



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



B.TECH. - ELECTRONICS & COMMUNICATION ENGINEERING

Course Structure R-25

SEMESTER I

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	BS	EBSM1	Matrices and Calculus	3	1	0	4	40	60	100
2	BS	EBSC1	Engineering Chemistry	3	0	0	3	40	60	100
3	ES	EESEE3	Introduction to Electrical Engineering	2	0	0	2	40	60	100
4	ES	EESCP1	C programming & Data structures	3	0	0	3	40	60	100
5	HS	EHSE1	English for skill Enhancement	3	0	0	3	40	60	100
6	BS	EBSC2	Engineering Chemistry Lab	0	0	2	1	40	60	100
7	ES	EESEE4	Basic Electrical Engineering Lab	0	0	2	1	40	60	100
8	ES	EESCP2	C programming & Data Structures Lab	0	0	2	1	40	60	100
9	HS	EHSE2	English language and Communications lab	0	0	2	1	40	60	100
10	ES	EESEW1	Engineering Workshop	0	0	2	1	40	60	100
			Induction Program							
Total Credits				14	01	10	20	400	600	1000

SEMESTER II

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	BS	EBSM2	Ordinary Differential equations and Vector Calculus	3	0	0	3	40	60	100
2	BS	EBSP1	Advanced Engineering Physics	3	0	0	3	40	60	100
3	ES	EESDC1	Semiconductor Devices and Circuits	3	0	0	3	40	60	100
4	ES	EESPP2	Python Programming	3	0	0	3	40	60	100
5	ES	EESNAS1	Network Analysis & Synthesis	3	0	0	3	40	60	100
6	ES	EESED1	Computer Aided Engineering Graphics	3	0	0	3	40	60	100
7	BS	EBSP2	Advanced Engineering Physics Lab	0	0	2	1	40	60	100
8	ES	EESDC2	Semiconductor Devices and Circuits Lab	0	0	2	1	40	60	100
9	ES	EESPP3	Applied Python Programming Lab	0	0	2	1	40	60	100
Total Credits				18	0	06	21	360	540	900



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

3/1/0 4

MATRICES AND CALCULUS

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives:

To learn

1. Understand and apply matrix methods for finding rank, inverse, and solving systems of linear Equations
2. Apply eigen concepts, transformations, and the Cayley–Hamilton theorem to analyze matrices and quadratic forms.
3. Apply limits, continuity, mean value theorems, and Taylor’s series to single-variable function Problems.
4. Analyze multivariable functions using partial differentiation, Jacobians, and Lagrange Multipliers for extrema
5. Evaluate double integrals, apply coordinate transformations, and compute areas using integration

Course outcomes:

After learning the contents of this paper, the student must be able to

1. Apply matrix methods to determine rank using Echelon and Normal forms, find inverses by the Gauss–Jordan method, and solve homogeneous and non-homogeneous systems of linear Equations
2. Apply eigenvalue and eigenvector concepts, the Cayley–Hamilton theorem, and orthogonal Transformations to solve matrix problems and reduce quadratic forms to canonical form
3. Apply the concepts of limits, continuity, mean value theorems, and Taylor’s series to analyze and solve problems involving single variable functions
4. Analyze multivariable functions using partial differentiation, Euler’s theorem, total derivatives, and Jacobians, and determine extrema through functional dependence, independence, and Lagrange multipliers
5. Analyze and evaluate double integrals in Cartesian and polar forms, apply change of order and variables, and determine areas using double integration techniques.

UNIT-I:

Matrices

Rank of a matrix by Echelon form and Normal form — Inverse of Non-singular matrices by Gauss-Jordan method. System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations. Gauss Seidel Iteration Method

UNIT-II:

Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values — Eigen vectors and

their properties – Diagonalization of a matrix – Cayley-Hamilton Theorem (without proof) –

Finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms – Reduction of Quadratic form to canonical form by Orthogonal Transformation.

UNIT-III:

Single Variable Calculus

Limit and Continuous of functions and its properties. Mean value theorems: Rolle's theorem – Lagrange's Mean value theorem with their Geometrical Interpretation and applications – Cauchy's Mean value Theorem – Taylor's Series (All the theorems without proof). Curve Tracing: Curve tracing in cartesian coordinates.

UNIT-IV:

Multivariable Calculus (Partial Differentiation and applications)

Definitions of Limit and continuity – Partial Differentiation: Euler's Theorem – Total derivative – Jacobian – Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates) – change of order of integration (only Cartesian form) – Change of variables for double integrals (Cartesian to polar). Evaluation of Triple Integrals – Change of variables for triple integrals (Cartesian to Spherical and Cylindrical polar coordinates). Applications: Areas by double integrals and volumes by triple integrals.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

3/0/0 3

ENGINEERING CHEMISTRY

Course Objectives:

1. Understand water quality parameters and apply suitable treatment methods for potable and Industrial water.
2. Learn electrochemical principles for electrode potential measurement, pH determination, and Corrosion prevention.
3. Understand various energy sources, including batteries, fuel cells, fossil fuels, and synthetic Fuels, along with their applications.
4. Learn the classification, preparation, properties, and applications of polymers, including Conducting polymers.
5. Understand the properties, and engineering applications of smart materials, biosensors, cement, and lubricants.

Course Out comes:

At the end of the course, student would be able to -

- CO1:** Apply water quality analysis and treatment methods, including hardness removal, Disinfection, boiler feed water treatment, and desalination techniques.
- CO2:** Apply electrochemical principles to measure electrode potentials and pH, and analyze Corrosion mechanisms with appropriate prevention methods.
- CO3:** Apply the concepts of conventional and alternative energy sources, including batteries, fuel Cells, and fuels, for energy production and applications.
- CO4:** Analyze polymer types, preparation, properties, and applications, including conducting Polymers.
- CO5:** Analyze the properties and applications of smart materials, biosensors, cement, and lubricants In engineering.

UNIT-I:

Water and its treatment:

Introduction-types of hardness and units. Estimation of hardness of water by complexometric method - Numerical problems. Potable water and its specifications (WHO) – Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break-point chlorination.

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning, Phosphate conditioning, Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis.

UNIT-II:

Electro chemistry and Corrosion:

Introduction- Electrode potential, standard electrode potential, Nernst equation (no derivation),

electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of electrodes, reference electrodes - Primary reference electrode - Standard Hydrogen Electrode (SHE), Secondary reference electrode - Calomel electrode, Construction, working and determination of pH of unknown solution using SHE and Calomel electrode.

Corrosion: Introduction- Definition, causes and effects of corrosion – Theories of corrosion, chemical and electrochemical theories of corrosion, Types of corrosion: galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion - Nature of the metal, Nature of the corroding environment. Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods.

