2
<b>CO2</b>	Perform operations on single and multiple Random variables	K3
<b>CO3</b>	Determine temporal characteristics of Random Signals.	K3
<b>CO4</b>	Determine the Spectral characteristics of Random Signals.	K3
<b>CO5</b>	Understand the concepts of Noise and Information theory in Communication systems	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
<b>CO 1</b>	3	2	1	2	1	1						1	2	1
<b>CO 2</b>	3	2	2	1	1							2	2	2
<b>CO 3</b>	2	2	2	1	1							1	2	1
<b>CO 4</b>	2	2	2	2	1							2	2	2
<b>CO 5</b>	2	2	3	3	2	2						2	2	2



## **COURSE CONTENT**

### **UNIT - I Probability & Random Variable:**

Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, Random Variable-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

**UNIT - II Operations on Single & Multiple Random Variables – Expectations:** Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable. Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

### **UNIT - III Random Processes – Temporal Characteristics:**

The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

### **UNIT - IV Random Processes – Spectral Characteristics:**

The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

### **UNIT - V Noise Sources & Information Theory:**

Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade-off between bandwidth and SNR

### **TEXT BOOKS:**

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles, 4 th Ed, TMH, 2001.
2. Taub and Schilling - Principles of Communication systems, TMH, 2008

### **REFERENCE BOOKS:**

1. Bruce Hajek - Random Processes for Engineers, Cambridge unipress, 2015
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes, 4th Ed., PHI, 2002.
3. B.P. Lathi - Signals, Systems & Communications, B.S. Publications, 2003.
4. S.P Eugene Xavier -Statistical Theory of Communication, New Age Publications, 2003



**II YEAR I SEMESTER**

**UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY  
and ETHICAL HUMAN CONDUCT**

(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY))

<b>Course Category</b>	HSMC	<b>Course Code</b>	24HM301T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	2-1-0-3
<b>Prerequisites</b>		<b>Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

<b>COURSE OUTCOMES</b>		
<b>Upon successful completion of the course, the student will be able to:</b>		<b>Blooms Taxonomy Level</b>
<b>CO1</b>	Understand the significance of value inputs in a classroom and start applying them in their life and profession	K1
<b>CO2</b>	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	K2
<b>CO3</b>	Understand the role of a human being in ensuring harmony in Family And Society.	K1
<b>CO4</b>	Appraise the role of a human being in ensuring harmony in Nature/Existence.	K2
<b>CO5</b>	Distinguish between ethical and unethical practices to actualize a harmonious environment wherever they work.	K2

<b>Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)</b>												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2						3			3	3		3
CO3						3		2				3
CO4						3	3					
CO5						3		3				



## **COURSE CONTENT**

**UNIT – I Introduction to Value Education:** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, self-exploration as the Process for Value Education, Continuous Happiness and Prosperity-the basic human aspirations, Happiness and Prosperity- Current Scenario, Method to Fulfill the Basic Human Aspirations.

**Practice Sessions:** PS1 Sharing about Oneself , PS2 Exploring Human Consciousness, PS3 Exploring Natural Acceptance

**UNIT – II Harmony in Human Being:** Understanding Human being as the Co-existence of the self and the body, Distinguishing between the Needs of the self and the body, The body as an Instrument of the self, Understanding Harmony in the self, Harmony of the self with the body, Programme to ensure self - regulation and Health

**Practice Sessions:** PS4 Exploring the difference of Needs of self and body, PS5 Exploring Sources of Imagination in the self, PS6 Exploring Harmony of self with the body

**UNIT – III Harmony in the Family and Society:** Harmony in the family - the Basic Unit of Human Interaction, 'Trust' - the Foundational Value in Relationship, 'Respect' - as the Right Evaluation, Other Feelings, Justice in Human – to - Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

**Practice Sessions:** PS7 Exploring the Feeling of Trust, PS8 Exploring the Feeling of Respect, PS9 Exploring Systems to fulfil Human Goal

**UNIT – IV Harmony in the Nature/Existence:** Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual fulfillment among the Four Orders of Nature, Realizing Existence as Co- existence at All Levels, The Holistic Perception of Harmony in Existence

**Practice Sessions:** PS10 Exploring the Four Orders of Nature, PS11 Exploring Co-existence in Existence

**UNIT – V Implications of the Holistic Understanding - a Look at Professional Ethics:** Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value- based Life and Profession.

**Practice Sessions:** PS12 Exploring Ethical Human Conduct, PS13 Exploring Humanistic Models in Education, PS14 Exploring Steps of Transition towards Universal Human Order

### **Text books and Teachers Manual**

1. A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 - R R Gaur, R Asthana, G P Bagaria
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2 - R R Gaur, R Asthana, G P Bagaria

### **Reference Books**

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth- by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal

### **Web References:**

1. <https://fdp-si.aicte-india.org>
2. [https://www.youtube.com/playlist?list=PLWDeKF97v9SP\\_Kt6jqzA3pZ3yA7g\\_OAQz](https://www.youtube.com/playlist?list=PLWDeKF97v9SP_Kt6jqzA3pZ3yA7g_OAQz)



<b>Course Category</b>	Engineering Science	<b>Course Code</b>	24EC302T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	3-0-0-3
<b>Prerequisites</b>	Calculus	<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

<b>1</b>	To study about signals and systems
<b>2</b>	To analyze the spectral characteristics of signal using Fourier series and Fourier transforms
<b>3</b>	To understand the characteristics of systems
<b>4</b>	To introduce the concept of sampling process
<b>5</b>	To know various transform techniques to analyze the signals and systems

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Differentiate the various classifications of signals and systems	K1
CO2	Analyze the frequency domain representation of signals using Fourier concepts	K4
CO3	Classify the systems based on their properties and determine the response of LTISystems	K3
CO4	Know the sampling process and various types of sampling techniques	K2
CO5	Apply Laplace and z-transforms to analyze signals and Systems(continuous & discrete)	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

[illegible]



## **COURSE CONTENT**

**UNIT- I: INTRODUCTION:** Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time- scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions. Related problems.

