DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
VIZIANAGARAM-535003, ANDHRA PRADESH, INDIA

B.Tech COURSE STRUCTURE (2020 Admitted batch)
R 20 Course Structure

I B. Tech – I SEMESTER

S. No	Course Code	Course Title	L	T	P	C
1	R2011BS01	Calculus and Differential Equations	3	0	0	3
2	R2011BS04	Applied Physics	3	0	0	3
3	R2011ES15	Problem solving and programming using C	3	0	0	3
4	R2011ES06	Engineering Drawing	1	0	4	3
5	R2011HS01	Communicative English	3	0	0	3
6	R2011HS01A	English Communication Skills Lab	0	0	3	1.5
7	R2011BS04A	Applied Physics lab	0	0	3	1.5
8	R2011ES15A	Problem solving and programming using C Lab	0	0	3	1.5
9	R2011MC01	Environmental Science	2	0	0	0
		Total	**15**	**0**	**13**	**19.5**

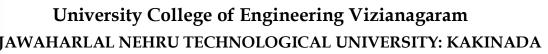| Category	Credits
Basic Science Course (**BS**)	7.5
Engineering Science Courses (**ES**)	7.5
Humanities & Social Science (**HS**)	4.5
Total Credits	19.5

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B.Tech COURSE STRUCTURE (2020 Admitted batch)
R 20 Course Structure

I B. Tech – II SEMESTER

S. No	Course Code	Course Title	L	T	P	C
1	R2012BS02	Linear Algebra and Numerical Methods	3	0	0	3
2	R2012BS06	Applied Chemistry	3	0	0	3
3	R2012ES14	Network Analysis and synthesis	3	0	0	3
4	R2012ES03	Basic Electrical Machines	3	0	0	3
5	R2012ES12	Electronic Devices	3	0	0	3
6	R2012BS06A	Applied Chemistry Lab	0	0	3	1.5
7	R2012ES03A	Basic Electrical Machines Lab	0	0	3	1.5
8	R2012ES12A	Electronic Devices Lab	0	0	3	1.5
		Total	**15**	**0**	**13**	**19.5**

Category	Credits
Basic Science Course (**BS**)	7.5
Engineering Science Courses (**ES**)	9+3=12
Total Credits	19.5

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I Year-I Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: CALCULUS AND DIFFERENTIAL EQUATIONS					

(Common to all branches)

Course Objectives:
  (i) This course will illuminate the students in the concepts of calculus.
  (ii) To enlighten the learners in the concept of differential equations and multivariable calculus.
  (iii)To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

UNIT I: Sequences, Series and Mean value theorems: (10 hrs)
Sequences and Series: Convergence and divergence – Ratio test – Comparison tests – Integral test – Cauchy's root test – Alternate series – Leibnitz's rule.
Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders.

UNIT II: Differential equations: (15 hrs)
Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form
Non-homogeneous equations of higher order with constant coefficients with non-homogeneous term of the type e^{ax}, sin ax, cos ax, polynomials in x^n, e^{ax} V(x) and x^nV(x) – Method of Variation of parameters- Euler-Cauchy equation and Legender's equation
Applications: Orthogonal trajectories – Electrical circuits (RL, RC, RLC) – Simple Harmonic motion.

UNIT III: Partial differentiation: (10 hrs)
Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Jacobian – Functional dependence – Taylor's and Mac Laurin's series expansion of functions of two variables.
Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT IV: Multiple integrals: (8 hrs)
Double integrals – Change of order of integration - Double integrals in polar coordinates- Areas enclosed by plane curves- Triple integrals – Volume of solids – Change of variables to polar, spherical and cylindrical co-ordinates.

Applications: Finding Areas and Volumes.

UNIT V: Beta and Gamma functions: (5 hrs)

Introduction to Improper Integrals-Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

Course Outcomes: At the end of the course, the student will be able to
 (i) Utilize mean value theorems to real life problems (L3)
 (ii) Solve the differential equations related to various engineering fields (L3).
 (iii) Familiarize with functions of several variables which are useful in optimization (L3)
 (iv) Apply double and triple integration techniques in evaluating areas and volumes bounded by region (L3)
 (v) Conclude the use of Beta and Gamma functions in evaluating improper integrals (L4)

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

Reference Books:

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **Joel Hass, Christopher Heil and Maurice D. Weir,** Thomas calculus, 14th Edition, Pearson.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press, 2013.
4. **Srimantha Pal, S C Bhunia,** Engineering Mathematics, Oxford University Press.