UNIT-III:

Energy sources:

Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Zn-air and Lithium-ion battery. Fuel Cells – Differences between a battery and a fuel cell, Construction and applications of Direct Methanol Fuel Cell (DMFC).

Fuels: Introduction and characteristics of a good fuel, Calorific value–Units-HCV, LCV

Fossil fuels: Introduction, Classification, Petroleum - Refining of Crude oil, Cracking - Types of cracking - Moving bed catalytic cracking. LPG and CNG composition and uses.

Synthetic Fuels: Fischer-Tropsch process.

UNIT-IV:

Polymers:

Definition-Classification of polymers: Based on origin and tacticity with examples –Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization. Plastics, Elastomers and Fibers: Definition and applications (PVC, Buna-S, Nylon-6,6). Thermoplastics and thermosetting plastics.

Conducting polymers: Definition and Classification with examples-Mechanism of conduction in trans-poly-acetylene and applications of conducting polymers.

UNIT-V:

Advanced Functional Materials:

Smart materials: Introduction, Classification with examples - Shape Memory Alloys – Nitinol, Piezoelectric materials – quartz and their engineering applications.

Biosensor: Definition, Amperometric Glucose monitor sensor.

Cement: Portland cement, its composition, setting and hardening.

Lubricants: Definition and characteristics of a good lubricant – thin film mechanism of lubrication, properties of lubricants - viscosity, cloud and pour point, flash and fire point.

Suggested Text Books:

1. Engineering Chemistry by P.C.Jain and M. Jain, Dhanpatrai Publishing Company, 2010.
2. Engineering Chemistry by Rama Devi, Dr.P. Aparna and Rath, Cengage learning, 2025.

Reference Textbooks:

1. Engineering Chemistry by Thirumala Chary, Laxminarayana & Shashikala, Pearson Publications (2020).
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company(P)Ltd. Delhi 2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.

4. Engineering Analysis of Smart Material Systems by Donald J.Leo,Wiley,2007.
5. Challenges and Opportunities in Green Hydrogen by **Editors:** Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. <https://www.worldscientific.com/doi/epdf/10.1142/13094>
7. E-Content-<https://doi.org/10.1142/13094>|October2023
8. E-books:
<https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2up>



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

2/0/0 2

INTRODUCTION TO ELECTRICAL ENGINEERING

Prerequisites: Mathematics

Course Objectives:

1. To introduce the concepts of DC circuits, laws, and network theorems for circuit analysis
2. To explain the fundamentals of AC circuits, phasor analysis, power concepts, and three-phase Systems..
3. To study the construction, equivalent circuit, losses, efficiency, and performance of Transformers.
4. To explain the construction, working principles, and characteristics of DC machines, Induction motors, and synchronous generators.
5. To acquire knowledge of low-voltage electrical installations, protective devices, batteries, and energy management practices.

Course Outcomes: After learning the contents of this course the student must be able to

1. Apply fundamental laws and theorems to analyze DC circuits L3
2. Analyze phasor analysis and power calculations in single-phase and three-phase systems. L4
3. Explain the construction, operation, and performance of transformers L3
4. Evaluate the characteristics, construction, and performance of electrical machines—DC machines, induction motors, and synchronous generators L5
5. Analyze different electrical installations with emphasis on components, safety Considerations, energy calculations, power factor improvement, and battery backup. L3

.Course Articulation Matrix:

(Correlation of Course Outcomes with Program Outcomes using mapping levels

1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	0	0	0	0	0	1	2
CO2	3	2	2	2	2	0	0	0	1	0	1	2
CO3	3	2	2	1	3	0	0	0	1	1	1	2
CO4	3	2	2	2	3	1	0	0	1	1	1	2
CO5	3	2	2	2	2	2	2	2	1	1	1	3

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, Mesh and Nodal Analysis ,analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton Theorems and Maximum Power Transfer theorem.

UNIT-II:

A. C. Circuits: Introduction to sinusoidal waveforms, phasor representation, the concept of power and power factor, Analysis of 1-phase RLC series and parallel circuits, resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III:

Transformers: Principle of operation, equivalent circuit, losses, regulation and efficiency. Introduction to Auto-transformer.

UNIT-IV:

Electrical Machines: Principle of operation of DC machine, performance characteristics of dc shunt machine. Principle of operation of a 3-phase induction motor, torque-slip characteristics. Principle of operation of synchronous generator.

UNIT-V:

Electrical Installations: Components of LT Switchgear: SFU, MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, and Characteristics. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2nd Edition, 2008.

Reference Books:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

3/0/0 3

C PROGRAMMING & DATA STRUCTURES

Course Objectives:

Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes:

Upon successful completion of this course, students will be able to:

- Demonstrate foundational knowledge of computer systems, number systems, algorithms, and structured programming constructs in C to foster computational thinking and analytical learning
- Apply decision-making and iterative constructs, arrays, and string operations in C to solve real-world problems using modern programming tools
- Develop modular C programs using functions, pointers, and dynamic memory allocation to design and investigate complex problems
- Design and implement recursive algorithms and user-defined data types (structures/unions) for robust, ethically responsible solutions
- Implement file handling and basic search/sort algorithms in C for efficient data processing, demonstrating lifelong learning and professional behavior

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	2	0	1	1	1	0	3
CO2	3	3	3	2	3	0	1	1	2	0	3
CO3	3	3	3	3	3	0	1	1	2	1	3
CO4	3	2	3	2	2	1	1	1	2	1	3
CO5	3	2	3	2	3	0	1	1	2	1	3

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

Structure of a C Program – Operators, Bit-wise operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements.

UNIT - II

Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

Designing Structured Programs- Functions, basics, user defined functions, inter function communication, standard functions.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

UNIT - III

Pointers – Introduction, Pointers for inter function communication, pointers to pointers, compatibility, **Pointer Applications** – Passing an array to a function, Memory allocation functions, array of pointers **Strings** – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

UNIT - IV

Derived types – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

Input and Output – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

UNIT – V

Sorting- selection sort, bubble sort, insertion sort,

Searching-linear and binary search methods.

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

Text Books:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

Reference Books:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

3/0/0 3

ENGLISH FOR SKILL ENHANCEMENT

INTRODUCTION

National Education Policy-2020 aims at preparing students with knowledge, skills, values, leadership qualities and initiates them for lifelong learning. It also emphasizes language study and promotion of languages through understanding and proper interpretation. English language is central to the educational eco system. The importance of language as medium of communication for personal, social, official and professional needs to be emphasized for clear and concise expression. Teaching and learning of receptive and productive skills viz., Listening, Speaking, Reading and Writing (LSRW) are to be taught and learnt effectively in the undergraduate Engineering programs. Learners should be encouraged to engage in a rigorous process of learning to become proficient users of English language by adopting a deeply focused and yet flexible approach as opposed to rote learning.