### **UNIT-II: FOURIER SERIES AND FOURIER TRANSFORM:**

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform, Related problems.

**UNIT-III: ANALYSIS OF LINEAR SYSTEMS:** Introduction, Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant(LTV)system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Filter characteristics of linear systems. Distortion less transmission through a system, Signal band width, system band width, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time

**UNIT-IV: CORRELATION:** Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

**SAMPLING THEOREM:** Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to B and Pass sampling, Related problems.

**UNIT-V: LAPLACE TRANSFORMS:** Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

**Z-TRANSFORMS:** Concept of Z-Transform of a discrete sequence. Region of convergence in Z- Transform, constraints on ROC for various classes of signals, Inverse Z- transform, properties of Z-transforms. Distinction between Laplace, Fourier and Z transforms.

### **TEXTBOOKS:**

1. Signals, Systems & Communications- B.P.Lathi, BSPublications,2003.
2. Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H.Nawab, PHI, 2<sup>nd</sup> Edn,1997
3. Signals & Systems – Simon Haykin and VanVeen,Wiley,2ndEdition,2007

### **REFERENCEBOOKS:**

1. Principles of Linear Systems and Signals–BP Lathi, Oxford University Press,2015
2. Signals and Systems–TK Rawat, Oxford University press,2011



## COURSE OBJECTIVES

## COURSE OUTCOMES

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

[illegible]



## **COURSE CONTENT**

**UNIT-I: Review of Semiconductor Physics:** Mobility and Conductivity, Intrinsic and extrinsic semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors. **(Text book: 1)**

**Junction Diode Characteristics :** energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in p-n junction Diode, Diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance. **(Text book: 1)**

**UNIT-II: Special Semiconductor Devices:** Zener Diode, Breakdown mechanisms, Zener diode applications, Varactor Diode, LED, Photodiode, Tunnel Diode, UJT, PNP Diode, SCR, Construction, operation and V-I characteristics. (Text book: 1)

**Diode Circuits:** The Diode as a circuit element, The Load-Line concept, The Piecewise Linear Diode model, Clipping (limiting) circuits, Clipping at Two Independent Levels, Peak Detector, Clamping circuits, Comparators, Sampling Gate, Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters, Inductor filter, Capacitor filter,  $\pi$ -section Filter, comparison of various filter circuits in terms of ripple factors. **(Text book: 1, 2)**

**UNIT- III: Transistor Characteristics:** Junction transistor, transistor current components, transistor equation in CB configuration, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values. (Text book: 1)

**Transistor Biasing and Thermal Stabilization :** Need for biasing, operating point, load line analysis, BJT biasing-methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in  $V_{BE}$ ,  $I_C$ , and  $\beta$ , Stability factors, ( $S, S', S''$ ), Bias compensation, Thermal runaway, Thermal stability. **(Text book: 1)**

## **UNIT- IV: Small Signal Low Frequency Transistor Amplifier Models**

**BJT:** Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers. **(Text book: 1, 2)**

**UNIT- V: FET:** FET types, JFET operation, characteristics, small signal model of JFET. **(Text book: 1)** **MOSFET:** MOSFET Structure, Operation of MOSFET: operation in triode region, operation in saturation region, MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET, Channel length modulation, MOS transconductance, MOS device models: MOS small signal model, PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS devices. **(Text book: 3)** **CMOS amplifiers:** General Considerations, Common Source Stage, Common Gate Stage, Source Follower, comparison of FET amplifiers. **(Text book: 3)**

### **Text Books:**

1. Millman's Electronic Devices and Circuits- J. Millman, C. C. Halkias and Satyabrata Jit, Mc-Graw Hill Education, 4<sup>th</sup> edition, 2015.
2. Millman's Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-Graw Hill Education, 2<sup>nd</sup> Edition, 2009.
3. Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3<sup>rd</sup> edition, 2021.

### **References:**

1. Basic Electronics-Principles and Applications, Chinmoy Saha, Arindam Halder, Debarati Ganguly, Cambridge University Press.
  2. Electronics devices & circuit theory- Robert L. Boylestad and Louis Nashelsky, Pearson, 11<sup>th</sup> edition, 2015.
  3. Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5<sup>th</sup> edition, 2008
- Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5<sup>th</sup> edition, 2022

[illegible]



## **COURSE CONTENT**

### **UNIT – I**

#### **REVIEW OF NUMBER SYSTEMS & CODES:**

Representation of numbers of different radix, conversation from one radix to another radix,  $r-1$ 's compliments and  $r$ 's compliments of signed members. Gray code, 4 bit codes; BCD, Excess-3, 2421, 84-2-1 code etc. Error detection & correction codes: parity checking, even parity, odd parity, Hamming code.