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I Year- I / II Semester		L	T	P	C
		3	0	0	3

NAME OF THE SUBJECT: APPLIED PHYSICS
(Common to CSE, ECE, EEE & IT)

Course Objectives:

The objectives of this course is to acquire knowledge on the

  i. To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
  ii. Understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications, study of propagation of light through optical fibers and their implications in optical communications.
  iii. Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of deBroglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals and band theory for crystalline solids. Metals-Semiconductors-Insulators concepts utilization of transport phenomenon of charge carriers in semiconductors.
  iv. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
  v. To Understand the physics of Semiconductors and their working mechanism. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

UNIT - I: Wave Optics   12 hrs

Interference: Principle of superposition –Interference of light - Interference in thin films (Reflection   Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.
Diffraction: Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits (Qualitative) – Diffraction Grating - resolving power of Grating(Qualitative).
Polarization: Introduction-Types of polarization - Polarization by reflection and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT-II: Lasers and Fiber optics   8hrs

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients and their relation – Population inversion – Lasing action - Pumping mechanisms – Ruby laser – He-Ne laser-Semiconductor laser - Applications of lasers.
Fiber optics: Introduction –Principle of optical fiber- Acceptance Angle - Numerical Aperture - Classification of optical fibers based on refractive index profile and modes –Block diagram of fiber optic communication.

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

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well-Quantum tunnellinng effect (qualitative).

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Fermi energy-Equation for electrical conductivity based on quantum free electron theory –Fermi-Dirac distribution.

UNIT - IV: Dielectric and Magnetic Materials   **8hrs**

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius-Mossotti equation.

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Origin of permanent magnetic moment - Classification of magnetic materials: Dia, para, Ferro, antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism (Qualitative) - Hysteresis - soft and hard magnetic materials-Applications.

UNIT - V: Semiconductors and Superconductors   **10hrs**

Semiconductors: Introduction-Classification of solids - Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – extrinsic semiconductors – density of charge carriers –Drift and diffusion currents – Einstein's equation- Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors: Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory (Qualitative) – Josephson effects (AC and DC) – SQUIDs.

Course Outcomes:

The students should be able to:

  i.   **understand** the concepts of physical optics through the wave nature of light and **discuss** the phenomenal differences between interference, diffraction and polarization.
 ii.   **Describe** the basic laser physics, working of lasers, and principle of propagation of light in optical fibers.
iii.   **Apply** the knowledge of basic quantum mechanics, to set up onedimensional Schrodinger's wave equation and **summarize** the importance of free electrons in determining the properties of metals.
 iv.   **explain** the basics of dielectric and magnetic materials to synthesize new materials as per needs of engineering applications.
  v.   gain the **knowledge** of semiconductor bonding, semiconductor carrier properties and henomenological **describe** the phenomenon of superconduction

Text books:
1. M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"-S.Chand Publications, 11th Edition 2019.
2. Engineering Physics" by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
3. Applied Physics by P.K.Palanisamy SciTech publications.
Reference Books:
1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
2. Engineering Physics by M.R.Srinivasan, New Age international publishers (2009).
3. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education, 2018
4. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press
5. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill
6. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning

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I Year-I Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: PROBLEM SOLVING AND PROGRAMMING USING C					

(Common to ALL)

Course Objectives:

The objectives of this course is to acquire knowledge on the
- To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.
- To enable effective usage of Control Structures and Implement different operations on arrays.
- To demonstrate the use of Strings and Functions.
- To impart the knowledge of pointers and understand the principles of dynamic memory allocation.
- To understand structures and unions and illustrate the file concepts and its operations.
- To impart the Knowledge Searching and Sorting Techniques.

UNIT-I

Introduction to Computer Problem Solving: Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem. Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.

UNIT-II

Introduction to C Programming: Introduction, Structure of a C Program. Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements. Operators, Type Conversion.