In this connection, suitable syllabus, effective pedagogy, continuous assessments and students' involvement result in productive learning. This course supports the latest knowledge and skill requirements and shall meet specified learning outcomes. The main objectives of English language teaching and learning as medium of communication and for promotion of cultural values are embedded in this syllabus. Efforts are being made in providing a holistic approach towards value-based language learning which equips the learner with receptive as well as productive skills.

The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed textbook for detailed study. The students should be encouraged to read the texts leading to reading comprehension. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material.

LEARNING OBJECTIVES:

This course will enable the students to:

- Improve their vocabulary.
- Use appropriate sentence structures in their oral and written communication.
- Develop their reading and study skills.
- Equip students to write paragraphs, essays, précis and draft letters.
- Acquire skills for Technical report writing.

COURSE OUTCOMES:

Students will be able to:

- Choose appropriate vocabulary in their oral and written communication.

- b. Demonstrate their understanding of the rules of functional grammar and sentence structures.
- c. Develop comprehension skills from known and unknown passages.
- d. Write paragraphs, essays, précis and draft letters.
- e. Write abstracts and reports in various contexts.

SYLLABUS: The course content / study material is divided into **Five Units**.

UNIT –I

Theme: Perspectives

Lesson on ‘The Generation Gap’ by Benjamin M. Spock from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Words Often Misspelt - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions – Degrees of Comparison

Reading: Reading and Its Importance- Sub Skills of Reading – Skimming and Scanning.

Writing: Sentence Structures and Types -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing Precisely –Nature and Style of Formal Writing.

UNIT –II

Theme: Digital Transformation

Lesson on ‘Emerging Technologies’ from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Reading Strategies-Guessing Meaning from Context – Identifying Main Ideas – Exercises for Practice

Writing: Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence – Linkers and Connectives - Organizing Principles in a Paragraph – Defining- Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.

UNIT –III

Theme: Attitude and Gratitude

Poems on ‘Leisure’ by William Henry Davies and ‘Be Thankful’ - Unknown Author from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume –Difference between Writing a Letter and an Email - Email Etiquette.

UNIT –IV

Theme: Entrepreneurship

Lesson on ‘Why a Start-Up Needs to Find its Customers First’ by Pranav Jain from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Standard Abbreviations in English – Inferring Meanings of Words through Context – Phrasal Verbs – Idioms.

Grammar: Redundancies and Clichés in Written Communication – Converting Passive to Active Voice and Vice-Versa.

Reading: Prompt Engineering Techniques– Comprehending and Generating Appropriate Prompts - Exercises for Practice

Writing: Writing Practices- Note Making-Précis Writing.

UNIT –V

Theme: Integrity and Professionalism

Lesson on ‘Professional Ethics’ from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Technical Vocabulary and their Usage– One Word Substitutes – Collocations.

Grammar: Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice

Writing: Report Writing - Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.

Note: *Listening and Speaking skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.*

➤ (Note: As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech. First Year is **Open-ended**, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.)

Text Book:

1. Board of Editors. 2025. *English for the Young in the Digital World*. Orient Black Swan Pvt. Ltd.

Reference Books:

1. Swan, Michael. (2016). *Practical English Usage*. Oxford University Press. New Edition.
2. Karal, Rajeevan. 2023. *English Grammar Just for You*. Oxford University Press. New Delhi
3. 2024. *Empowering with Language: Communicative English for Undergraduates*. Cengage Learning India Pvt. Ltd. New Delhi
4. Sanjay Kumar & Pushp Lata. 2022. *Communication Skills – A Workbook*. Oxford University Press. New Delhi
5. Wood, F.T. (2007). *Remedial English Grammar*. Macmillan.
6. Vishwamohan, Aysha. (2013). *English for Technical Communication for Engineering Students*. Mc Graw-Hill Education India Pvt. Ltd.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

0/0/2 1

ENGINEERING CHEMISTRY LABORATORY

Course Description:

The course includes experiments based on fundamental principles of chemistry essential for engineering students, aiming to develop practical skills and reinforce theoretical concepts.

Course Objectives:

1. **Estimate** water hardness and **assess** its suitability for drinking.
2. **Demonstrate** acid-base titrations using conductometry, potentiometry, and pH metry.
3. **Synthesize** Bakelite and Nylon 6,6 in the lab.
4. **Measure** acid value and viscosity to **evaluate** material properties.
5. **Interpret** virtual experiments for engineering applications

Course Outcomes:

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

CO1: Determine the hardness in water to verify its suitability for drinking purpose.

CO2: Apply techniques like conductometry, potentiometry, pH metry to determine Concentrations in acid-base reactions.

CO3: Use fundamental preparatory techniques for the synthesis of Bakelite and Nylon-6, 6.

CO4: Determine physical properties, namely acid value and viscosity of a given fluid.

CO5: Demonstrate the ability to analyze and interpret virtual experiments based on fundamental Chemical principles applicable to engineering systems.

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometric method.

II. Conductometry:

1. Estimation of the concentration of strong acid by Conductometry.
2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.

III. Potentiometry:

1. Estimation of concentration of Fe^{+2} ion by potentiometry using KMnO_4 .
2. Estimation of concentration of strong acid with strong base by potentiometry using quinhydrone

IV. Colorimetry: Verification of Lambert-Beer's law using KMnO_4

V. Preparations:

1. Preparation of Bakelite.
2. Preparation of Nylon- 6,6.

VI. pH Metry: Determination of an acid concentration using pH meter.

VII. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of viscosity of lubricant oil using Ostwald's Viscometer.

VIII. Virtual lab experiments:

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications

Additional Experiments:

1. Thin layer Chromatography calculation of R_f values
2. Determination of Surface tension of given liquid by using Stalagnometer.

Reference Books:

1. Lab manual for Engineering chemistry by B. Ramadevi and P.Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's textbook of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I.Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

0/0/2 1

BASIC ELECTRICAL ENGINEERING LAB

Prerequisites: Basic Electrical Engineering

Course Objectives:

1. To study the basic knowledge of electrical circuits using various laws.
2. To learn to use different theorems for electrical circuits.
3. To measure the performance of single phase transformer.
4. To understand the performance characteristics of electrical machines
5. To understand the basic electrical engineering knowledge for house wiring practice.