#### **BOOLEAN THEOREMS AND LOGIC OPERATIONS:**

Boolean theorems, principle of complementation & duality, De-morgan theorems. Logic operations ; Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX- NOR operations. Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits.

### **UNIT – II**

#### **MINIMIZATION TECHNIQUES:**

Minimization and realization of switching functions using Boolean theorems, K-Map (up to 6 variables) and tabular method (Quine - mcclus key method) with only four variables and single function.

#### **COMBINATIONAL LOGIC CIRCUITS DESIGN:**

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4- bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a- head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.

### **UNIT – III**

#### **COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI &LSI :**

Design of encoder ,decoder, multiplexer and de-multiplexers, Implementation of higher order circuits using lower order circuits . Realization of Boolean functions using decoders and multiplexers. Design of Priority encoder, 4-bit digital comparator and seven segment decoder

INTRODUCTION OF PLD's : PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table.

### **UNIT – IV**

#### **SEQUENTIAL CIRCUITS I:**

Classification of sequential circuits (synchronous and asynchronous) , operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip- flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip- flop. Design of Sripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi- directional shift register, universal shift, register  
Study the following relevant ICs and their relevant functions 7474,7475,7476,7490,7493,74121.

### **UNIT – V**

#### **SEQUENTIAL CIRCUITS II :**

Finite state machine; state diagrams, state tables, reduction of state tables. Analysis of clocked sequential circuits Mealy to Moore conversion and vice-versa. Realization of sequence generator, Design of Clocked Sequential Circuit to detect the given sequence (with overlapping or without overlapping)

#### **TEXT BOOKS:**

1. Switching and finite automata theory Zvi.KOHAVI, Niraj. K.Jha 3rdEdition,Cambridge UniversityPress,2009
2. Digital Design by M.Morris Mano, Michael D Ciletti,4th editionPHIpublication,2008
3. Switching theory and logic design by Hill and Peterson, Mc-Graw Hill TMH edition, 2012.

#### **REFERENCES:**

1. Fundamentals of Logic Design by Charles H. Roth Jr,JaicoPublishers,2006
2. Digital electronics by R S Sedha. S.Chand &companylimited,2010
3. Switching Theory and Logic Design by A. Anand Kumar, PHI Learningpvtltd,2016.
4. Digital logic applications and design by John M Yarbough, Cengagelearning,2006. TTL 74-Seriesdatabook



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(Autonomous)  
**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**II YEAR I SEMESTER**  
**ELECTRONIC DEVICES AND CIRCUITS LABORATORY**

<b>Course Category</b>	Professional Core	<b>Course Code</b>	24EC303P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-3-1.5
<b>Prerequisites</b>	Identification of Components	<b>Continuous Internal Assessment</b> <b>Semester End Examination</b> <b>Total Marks</b>	30 70 100

**COURSE OBJECTIVES**

<b>1</b>	To plot the V-I characteristics of various devices -clippers, clampers, transistors, etc...
<b>2</b>	To calculate ripple factor and efficiency of rectifiers
<b>3</b>	To plot the frequency response of different amplifier circuits

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		<b>Cognitive Level</b>
<b>CO1</b>	Understand the basic knowledge and analyze the characteristics of clippers, clampers, Transistor, FET, UJT and SCR.	K2
<b>CO2</b>	Calculate the ripple factor for half wave and full wave rectifiers with and without filters	K2
<b>CO3</b>	Analyze CE and CC amplifiers.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2
CO1	1	2					1		2	1			1	1
CO2	1	1							2	1			1	1
CO3	1	1					1		2	1			1	1



**List of Experiments: (Minimum of Ten Experiments has to be performed)**

1. clipper circuit using diode
2. Clamping circuit using diode
3. Rectifiers (without and with c-filter) Part A: Half-wave Rectifier  
Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration) Part A: Input Characteristics  
Part B: Output Characteristics
5. FET Characteristics (CS Configuration) Part A: Drain Characteristics  
Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

**Equipment required:**

1. Regulated Power supplies
2. Analog/ Digital Storage Oscilloscopes
3. Analog/ Digital Function Generators
4. Digital Multi-meters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components



<b>COURSE OBJECTIVES</b>
1. The working of logic gates
2. The interconnection of logic gates to create a combinational circuit and its working
3. The interconnection of logic gates to create a sequential circuit and its working

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Verify the functionality of logic gates Flip-Flops using ICs	K3
CO2	Verify the functionality of combinational circuits using ICs	K3
CO3	Verify the functionality of sequential circuits using ICs	K3

[illegible]



**List of Experiments:**

1. Verification of truth tables of the following Logic gates  
Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR
2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
3. Verification of functional table of 3 to 8-line Decoder /De-multiplexer
4. 4 variable logic function verification using 8 to1 multiplexer.
5. Design full adder circuit and verify its functional table.
6. Verification of functional tables of (i) JK Edge triggered Flip-Flop (ii) JK Master Slave Flip-Flop (iii) D Flip-Flop
7. Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output.
8. Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output
9. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
10. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms.
11. Design MOD-8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.
12. (a) Draw the circuit diagram of a single bit comparator and test the output  
(b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.

**Additional Experiments:**

1. Design BCD Adder Circuit and Test the Same using Relevant IC
2. Design Excess-3 to 9- Complement convertor using only four Full Adders and test the Circuit.
3. Design an Experimental model to demonstrate the operation of 74154 De-Multiplexer using LEDs for outputs.
4. Design of any combinational circuit using Hardware Description Language
5. Design of any sequential circuit using Hardware Description Language



**II YEAR II SEMESTER**  
**DATA STRUCTURES USING PYTHON**  
(Common to ECE)

<b>Course Category</b>	Professional Core	<b>Course Code</b>	24CS301S
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-3-1.5
<b>Prerequisites</b>		<b>Continuous Internal Assessment</b>	30
		<b>Semester End Examination</b>	70
		<b>Total Marks</b>	100

**COURSE OBJECTIVES**

<b>1</b>	Understand basic data structures in python like Lists, Tuples, Dictionaries, Sets and Maps
<b>2</b>	Design and analyze simple linear data structures.
<b>3</b>	Identify and apply the suitable data structure for the given real world problem.
<b>4</b>	Design and analyze non linear data structures.
<b>5</b>	Gain knowledge in practical applications of data structures

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		<b>Cognitive Level</b>
<b>CO1</b>	Understand various data representation techniques in the real world.	K3
<b>CO2</b>	Implement linear and non-linear data structures.	K3
<b>CO3</b>	Analyze various algorithms based on their time and space complexity.	K3
<b>CO4</b>	Develop real-time applications using suitable data structure.	K5
<b>CO5</b>	Identify suitable data structure to solve various computing problems	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

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



**List of Experiments:**

1. Write a Python program for class, Flower, that has three instance variables of type str, int, and float that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.
2. Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area( ) and perimeter( ). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area( ) and perimeter( ) methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter
3. Write a python program to implement Method Overloading and Method Overriding.
4. Write a Python program to illustrate the following comprehensions: a) List Comprehensions b) Dictionary Comprehensions c) Set Comprehensions d) Generator Comprehensions
5. Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list. Example: Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct objects: [1, 2] [1, 3] [1, 4] [1, 5] [7, 8] [7, 9] [8, 9].
6. Write a program for Linear Search and Binary search.
7. Write a program to implement Bubble Sort and Selection Sort.
8. Write a program to implement Merge sort and Quick sort.
9. Write a program to implement Stacks and Queues.
10. Write a program to implement Singly Linked List.
11. Write a program to implement Doubly Linked list.
12. Write a program to implement Binary Search Tree.



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**R23**

**II YEAR I SEMESTER**  
**ENVIRONMENTAL SCIENCE**  
(Common to all branches)

Course Category	BASIC SCIENCES	Course Code	24BC301T
Course Type prerequisites	Theory	<b>L-T-P-C</b> <b>Internal Assessment</b> <b>Semester End Examination</b> <b>Total Marks</b>	2 -0-0--0 30 70 100

S.No.	Course Objectives
1	To make the students to get awareness on environment
2	To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
3	To save earth from the inventions by the engineers.

COURSE OUTCOMES		Cognitive Level
<b>Upon successful completion of the course, the student will be able to:</b>		
CO1	Grasp multi disciplinary nature of environmental studies and various renewable and non-renewable resources.	K2
CO2	Understand flow and bio-geo- chemical cycles and ecological pyramids.	K2
CO3	Understand various causes of pollution and solid waste management and related preventive measures.	K2
CO4	Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.	K2
CO5	Illustrate the casus of population explosion, value education and welfare programmes.	K3

Contribution of Course Outcomes towards achievement of Program												
Outcomes (1 – Low, 2 - Medium, 3 – High)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	0	1	0	0	1	2	0	0	0	1	0
CO2	0	1	0	0	0	0	1	0	0	0	0	0
CO3	0	0	0	0	2	0	1	0	0	0	0	0
CO4	0	0	0	0	1	1	3	0	0	0	0	0
CO5	0	0	0	0	0	0	3	1	0	0	0	0



## **COURSE CONTENT**

### **UNIT – I**

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – 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, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies, Energy resources-Renewable and non-renewable resources (Biomass).

### **UNIT – II**

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 the following ecosystem:

a)Forest ecosystem, b)Grassland ecosystem, c)Desert ecosystem, e)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)(Primary Treatment)

Biodiversity and Its Conservation : Introduction and Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hotspots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### **UNIT – III**

Environmental Pollution: Definition, Cause, effects and control measures of: a)Air Pollution, b)Water pollution, c)Soil pollution, d)Marine pollution, e)Noise pollution, f)Thermal pollution, g)Nuclear hazards (Primary treatment)

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

### **UNIT – IV**

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics (Issues and possible solutions) –Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment 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.



### **UNIT – V**

Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Viral infections -Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

### **Textbooks:**

1. Erach Bharucha, Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.
2. Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
3. S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd, 2010.