Course Outcomes:

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

1. Apply Ohm's law, Kirchhoff's law and basic circuit analysis methods to solve electrical networks L3
2. Develop and implement network theorem to solve complex electrical networks.L4
3. Analyze the resonance characteristics of AC circuits L4
4. Evaluate the performance characteristics of different types of Electrical machines and single phase transformer by conducting various tests L5
5. Design and analyze electrical systems of series and parallel connection L4

COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes using mapping levels

1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	–	–	–	–	–	2
CO2	3	3	2	2	3	1	–	–	–	–	–	2
CO3	3	3	2	3	2	1	–	–	–	–	–	2
CO4	3	3	2	3	2	1	–	–	–	–	–	2
CO5	3	2	3	3	2	2	–	–	–	–	–	2

List of experiments/demonstrations:

PART- A (compulsory)

1. Verification of KVL and KCL

2. Verification of Mesh and Nodal Analysis
3. Verification of Thevenin's and Norton's theorem
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series Circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)

1. Verification of Superposition theorem.
2. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. No-Load Characteristics of a Three-phase Alternator
5. Make circuit for series and parallel connection of lamps.

Text Books:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

Reference Books:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

0/0/2 1

C PROGRAMMING & DATA STRUCTURES LAB

Course Objectives:

Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes:

Upon successful completion of this course, students will be able to:

- Demonstrate foundational knowledge of C programming constructs (data types, control flow, functions) and computational thinking to solve basic algorithmic problems.
- Implement iterative and recursive algorithms (loops, recursion) in C for mathematical sequences, factorial, GCD, and Towers of Hanoi, optimizing for correctness and efficiency.
- Design and manipulate complex data structures using pointers, user-defined types (structures/unions), and dynamic memory allocation to build modular C applications.
- Develop file-based utilities—file copy, merge, reverse, and text processing—ensuring reliable data handling and ethical responsibility.
- Apply searching, sorting, and advanced string operations to process and analyze data, demonstrating teamwork, professional communication, and commitment to lifelong learning.

CO-PO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1	2	0	1	2	2	0	3
CO2	2	3	3	2	2	0	1	2	2	0	3
CO3	3	3	3	2	3	0	1	2	2	1	3
CO4	2	2	2	2	3	1	3	2	2	1	2
CO5	2	3	3	1	2	0	1	3	3	1	3

List of Experiments:

1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C program to find the roots of a quadratic equation.
5. Write a C program to find the factorial of a given integer.

6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
 - a. Addition of Two Matrices
 - b. Multiplication of Two Matrices
11. Write a C program that uses functions to perform the following operations:
 - a. To insert a sub-string in to a given main string from a given position.
 - b. To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
14. Write a C program to count the lines, words and characters in a given text.
15. Write a C program to generate Pascal's triangle.
16. Write a C program to construct a pyramid of numbers.
17. Write a C program that uses functions to perform the following operations:
 - a. Reading a complex number
 - b. Writing a complex number
 - c. Addition of two complex numbers
 - d. Multiplication of two complex numbers
18. (Note: represent complex number using a structure.)
19. Write a C program which copies one file to another.
20. Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)
21. Write a C program to display the contents of a file.
22. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)
23. Write a C program that uses functions to perform the following operations on singly linked list.:
 - i) Creation ii) Insertion iii) Deletion iv) Traversal
24. Write C programs that implement stack (its operations) using
 - i) Arrays ii) Pointers
25. Write C programs that implement Queue (its operations) using
 - i) Arrays ii) Pointers
26. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
 - i) Bubble sort ii) Selection sort iii) Insertion sort
27. Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:
 - i) Linear search ii) Binary search

Text Books:

1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Let us C, Yeswanth Kanitkar
3. C Programming, Balaguruswamy.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

0/0/2 1

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

The **English Language and Communication Skills (ELCS) Lab** focuses on listening and speaking skills, particularly on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Listening Skills:

Objectives

1. To enable students develop their active listening skills
2. To equip students with necessary training in listening, so that they can comprehend the speech of people from different linguistic backgrounds

Speaking Skills:

3. To improve their pronunciation and neutralize accent
4. To enable students express themselves fluently and appropriately
5. To practise speaking in social and professional contexts

Learning Outcomes: Students will be able to:

1. Listen actively and identify important information in spoken texts
2. Interpret the speech and infer the intention of the speaker
3. Improve their accent for intelligibility
4. Speak fluently with clarity and confidence
5. Use the language in real life situations

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

- a. **Computer Assisted Language Learning (CALL) Lab** which focusses on listening skills
- b. **Interactive Communication Skills (ICS) Lab** which focusses on speaking skills

The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise – I

CALL Lab:

Instruction: Speech Sounds-Listening Skill - Importance – Purpose - Types- Barriers- Active Listening

Practice: Listening to Distinguish Speech Sounds (Minimal Pairs) - *Testing Exercises*

ICS Lab:

❖ Diagnostic Test – Activity titled ‘Express Your View’

Instruction: Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others

Practice: Any Ice-Breaking Activity

Exercise – II CALL Lab:

Instruction: Listening vs. Hearing - Barriers to Listening

Practice: Listening for General Information - Multiple Choice Questions - Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: Features of Good Conversation – Strategies for Effective Communication

Practice: Role Play Activity - Situational Dialogues –Expressions used in Various Situations – Making Requests and Seeking Permissions – Taking Leave - Telephone Etiquette

Exercise - III CALL Lab:

Instruction: Errors in Pronunciation – Tips for Neutralizing Mother Tongue Influence (MTI)

Practice: Differences between British and American Pronunciation –Listening Comprehension Exercises

ICS Lab:

Instruction: Describing Objects, Situations, Places, People and Events

Practice: Picture Description Activity – Looking at a Picture and Describing Objects, Situations, Places, People and Events (A wide range of Materials / Handouts are to be made available in the lab.)

Exercise – IV CALL Lab:

Instruction: Techniques for Effective Listening

Practice: Listening for Specific Details - Listening - Gap Fill Exercises - Listening Comprehension Exercises

(It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: How to Tell a Good Story - Story Star- Sequencing-Creativity

Practice: Activity on Telling and Retelling Stories - Collage

Exercise – V CALL Lab:

Instruction: Identifying the literal and implied meaning

Practice: Listening for Evaluation - Write the Summary – Listening Comprehension Exercises

(It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: Understanding Non-Verbal Communication

Practice: Silent Speech - Dumb Charades Activity

❖ **Post-Assessment Test on ‘Express Your View’****Minimum Requirement of infrastructural facilities for ELCS Lab:****1. Computer Assisted Language Learning (CALL) Lab:**

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

- **Note: English Language Teachers are requested to prepare Materials / Handouts for each Activity for the Use of those Materials in CALL & ICS Labs.**

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

REFERENCE BOOKS:

1. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
2. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient BlackSwan Pvt. Ltd.
3. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press
4. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
5. Ur, Penny and Wright, Andrew. 2022. *Five Minute Activities – A Resource Book for Language Teachers*. Cambridge University Press.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year I Semester

L/T/P C

0/0/2 1

ENGINEERING WORKSHOP

Prerequisites: Practical skill

Course Objectives:

1. To introduce students to basic manufacturing processes and workshop practices.
2. To provide hands-on training in carpentry, fitting, welding, sheet metal, and machining
3. To develop skills in using hand tools and measuring instruments.
4. To enhance safety awareness and proper handling of workshop equipment.
5. To build a foundational understanding of industrial production and fabrication.

Course Outcomes:

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

1. Understand the basic manufacturing processes and operations.
2. Use hand tools and equipment safely and efficiently.
3. Perform basic operations in carpentry, fitting, welding, sheet metal work, and machining
4. Read and interpret workshop drawings
5. Develop teamwork, time management, and quality awareness in a workshop environment.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

- i. **Carpentry:** T- Lap Joint, Dovetail Joint, Mortise and Tenon Joint
- ii. **Fitting:** V- Fit, Dovetail Fit and Semi- circular fit
- iii. **Tin Smithy:** Square Tin, Rectangular Tray and Conical Funnel
- iv. **Foundry:** Preparation of Green Sand Mould using Single Piece and Split Pattern
- v. **Welding Practice:** Arc Welding and Gas Welding
- vi. **House wiring:** Parallel and Series, Two-way Switch and Tube Light
- vii. **Black Smithy:** Round to Square, Fan Hook and S- Hook

2. TRADES FOR DEMONSTRATION AND EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

Text Books:

1. Workshop Practice, B. L. Juneja, Cengage Learning India, 1st edition, 2015.
2. Workshop Practice Manual, K. Venkata Reddy, BS Publication, 6th Edition, Rpt.2025.

Reference Book:

1. Workshop Manual, K. Venugopal, Anuradha Publications, 2012th edition, 2012.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

3/0/0 3

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives:

To learn

1. Understand and apply methods to solve first-order differential equations and model basic Physical phenomena.
2. Learn techniques to solve higher-order linear differential equations with constant coefficients and variable parameters.
3. Understand Laplace transform concepts and apply them to solve initial value problems and Evaluate integrals
4. Learn vector differentiation concepts to analyze vector fields and determine their properties.
5. Understand vector integration and apply fundamental theorems to evaluate integrals in Engineering contexts.

Course outcomes:

After learning the contents of this paper, the student must be able to

1. Apply methods to solve first-order differential equations and model real-life problems such as Cooling, growth, and decay
2. Apply methods to solve higher-order linear differential equations with constant coefficients Using standard techniques and variation of parameters
3. Apply Laplace transform techniques to solve initial value problems and evaluate integrals for Engineering applications
4. Analyze vector point functions using gradient, divergence, curl, and vector identities to Determine scalar potentials and classify vector fields
5. Analyze and evaluate line, surface, and volume integrals using Green's, Gauss's, and Stokes' Theorems for solving engineering problems

UNIT-I: First Order Ordinary Differential Equations

Exact differential equations – Equations reducible to exact differential equations – linear and Bernoulli's equations – Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling – Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order

Higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}(x)$ and $x V(x)$ – Method of variation of parameters.

UNIT-III: Laplace Transforms

Laplace Transforms: Laplace Transform of standard functions — First shifting theorem — Laplace transforms of functions multiplied by 't' and divided by 't' — Laplace transforms of derivatives and integrals of function — Evaluation of integrals by Laplace transforms — Laplace transform of periodic functions — Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions — Gradient — Divergence and Curl — Directional derivatives – Vector Identities – Scalar potential functions – Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

3/0/0 3

ADVANCED ENGINEERING PHYSICS

Course Objectives:

1. Understand quantum mechanics and band theory concepts to study the electronic properties of solids.
2. Learn crystallography fundamentals, nanomaterials and their characterization techniques.
3. Understand quantum computing principles, qubit operations, and quantum algorithms for Information processing.
4. Learn the properties, classification, and applications of magnetic and dielectric materials in Engineering.
5. Understand the principles, construction, and applications of lasers and optical fibres in Communication and sensing.

Course Outcomes:

- CO1:** Apply quantum mechanics and band theory concepts to analyze the electronic properties of solids.
- CO2:** Apply crystallography principles, nanomaterial and their characterization techniques to Analyze material structures and properties.
- CO3:** Apply quantum computing principles, qubit operations, and quantum algorithms to Process and analyze information.
- CO4:** Analyze the properties, classification, and applications of magnetic and dielectric Materials in advanced engineering devices.
- CO5:** Analyze the principles, types, and applications of lasers and optical fibres in Communication and sensing technologies.

UNIT - I:

Quantum Mechanics and Band theory of Solids

Introduction to Quantum mechanics, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box,

Band theory of solids: Introduction to Band theory of solids, Bloch's theorem (qualitative), Kronig-Penney model (qualitative): E-k diagram, effective mass of electron, formation of energy bands, origin of bandgap, classification of solids.

UNIT - II:**Crystallography and Nano Materials & Characterization**

Introduction to Crystallography: Unit cell, space lattice, basis, lattice parameters; crystal structures, Bravais lattices, packing factor: SC, BCC, FCC; Miller indices, inter-planar distance;

Concept of nanomaterials: surface to volume ratio, concept of discrete energy levels and quantum confinement in nanomaterials, X-ray diffraction: Bragg's law, powder method, calculation of average crystallite size using Debye Scherrer's formula, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM): block diagram, working principle.

UNIT - III:**Quantum Computing and Quantum Information Science**

Introduction to Quantum computing, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system. **Quantum computing system for information processing,** evolution of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, quantum algorithms: Deutsch- Jozsa, Shor, Grover.

UNIT - IV:**Magnetic and Dielectric Materials**

Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device

Introduction to dielectric materials, types of polarization (qualitative): electronics, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.

UNIT - V:**Lasers and Fibre Optics**

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, CO₂ laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for autonomous vehicle.

Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, applications: optical fibre for communication system, sensor for structural health monitoring.

Text Books:

1. Walter Borchardt-Ott, *Crystallography: An Introduction*, Springer.
2. Charles Kittel, *Introduction to Solid State Physics*, John Wiley & Sons, Inc.
3. Thomas G. Wong, *Introduction to Classical and Quantum Computing*, Rooted Grove

Reference Books:

1. Jozef Gruska, Quantum Computing, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, Quantum Computation and Quantum Cambridge University Press.
3. John M. Senior, Optical Fiber Communications Principles and Practice, Pearson Education Limited.

Useful Links:

- <https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber-communications-principles-and-pr.pdf>
- https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf
- <https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf>
- <https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf>
- <https://www.fi.muni.cz/usr/gruska/qbook1.pdf>
- <https://profmcruez.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf>



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

3/0/0 3

SEMICONDUCTOR DEVICES AND CIRCUITS

Pre-requisite: Fundamentals of Semiconductors.