### **Reference Books:**

1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.
2. M.Anji Reddy, “Textbook of Environmental Sciences and Technology”, BS Publication, 2014.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
4. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
5. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
6. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

### **Online Learning Resources:**

- [https://onlinecourses.nptel.ac.in/noc23\\_hs155/preview](https://onlinecourses.nptel.ac.in/noc23_hs155/preview)
- [https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-8388-1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science++Part+3%3A+Pollution+and+Resources&source=edX&product\\_category=course&placement\\_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science](https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-8388-1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science++Part+3%3A+Pollution+and+Resources&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science)
- <http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-I/Data%20Files/pdf/lec07.pdf>
- <https://www.youtube.com/watch?v=5QxxaVfgQ3k>



<b>Course Category</b>	Management Course - I	<b>Course Code</b>	24HM401T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	2 -0 -0-2
<b>Prerequisites</b>		<b>Internal Assessment</b> <b>Semester End Examination</b> <b>Total Marks</b>	30 70 100

Course Outcomes		Blooms Taxonomy Level
Upon successful completion of the course, the student will be able to		
CO 1	Understand of the concepts of managerial economics and demand in managerial decision making and predicting demand for goods and services	K1
CO 2	Assess the functional relation among production, cost of production, cost concepts and Break-Even Analysis.	K3
CO 3	Classify market structures for price and output decisions and Appraise the forms of business organizations and trade cycles in economic growth.	K1
CO 4	Apply capital budgeting techniques in financial decision making	K3
CO 5	Make use of the final accounting statements and analysis in financial decision making	K3

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## **COURSE CONTENT**

### **Unit – I**

**Managerial Economics:** Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

### **Unit – II**

**Production and Cost Analysis:** Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

### **Unit – III**

**Business Organizations and Markets:** Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic - Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

### **Unit – IV**

**Capital Budgeting:** Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects - Pay Back Period Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

### **Unit – V**

**Financial Accounting and Analysis:** Introduction - Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

### **Textbooks:**

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

### **Reference Books :**

1. Suma Damodaran - Managerial Economics - Oxford - 2011.
2. Vanitha Agarwal - Managerial Economics - Pearson Publications- 2011.
3. V. Maheswari - Financial Accounting- Vikas Publications - 2018
4. S. A. Siddiqui & A. S. Siddiqui - Managerial Economics and Financial Analysis - New Age International Publishers – 2012

**Web References:** <https://www.slideshare.net/123ps/managerial-economics-ppt>

<https://www.slideshare.net/rossanz/production-and-cost-45827016>

<https://www.slideshare.net/darkyla/business-organizations-19917607>

<https://www.slideshare.net/balarajbl/market-and-classification-of-market>

<https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396>

<https://www.slideshare.net/ashu1983/financial-accounting>

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## **COURSE CONTENT**

### **UNIT I - INTRODUCTION**

Concepts of System, Control Systems: Open Loop and closed loop control systems and their differences. Different examples of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models, Differential equations, Impulse Response and transfer functions. Translational and Rotational mechanical systems

### **UNIT II – TRANSFER FUNCTION REPRESENTATION**

Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples –Block diagram algebra– Representation by Signal flow graph-Reduction using mason's gain formula.

### **TIME RESPONSE ANALYSIS**

Standard test signals – Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications – Steady state response - Steady state errors and error constants.

### **UNIT III – STABILITY ANALYSIS IN S-DOMAIN**

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability

#### **Root Locus Technique:**

The root locus concept - construction of root loci-effects of adding poles and zeros to  $G(s)H(s)$  on the root loci.

### **UNIT IV**

**Frequency response analysis:** Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots, Nyquist Stability Criterion

### **UNIT V – CLASSICAL CONTROL DESIGN TECHNIQUES**

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers. State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties – Concepts of Controllability and Observability.

### **TEXT BOOKS:**

1. Automatic Control Systems 8th edition– by B.C.Kuo – John Wiley and son's, 2003.
2. Control Systems Engineering –by I. J.Nagrath and M.Gopal, New Age International (P)Limited, Publishers, 2nd edition, 2007
3. Modern Control Engineering–by Katsuhiko Ogata–Pearson Publications, 5th edition, 2015.

### **REFERENCE BOOKS:**

1. Control Systems by A.Nagoorkani, RB Publications, 3 edition, 2017.
2. Control Systems by A.Anandkumar, PHI, 2 Edition, 2014.



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
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**II YEAR II SEMESTER**  
**ELECTROMAGNETIC WAVES AND TRANSMISSION LINES**

<b>Course Category</b>	Professional Core	<b>Course Code</b>	24EC403T
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	3-0-0-3
<b>Prerequisites</b>	Basics of vector calculus, Review of Co-ordinate Systems	<b>Continuous Internal Assessment</b> <b>Semester End Examination</b> <b>Total Marks</b>	30 70 100

**COURSE OBJECTIVES**

<b>1</b>	Understand the fundamentals of electric fields, coulomb's law and gauss law
<b>2</b>	Familiar with of Biot-Savart Law, Ampere's Circuital Law and Maxwell equations
<b>3</b>	Aware of electromagnetic wave propagation in dielectric and conducting media
<b>4</b>	Study the equivalent circuit of transmission lines and parameters of the transmissionlines
<b>5</b>	Learn the working of smith chart and its usage in the calculation of transmission lineparameters

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:		<b>Cognitive Level</b>
<b>CO1</b>	Determine electric field intensity using coulomb's law and Gauss law	K2
<b>CO2</b>	Determine magnetic field intensity using Biot-Savarts Law and Ampere's Circuital Law	K2
<b>CO3</b>	Analyze the electromagnetic wave propagation in dielectric and conducting media	K3
<b>CO4</b>	Examine the primary and secondary constants of different types of transmission lines	K3
<b>CO5</b>	Derive the expressions for input impedance, reflection coefficient, and VSWR of transmission lines and calculate these parameters using smith chart	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**  
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	2	2	2						2		2	3	1
<b>CO2</b>	3	2	2	2						2		2	3	1
<b>CO3</b>	3	3	2	2						1		2	3	1
<b>CO4</b>	3	3	2	2						1		2	3	1
<b>CO5</b>	3	3	2	2						1		2	3	1



## **COURSE CONTENT**

### **UNIT I:**

Review of Co-ordinate Systems, **Electrostatics:** Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

### **UNIT II:**

**Magnetostatics:** Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

**Maxwell's Equations (Time Varying Fields):** Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface, Illustrative Problems.