Course Objectives:

To introduce the concepts of various semiconductor devices like Diodes, Transistors, FET's and MOSFET'S and advanced semiconductor technologies like FinFETs and CNTFETs. Emphasis is placed on developing a strong foundation for analog circuit design and understanding modern device technologies in electronics. To impart the knowledge of various configurations, characteristics and applications of electronic circuits.

Course Outcomes:

After this course, the student will be able to

CO1: Acquire the knowledge in semiconductor materials and analyze the complete internal Structure of PN junction its capacitances and resistances.

CO2: Design the circuits for the conversion of AC to DC Voltages.

CO3: Acquire knowledge in the structure of Transistor and evaluate different types, operation, Characteristics and applications

CO4: Design the dc bias circuitry of BJT.

CO5: Acquire the knowledge and analyze the structure of, FET, MOS (different types, operation, Characteristics and applications), FIN FET, CNTFET

Course Articulation Matrix

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

UNIT I

Introduction to semiconductor physics:

Formation of P-type and N-type semiconductors, principle and operation of Diode, Volt-Ampere characteristics, Current components in a p-n Diode, Diode equation, Temperature dependence, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Break down mechanisms in Diode,

Special Purpose Diodes: Zener Diode Volt-Ampere characteristics, Zener Diode as a Regulator. Principle of Operation of – SCR, Tunnel Diode, Varactor Diode, Photo Diode, Solar Cell, LED and Schottky Diode

UNIT II

Rectifiers and Filters:

P-N junction diode as a Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L-section Filters, π - section Filters (Qualitative treatment).

UNIT III

Bipolar Junction Transistor (BJT):

Principle of Operation, Transistor current components, Transistor as an Amplifier, Common Emitter, Common Base and Common Collector configurations and their Characteristics.

UNIT IV

Transistor Biasing and Stabilization:

Operating point, DC Load line, Biasing - Fixed Bias, Collector to Base Bias, Collector and Emitter Feedback Bias, Self bias, Bias stability, Stabilization against variations in V_{BE} , I_{CO} , β , Bias Compensation using Diodes and Transistors.

UNIT V

Field Effect Transistor (FET):

Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET.

Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Different types of MOSFET's, Working operation and V-I Characteristics of different types of MOSFET's.

Text Books:

1. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", PEI/PHI, 12th Ed, 2015.
2. J. Millman and C. C. Halkias, Satyabratajit, "Electronic Devices and Circuits", TMH, 4th Ed. 2015.
2. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. Oxford University Press, 7th ed., 2014.

References Books:

1. "Electronic Devices and Circuits", S.Salivahanan and N.Suresh Kumar, TMH, 2015.
2. "Electronic Devices and Circuits", Sanjeev Gupta and Santosh Gupta, Dhanpat Rai Publications 5th Ed. 2017
3. Razavi, Behzad. Fundamentals of Microelectronics. Wiley, 2nd ed 2013.
4. Taur, Yuan, and Tak H. Ning. Fundamentals of Modern VLSI Devices. Cambridge University Press, 2nd ed., 2009



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

3/0/0 3

PYTHON PROGRAMMING

Course Objectives:

Introduce the fundamentals of Python programming for problem-solving.

1. Develop skills to write structured, modular, and efficient Python code.
2. Enable students to use Python's built-in data structures and libraries effectively.
3. Provide knowledge on file handling, exception handling, and object-oriented programming in Python.
4. Equip students with the ability to apply Python for real-world applications including data Processing and automation.

Course Outcomes:

CO1: Write Python programs using variables, operators, expressions, and control structures.

CO2: Implement Python programs using built-in data structures like lists, tuples, sets, and Dictionaries.

CO3: Apply modular and object-oriented programming principles in Python.

CO4: Handle files, exceptions, and apply Python libraries for problem-solving.

CO5: Develop small-scale applications in Python for automation and data manipulation.

Course Articulation Matrix

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

UNIT-1

Introduction to Python and Basics of Programming

Introduction to Python: Features, Applications, Installation, IDEs, Python Syntax, Indentation, Comments, Variables, Data Types, Type Casting, Operators: Arithmetic, Relational, Logical, Assignment, Membership, Identity, Bitwise, Input/Output functions (input(), print()), Control Structures: if, if-else, if-elif-else, Nested Conditions, Looping: for, while, Nested Loops, break, continue, pass.

UNIT-2**Data Structures in Python**

Strings: Creation, Indexing, Slicing, Methods, String Formatting, Lists: Creation, Indexing, Slicing, List Comprehension, Methods, Tuples: Properties, Indexing, Methods, Sets: Creation, Operations, Methods, Dictionaries: Creation, Access, Methods, Dictionary Comprehension, Iterating over data structures.

UNIT-3**Functions and Modules**

Functions: Defining, Calling, Parameters, Return Values, Types of Arguments: Positional, Keyword, Default, Variable Length, Scope of Variables: Local and Global, Lambda Functions, Map, Filter, Reduce, Recursion in Python, Modules: Importing, Creating User-defined Modules, Standard Modules (math, random, datetime), Packages in Python.

UNIT-4**File Handling and Exception Handling**

File Handling: Opening, Reading, Writing, Appending, File Modes, File Methods, Working with CSV and JSON Files, Exception Handling: try, except, else, finally, Built-in Exceptions, Raising Exceptions Introduction to Regular Expressions (re module).

UNIT-5**Object-Oriented Programming and Applications**

OOP Basics: Classes, Objects, Attributes, Methods, Constructor (init), self keyword, Inheritance: Single, Multiple, Multilevel, Hierarchical, Method Overriding, Method Overloading (conceptual), Encapsulation and Polymorphism, Application Development: Data Processing Script, Basic Calculator, File Organizer, Simple Data Analysis with pandas.

TEXT BOOKS:

1. Python Programming: Using Problem Solving Approach by Reema Thareja.
2. Python Crash Course by Eric Matthes, Learning Python by Mark Lutz.