### **UNIT III:**

**EM Wave Characteristics :** Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types, Illustrative Problems.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem, Illustrative Problems.

### **UNIT IV:**

**Transmission Lines - I :** Types, Parameters, T &  $\pi$  Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems.

### **UNIT V:**

**Transmission Lines – II:** Input Impedance Relations, Reflection Coefficient, VSWR, Average Power, Shorted Lines, Open Circuited Lines, and Matched Lines, Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.

### **TEXT BOOKS:**

1. Elements of Electromagnetic – Matthew N. O. Sadiku, Oxford University Press, 7<sup>th</sup> edition, 2018.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2<sup>nd</sup> Edition, 2008.

### **REFERENCE BOOK:**

1. Engineering Electromagnetics – William H. Hayt, John A. Buck, Jaleel M. Akhtar, TMH, 9<sup>th</sup> edition, 2020.
2. Electromagnetic Field Theory and Transmission Lines –G. S. N. Raju, Pearson Education 2006
3. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao, Wiley India 2013.
4. Networks, Lines and Fields John D. Ryder, Second Edition, Pearson Education, 2015.

## II YEAR II SEMESTER ELECTRONIC CIRCUIT ANALYSIS



## **COURSE CONTENT**

### **UNIT-I Small Signal High Frequency Transistor Amplifier models:**

**BJT:** Transistor at high frequencies, Hybrid-  $\pi$  common emitter transistor model, Hybrid  $\pi$  conductance, Hybrid  $\pi$  capacitances, validity of hybrid  $\pi$  model, determination of high- frequency parameters in terms of low-frequency parameters , CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

**FET:** Analysis of common Source and common drain Amplifier circuits at high frequencies.

### **UNIT-II**

**Multistage Amplifiers:** Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Differential amplifier using BJT.

### **UNIT-III**

**Feedback Amplifiers:** Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

### **UNIT-IV**

**Oscillators:** Oscillator principle, condition for oscillations, types of oscillators, RC- phase shift and Wien bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT, Frequency and amplitude stability of oscillators.

### **UNIT-V**

**Power Amplifiers:** Classification of amplifiers(A to H), Class A power Amplifiers, Class B Push-pull amplifiers, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks.

**Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, , staggered tuned amplifiers**

### **Text Books:**

1. Integrated Electronics- J.Millman and C.C.Halkias, Tata McGraw-Hill, 1972.
2. Electronic Devices and Circuits Theory –Robert L.Boylestad and Louis Nashelsky,Pearson/ Prentice Hall, Tenth Edition, 2009.
3. Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications,2006

### **References:**

1. Electronic Circuit Analysis and Design –Donald A.Neaman, McGrawHill, 2010.
2. Micro electronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition, 2011.
3. Electronic Circuit Analysis-B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy,Pearson Publications



COURSE OBJECTIVES	
1	To know the basics of Analog Communication
2	To extend the modulation techniques for better communication.
3	To know the concepts of Frequency Modulation
4	To study the transmitting & receiving phenomenon by using different receivers & transmitters types
5	To study various effects of noise on Communication Systems. And To study about different Pulse Modulation techniques

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Understand the concepts of amplitude modulation	K2
CO2	Compare different types of Amplitude Modulation and Demodulation techniques	K2
CO3	Interpret the Radio Transmitters completely, Analyze the concepts of generation and detection of Angle Modulated signals	K3
CO4	Outline the Radio Receivers with different sections	K2
CO5	Illustrate the noise performance in Analog Modulation techniques and also the concepts of Pulse Analog Modulation and Demodulation techniques	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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## **COURSE CONTENT**

### **Unit – I**

**Amplitude Modulation:** Introduction to Fourier transform, Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Time domain and Frequency domain descriptions, Single tone modulation, Power relations in AM waves, Generation of AM waves: Square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector, Related problems.

### **Unit – II**

**DSB & SSB Modulation:** Double sideband suppressed carrier modulator: Time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulator, Ring Modulator, Detection of DSBSC Waves: Coherent detection, Quadrature Null Effect, COSTAS Loop, Squaring Loop.

Single sideband suppressed carrier modulator: Time domain and Frequency domain description, Generation of SSBSC Waves: Frequency discrimination method, Phase discrimination method, Demodulation of SSB Waves: Coherent Detection.

Vestigial sideband modulation: Time domain description, Frequency domain description, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier, Comparison of different AM Techniques, Applications of different AM Systems, Related problems.

### **Unit – III**

**Angle Modulation:** Introduction, Basic concept of phase modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave, Generation of FM Waves: Direct Method, Indirect Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM, Related problems.

### **Unit – IV**

**Radio Transmitters:** Classification of Transmitters, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter: Variable reactance type and Phase modulated FM Transmitter, Frequency stability in FM Transmitter.

**Radio Receivers:** Receiver Types: Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics, Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Amplitude limiting, Comparison of FM & AM Receivers, Communication Receivers, Extension of super heterodyne principle and additional circuits.

### **Unit – V**

**Noise:** Review of noise and noise sources, Noise figure, Noise in Analog communication Systems: Noise in DSB & SSB Systems, Noise in AM System and Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & De-emphasis.

**Pulse Analog Modulation:** Types of Pulse modulation, PAM (Single polarity, double polarity), PWM: Generation & Detection of PWM, PPM: Generation and Detection of PPM, Time Division Multiplexing, TDM Vs FDM.



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**Text Books:**

1. Communication Systems, Simon Haykin, Michael Moher, Wiley, 5th Edition, 2009.
2. Principles of Communication Systems, H Taub, D L Schilling, Gautam Sahe, TMH, 4th Edition, 2017.
3. Modern Digital and Analog Communication Systems, B.P.Lathi, Zhi Ding, Hari Mohan Gupta, Oxford University Press, 4th Edition, 2017.

**Reference Books:**

1. Electronics & Communication Systems, George Kennedy, Bernard Davis, S R M Prasanna, TMH, 6th Edition, 2017.
2. Communication Systems, R P Singh, S D Sapre, TMH, 3rd Edition, 2017.
3. Communication Systems (Analog and Digital), Dr. Sanjay Sharma, Katson Books, 7th Reprint Edition, 2018

**Web Links:**

1. <http://nptel.ac.in/courses/117102059/> Prof. Surendra Prasad.
2. <https://ict.iitk.ac.in/wp-content/uploads/EE320A-Principles-Of-Communication-CommunicationSystems-4ed-Haykin.pdf>.
3. <https://www.scribd.com/document/266137872/sanjay-sharma-pdf>.
4. <http://bayanbox.ir/view/914409083519889086/Book-Modern-Digital-And-AnalogCommunication-Systems-4th-edition-by-Lathi.pdf>.
5. <https://soaneemrana.org/onewebmedia/ELECTRONICS%20COMMUNICATION%20SYSTEM%20BY%20GEORGE%20KENNEDY.pdf>

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**List of Experiments:**

**I. Generation of Basic Signals (Analog and Discrete)**

1. Unit step
2. Unit impulse
3. Unit Ramp
4. Sinusoidal
5. Signum

**II. Operations on signals**

1. Addition & Subtraction
2. Multiplication & Division
3. Maximum & minimum

**III. Energy and power of signals ,even and odd signals**

**IV. Transformation of the independent variable**

1. Shifting (Delay & Advance)
2. Reversing
3. Scaling

**V. Convolution & Deconvolution**

**VI. Correlation**

**VII. Fourier Series Representation**

**VIII. Fourier Transform and Analysis of Fourier Spectrum**

**IX. Laplace Transform**

**X. Z-Transforms**



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**II YEAR II SEMESTER**  
**ELECTRONIC CIRCUIT ANALYSIS LABORATORY**

<b>Course Category</b>	Professional Core	<b>Course Code</b>	24EC404P
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-0-3-1.5
<b>Prerequisites</b>	Concepts of Amplifiers	<b>Continuous Internal Assessment</b> <b>Semester End Examination</b> <b>Total Marks</b>	30 70 100

**COURSE OBJECTIVES**

1. To analyze frequency response of multistage amplifiers.
2. To illustrate the effect of feedback on the performance of the amplifier.
3. To design oscillators and power amplifiers for the given specifications.

**COURSE OUTCOMES**

Upon successful completion of the course, the student will be able to:			<b>Cognitive Level</b>
<b>CO1</b>	Analyze the frequency response of multistage amplifiers.		K2
<b>CO2</b>	Explain the effect of feedback on the performance of the amplifier.		K2
<b>CO3</b>	Design Oscillators and Power amplifiers for the given specifications.		K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program**  
**Outcomes (1 – Low, 2 - Medium, 3 – High)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3										1		3	3
CO2	3	2									2	1	2	3
CO3	3	2	2								3		2	3



**List of Experiments:**

**List of Experiments: (Minimum of Ten Experiments has to be performed)**

1. Determination of  $F_t$  of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt's Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

**Equipment required: Software:**

- i. Multisim/Equivalent Industrial Standard Licensed simulation software tool.
- ii. Computer Systems with required specifications

**Hardware Required:**

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components



**II YEAR II SEMESTER  
SOFT SKILLS**

<b>Course Category</b>	Humanities	<b>Course Code</b>	24BE401S
<b>Course Type</b>	Laboratory	<b>L-T-P-C</b>	0-1-2-2
<b>Prerequisites</b>	LSRW Skills	<b>Internal Assessment</b> <b>Semester End Examination</b> <b>Total Marks</b>	30 70 100

**COURSE OBJECTIVES**

1	To prepare to face global competition for employment and excellence in the profession.
2	To help the students understand and build intrapersonal and interpersonal skills that will enable them to lead meaningful professional lives.