REFERENCE BOOKS:

1. Introduction to Python Programming by Gowrishankar S., Veena A.
2. Python Cookbook by David Beazley and Brian K. Jones.
3. Fluent Python by Luciano Ramalho, Automate the Boring Stuff with Python by Al Sweigart.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

3/0/0 3

NETWORK ANALYSIS AND SYNTHESIS

Prerequisites: Mathematics

Course Objectives:

1. To introduce the concepts of network topology, magnetic circuits, coupled circuits, and Transformers.
2. To gain Knowledge in the transient and steady-state responses of electrical circuits under Different excitations.
3. To study two-port network parameters, network functions, and their applications in circuit Analysis.
4. To understand the design and characteristics of filters, attenuators, and equalizers.
5. To learn network synthesis techniques using positive real functions and Foster/Cauer methods

Course Outcomes:

After learning the contents of this course the student must be able to

1. Apply graph theory and magnetic circuit concepts for the analysis of electrical networks and Coupled circuits.L3
2. Analyze transient and steady-state responses of RL, RC, and RLC circuits under different Excitations and resonance conditions.L4
3. Evaluate two-port network parameters, network functions, and design impedance-matching networks.L5
4. Design and analyze filters, attenuators, and equalizers for signal processing applications.L5
5. Synthesize electrical networks using LC, RC, and RL functions with Foster and Cauer methods.L4

Course Articulation Matrix:

(Correlation of Course Outcomes with Program Outcomes using mapping levels

1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	-	-	-	-	-	-	1
CO2	3	3	2	2	1	-	-	-	-	-	-	1
CO3	3	3	2	2	2	-	-	-	-	-	-	1
CO4	3	3	3	2	2	-	-	-	-	-	-	1
CO5	3	3	3	2	2	-	-	-	-	-	-	1

UNIT - I**Network Topology:**

Basic cutset and tie set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT - II**Transient and Steady state analysis:**

RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT - III**Two port network parameters:**

Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T, π , L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT-IV**Filters:**

Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass

Attenuators: Types – T, π , L, Bridge T and lattice, Asymmetrical Attenuators T, π , L Equalizers- Types- Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers

UNIT-V**Network Synthesis:**

Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non-ladder networks, Poles, Zeros analysis of network functions, Hurwitz polynomials, Positive Real Functions, synthesis of LC, RC and RL Functions by foster and causer methods.

Text Books:

1. Van Valkenburg -Network Analysis, 3rd Ed., Pearson, 216.
2. JD Ryder - Networks, Lines and Fields, 2nd Ed., PHI, 1999.

Reference Books:

1. J. Edminister and M. Nahvi - Electric Circuits, Schaum's Outlines, Mc Graw Hills Education, 1999.
2. A. Sudhakar and Shyammohan S Palli - Networks & Circuits, 4th Ed., Tata McGraw- Hill Publications
3. William Hayt and Jack E. Kimmerley - Engineering Circuit Analysis, 6th Ed., William Hayt and Jack E. Kimmerley, McGraw Hill Company



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

2/0/2 3

ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING

Course Objectives:

1. To introduce the fundamentals of engineering drawing and projection systems.
2. To develop skills in constructing orthographic, isometric, and sectional views.
3. To train students in interpreting and creating technical drawings using CAD tools.
4. To familiarize students with dimensioning standards and drafting conventions.
5. To bridge manual drafting techniques with computer-aided drafting practices.

Course Outcomes:

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

1. Understand and apply the principles of orthographic and isometric projections.
2. Create sectional views and dimensioned drawings using BIS standards.
3. Use CAD software to generate 2D engineering drawings.
4. Visualize and construct solid models from 2D views.
5. Interpret and produce engineering drawings of mechanical components and assemblies.
6. Demonstrate drafting skills for practical and industrial applications.

UNIT – I:

Introduction to Engineering Graphics (Conventional)

Principles of Engineering Graphics and their Significance, Geometrical Constructions, Scales, Plain and Diagonal, Conic Sections including the Rectangular Hyperbola, General method only. Cycloid, Epicycloid and Hypocycloid.

UNIT - II:

Orthographic Projections (Conventional and Computer Aided)

Principles of Orthographic Projections, Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures. Computer aided orthographic projections, points, lines and planes. Introduction to Computer aided drafting, views, commands and conics.

UNIT – III:

Projections of Regular Solids (Conventional and Computer Aided)

Projections of Right Regular Solids, Prism, Cylinder, Pyramid, Cone, and Computer aided projections of solids, sectional views

UNIT – IV:

Development of Surfaces (Conventional): Prism, Cylinder, Pyramid and Cone.

views of Development of Surfaces

Sectional

UNIT – V:**Isometric Projections (Conventional and Computer Aided)**

Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Simple and Compound Solids, Conversion of Isometric Views to Orthographic Views and Vice- versa, Conventions. Conversion of orthographic projection into isometric view.

Note:

1. The End Semester Examination will be in conventional mode.
2. CIE – I will be in conventional mode.
3. CIE – II will be using Computer.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhatt, Charotar, 54th Edition, 2023.
2. Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan and Vikas, S. Chand and Company Ltd., 3rd Edition, 2010.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C.M. Agrawal, McGraw Hill, 3rd Edition, 2019.
2. Engineering Graphics and Design, WILEY, John Wiley and Sons Inc, 3rd Edition, 2020.
3. Engineering Drawing, M. B. Shah and B.C. Rane, Pearson, 2nd Edition, 2009.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford, 1st Edition, 2015.
5. Computer Aided Engineering Drawing, K. Balaveera Reddy, CBS Publishers, 2nd Edition, 2015.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

0/0/2 1

ADVANCED ENGINEERING PHYSICS LAB

Pre-requisites: 10+2 Physics

Course Objectives:

- 1.To impart practical skills in advanced solid-state and modern physics concepts
- 2.To prepare and examine properties of semiconductor, ferromagnetic, and ferroelectric Materials.
- 3.To characterize semiconductors through Hall effect and band gap studies.
- 4.To investigate laser and optical fiber operation through experiments.
- 5.To build skills in data analysis, interpretation, and scientific reporting.

Course Outcomes:

CO1: Verify the particle nature of light using the photoelectric effect.

CO2: Measure electrical, magnetic, and optical properties of semiconductors and functional materials.

CO3: Analyze semiconductor properties using Hall effect and band gap measurements.

CO4: Examine the operation of lasers and parameters of optical fibers through experiments.

CO5: Employ scientific methods for precise data collection, analysis, and technical reporting.

List of Experiments:

1. Determination of Planck's constant using photo electric effect.
2. Determination of Hall coefficient and carrier concentration of a given semiconductor.
3. Determination of energy gap of a semiconductor.
4. Determination of V-I characteristics of LED(Blue,Green,Red)
5. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.
6. Study of B-H curve of a ferro magnetic material.
7. Determination of dielectric constant of a given material.
8. Determination of Curie's temperature of a given ferroelectric material.
9. A) Determination of wavelength of a laser using diffraction grating.
B) Study of V-I & L-I characteristics of a given laser diode.
- 10.A) Determination of numerical aperture of a given optical fibre.
B) Determination of bending losses of a given optical fibre.

Note: Any 8 experiments are to be performed.



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

0/0/2 1

SEMICONDUCTOR DEVICES AND CIRCUITS LAB

Course Overview:

This laboratory course aims to provide hands-on experience and simulation-based learning of semiconductor devices and basic electronic circuits. Students will analyze the characteristics and applications of diodes, BJTs, and FETs, design rectifiers and amplifiers, and simulate modern electronic circuits using software tools. The course bridges theoretical concepts with practical implementation, developing foundational skills essential for analog electronics and circuit analysis.