S.NO	COURSE OUTCOME		Cognitive Level
1	CO1	Assimilate and understood the meaning and importance of soft skills and learn how to develop them.	K1
2	CO2	Understand the significance of skills in the working environment for Professional excellence.	K2
3	CO3	Prepare to undergo the placement process with confidence and clarity.	K3
4	CO4	Ready to face any situation in life and equip themselves to handle them effectively.	K6
5	CO5	Understand and learn the importance of etiquette in both professional and personal life.	K2

K1- Remembering, K2- Understanding, K3-Applying, K-4 Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)**

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



## **COURSE CONTENT**

### **UNIT I**

#### **Introduction:**

*Introduction: Emergence of life skills, definition, Importance & need, reasons for skill gap, Analysis--Soft Skills vs. hard skills, Linkage between industry and soft skills, Challenges, Personality Developments. Soft Skills, Soft Skills vs English - Improving Techniques.*

### **UNIT II**

#### **Intra-Personal:**

Definition-Meaning-Importance- SWOT analysis, Johari windows- Goal Setting – quotient skills - Emotional Intelligence- Attitudinal skills - Right thinking- Problem Solving-Time management, stress management.

### **UNIT III**

#### **Inter-Personal:**

Definition-Meaning-Importance-Communications skills-Teamwork, managerial skills  
-Negotiation skills -Leadership skills, corporate etiquettes.

### **UNIT IV**

#### **Verbal Skills:**

Definition and Meaning-Listening skills, need- types, advantages, Importance-Improving Tips for Listening, Speaking, need- types, benefits, Importance- Improving Tips, Reading- Writing Skills, Report, Resume, statement of purpose, need- types, advantages, Importance-Improving Tips.

### **UNIT V**

#### **Non Verbal Skills & Interview skills**

Definition and Meaning – Importance- Facial Expressions- Eye Contact – Proxemics- Haptics -Posture, cross cultural body language, body language in the interview room, appearance and dress code-Kinetics-Para Language-tone, pitch, pause, neutralization of accent, use of appropriate language, Interview skills, interview methods, and questions.

## **TEXT BOOKS**

1. Sherfield, M. Robert et al, Cornerstone Developing SoftSkills, 4/e, Pearson Publication, New Delhi, 2014.
2. Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited, 2016.

## **REFERENCE BOOKS**

1. Sambaiah .M. Technical English, Wiley Publishers India. New Delhi. 2014.
2. Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.
3. Alex. K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
4. Meenakshi Raman and Sangita Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2009.
5. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication, New Delhi, 2014.
6. Stephen Covey, Seven Habits of Highly Effective People, JMDBook, 2013.

## **Online Learning Resources:**

1. [https://onlinecourses.nptel.ac.in/noc20\\_hs60/preview](https://onlinecourses.nptel.ac.in/noc20_hs60/preview)
2. <http://www.youtube.com/@softskillsdevelopment6210>
3. [https://youtube.com/playlist?list=PLLy\\_2iUCG87CQhELCytvXh0E\\_y-bOO1\\_q&si=Fs05Xh8ZrOPsR8F4](https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&si=Fs05Xh8ZrOPsR8F4)
4. <https://www.coursera.org/learn/people-soft-skills-assessment?language=English>
5. <https://www.edx.org/learn/soft-skills>



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**  
(Autonomous)  
**DEPARTMENT ELECTRONICS AND COMMUNICATION ENGINEERING**

**R23**

**II YEAR II SEMESTER**  
**DESIGN THINKING & INNOVATION**  
(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY))

<b>Course Category</b>	BS&H	<b>Course Code</b>	24HM401P
<b>Course Type</b>	Theory	<b>L-T-P-C</b>	1 -0 -2-2
<b>Prerequisites</b>		<b>Internal Assessment</b> <b>Semester End Examination</b> <b>Total Marks</b>	30 70 100

Course Outcomes		Blooms Taxonomy Level
Upon successful completion of the course, the student will be able to		
CO 1	Define the concepts related to design thinking.	K1
CO 2	Explain the fundamentals of Design Thinking and innovation.	K2
CO 3	Apply the design thinking techniques for solving problems in various sectors.	K3
CO 4	Analyze to work in a multidisciplinary environment.	K4
CO 5	Evaluate the value of creativity.	K5

<b>Contribution of Course Outcomes towards achievement of Program Outcomes</b> (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3		1	3					1	1
CO2			3		2	3						
CO3		1	3			3			1			1
CO4			3			3						
CO5			3			3					3	2



## **COURSE CONTENT**

### **UNIT – I Introduction to Design Thinking**

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

### **UNIT - II Design Thinking Process**

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

**Activity:** Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

### **UNIT - III Innovation**

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

**Activity:** Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

### **UNIT - IV Product Design**

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

**Activity:** Importance of modeling, how to set specifications, Explaining their own product design.

### **UNIT – V Design Thinking in Business Processes**

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

**Activity:** How to market our own product, about maintenance, Reliability and plan for startup.

#### **Textbooks:**

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

#### **Reference Books:**

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

#### **Web Resources:**

- <https://nptel.ac.in/courses/110/106/110106124/>
- <https://nptel.ac.in/courses/109/104/109104109/>
- [https://swayam.gov.in/nd1\\_noc19\\_mg60/preview](https://swayam.gov.in/nd1_noc19_mg60/preview)
- [https://onlinecourses.nptel.ac.in/noc22\\_de16/preview](https://onlinecourses.nptel.ac.in/noc22_de16/preview)