Course Outcomes (COs):

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

CO1: Analyze the I–V characteristics of semiconductor devices such as diodes, BJTs, and FETs.

CO2: Design and evaluate rectifiers, and voltage regulation circuits.

CO3: Demonstrate biasing techniques for BJTs and determine their operating point using DC Load line analysis.

CO4: Design a transistor amplifier circuits in any configuration

CO5: Simulate and interpret electronic circuits using appropriate simulation tools.

Course Articulation Matrix

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

List of Experiments

A. Hardware-Based Experiments (5):

1. Study the I–V characteristics of a PN junction diode in forward and reverse bias to determine Cut-in voltage and dynamic resistance.
2. Examine the reverse bias characteristics of a Zener diode and demonstrate its application as a Voltage regulator under varying conditions.
3. Design and analyze half-wave with and without capacitor filters to evaluate ripple factor and Output voltage.
4. Design and full-wave rectifiers (center-tap and bridge) with and without capacitor filters to Evaluate ripple factor and output voltage.

e ec

5. Plot the input and output characteristics of a BJT in common emitter configuration to Determine input/output resistance and current gain.
6. Construct and analyze a Common Base (CB) configuration of a BJT to study input-output Characteristics and determine current gain (α) and input/output resistance.
7. Design and test fixed bias and voltage divider bias circuits to establish a stable operating point For a BJT amplifier and study DC load line behavior.

B. Software-Based Simulation Experiments (5):

1. Simulate a full-wave bridge rectifier with capacitor filter to analyze waveform smoothing and ripple reduction in DC power supply design.
2. Simulate a Zener diode-based voltage regulator to study voltage stabilization against varying Supply voltages and load resistances.
3. Simulate the Verification of Transistor as an Amplifier using CE configuration.
4. Simulate Common Base (CB) configuration of a BJT to study input-output characteristics.
5. Simulate Common Emitter(CE) configuration of a BJT to study input-output characteristics
6. Simulate the output and transfer characteristics of a JFET to determine parameters such as Pinch-off
7. Simulate the characteristics of MOSFET.voltage, drain resistance, and transconductance.
8. Simulate the characteristics of a MOSFET and design a CMOS inverter to study digital Switching behavior and low-power logic design.
9. Simulate the transfer and output characteristics of an enhancement-mode NMOS transistor to Analyze threshold voltage, drain current, and switching behavior.

Hardware Requirements:

1. Regulated DC Power Supply (0–30V)
2. Function Generator
3. Digital Multimeter
4. Cathode Ray Oscilloscope (CRO) or DSO
5. Breadboards and Connecting Wires
6. Resistors, Capacitors, Diodes (1N4007, Zener Diodes)
7. BJTs (e.g., BC107, 2N2222), JFETs (e.g., J201), MOSFETs (e.g., IRF540N)
8. Trainer Kits (optional but preferred for ease)

Software Requirements (Any one of the listed tools or equivalent):

1. LTSpice (Free from Analog Devices)
2. NI Multisim (Academic License or Student Version)
3. Proteus Design Suite (Simulation and PCB Design)
4. TINA-TI (Free from Texas Instruments)
5. PSPICE for TI or OrCAD Lite
6. Windows PC or Laptop with minimum 4GB RAM and i3 processor or better



TKR COLLEGE OF ENGINEERING & TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with A+ Grade.

(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)

Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790. email: info@tkrcet.ac.in. web site: www.tkrct.ac.in



ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. I Year II Semester

L/T/P C

0/0/2 1

APPLIED PYTHON PROGRAMMING LAB

Course Outcomes:

CO1: Build basic programs using fundamental programming constructs

CO2: Write and execute python codes for different applications

CO3: Capable to implement on hardware boards

Course Articulation Matrix

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

List of Experiments:

Cycle - 1

1. Downloading and Installing Python and Modules
 - a) Python 3 on Linux
Follow the instructions given in the URL <https://docs.python-guide.org/starting/install3/linux/>
 - b) Python 3 on Windows
Follow the instructions given in the URL <https://docs.python.org/3/using/windows.html> (Please remember that Windows installation of Python is harder!)
 - c) pip3 on Windows and Linux
Install the Python package installer by following the instructions given in the URL <https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/>
 - d) Installing numpy and scipy
You can install any python3 package using the command `pip3 install <packagename>`
 - e) Installing jupyterlab
Install from pip using the command `pip install jupyterlab`
2. Introduction to Python3
 - a) Printing your biodata on the screen
 - b) Printing all the primes less than a given number
 - c) Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. Defining and Using Functions
 - a) Write a function to read data from a file and display it on the screen
 - b) Define a boolean function `is_palindrome(<input>)`
 - c) Write a function `collatz(x)` which does the following: if x is odd, $x = 3x + 1$, if x is even, then $x = x/2$. Return the number of steps it takes for $x = 1$

e ec

- d) Write a function $N(m, s) \text{ --- } \exp(-(x-m)/(2s^*)) / \sqrt{2\pi s}$ that computes the Normal distribution
4. The package numpy
 - a) Creating a matrix of given order $m \times n$ containing *random numbers* in the range 1 to 99999
 - b) Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
 - c) Write a program to solve a system of n linear equations in n variables using matrix inverse
5. The package scipy and pyplot
 - a) Finding if two sets of data have the same *mean* value
 - b) Plotting data read from a file
 - c) Fitting a function through a set of data points using *polyfit* function
 - d) Plotting a histogram of a given data set
6. The strings package
 - a) Read text from a file and print the number of lines, words and characters
 - b) Read text from a file and return a list of all n letter words beginning with a vowel
 - c) Finding a secret message hidden in a paragraph of text
 - d) Plot a histogram of words according to their length from text read from a file

Cycle -2

7. Installing OS on Raspberry Pi
 - a) Installation using Pilmager
 - b) Installation using image file
 - Downloading an Image
 - Writing the image to an SD card
 - using Linux
 - using Windows
 - Booting up

Follow the instructions given in the URL
<https://www.raspberrypi.com/documentation/computers/getting-started.html>
8. Accessing GPIO pins using Python
 - a) Installing GPIO Zero library.
 First, update your repositories list:
`sudo apt update`
 Then install the package for Python 3:
`sudo apt install python3-gpiozero`
 - b) Blinking an LED connected to one of the GPIO pin
 - c) Adjusting the brightness of an LED
 - d) Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.
9. Collecting Sensor Data
 - a) DHT Sensor interface
 Connect the terminals of DHT GPIO pins of Raspberry Pi. Import the DHT library using `import Adafruit_DHT`
 Read sensor data and display it on screen.