Control Flow, Relational Expressions: Conditional Branching Statements: if, if-else, if-else—if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement.

UNIT-III

Arrays: Introduction, Operations on Arrays, Arrays as Function Arguments, Two dimensional Arrays, Multi dimensional arrays.

Pointers: Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function Arguments, Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command Line Arguments,

UNIT-IV

Functions: Introduction, Function Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes. Recursion.

Strings: String Fundamentals, String Processing with and without Library Functions, Pointers and Strings.

UNIT-V

Structures, Unions, Bit Fields: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type —Enum variables, Using Typedef keyword, Bit Fields.

Data Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

Course Outcomes:

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

i. Illustrate the Fundamental concepts of Computers and basics of computer programming.
ii. Use Control Structures and Arrays in solving complex problems.
iii. Develop modular program aspects and Strings fundamentals.
iv. Demonstrate the ideas of pointers usage.
v. Solve real world problems using the concept of Structures, Unions and File operations.

Text Books:

i. How to solve it by Computer, R. G. Dromey, and Pearson Education.
ii. Computer Programming. Reema Thareja, Oxford University Press
iii. Let us C , Yaswanth Kanetkar, 16th Edition,BPB Publication.

Reference Books:

i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
ii. Programming In C A-Practia1 Approach. Ajay Mittal, Pearson.
iii. C Programming — A Problem Solving Approach, Forouzan, Gilberg, Cengage.
iv. The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
v. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication.

Web Links:

- http://www.c4learn.com/
- http://www.geeksforgeeks.org/c/
- http://nptel.ac.in/courses/122104019/
- http://www.learn-c.org/
- https://www.tutorialsyoint.com/cprogramming/

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		L	T	P	C
I Year-I Semester		1	0	4	3

NAME OF THE SUBJECT: ENGINEERING DRAWING
(Common to CE, ECE and MET)

Course Objectives:
The objectives of this course is to acquire knowledge on the
i. To introduce the students to use drawing instruments and to draw engineering curves.
ii. To introduce the students to use orthographic projections, projections of points & simple lines. To make the students draw the projections of the lines inclined to both the planes.
iii. The objective is to make the students draw the projections of the plane objects in different positions with the reference planes.
iv. The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
v. The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view.

UNIT - I:
Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, tangents & normals for the curves.
Scales: Plain scales, diagonal scales and vernier scales

UNIT - II:
Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

UNIT - III:

Polygons: Constructing regular polygons by general methods.

Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT - IV:
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one plane-Auxiliary views.

UNIT - V:
Conversion of isometric views to orthographic views and Conversion of orthographic views to isometric views.

Course Outcomes:

The students should be able to:

i. To make the student familiar with the techniques used for drawing various geometric
   elements used in engineering practice.

ii. The student can apply orthographic projections and project the points and lines parallel to one plane and inclined to both the planes.

iii. Prepare the drawings for construction of regular polygons and the projection of the planes inclined to both the planes.

iv. The student can prepare the drawings for the projections of the various types of solids in different positions inclined to one of the planes.

v. Ability to use the concepts of isometric views to orthographic views and vice-versa.

Text Books:

i. Engineering Drawing by N.D. Bhatt, Chariot Publications

ii. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

Reference Books:

i. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers

ii. Engineering Graphics for Degree by K.C. John, PHI Publishers

iii. Engineering Graphics by PI Varghese, McGrawHill Publishers

iv. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

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		L	**T**	**P**	**C**
I Year-I / II Semester		**3**	**0**	**0**	**3**
	NAME OF THE SUBJECT: COMMUNICATIVE ENGLISH				

(Common to all branches)

Course Objectives

(i) Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers

(ii) Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials

(iii) Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations

(iv) Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information

(v) Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

UNIT I:

A Drawer full of happiness

Listening: Listening to short audio texts and identifying the topic. Listening to prose, prose and conversation.

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

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph writing (specific topics) using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing - punctuation, capital letters.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20) (Antonyms and Synonyms, Word applications) Verbal reasoning and sequencing of words.

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

Pronunciation: Vowels, Consonants, Plural markers and their realizations

UNIT II:

Nehru's letter to his daughter Indira on her birthday

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

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings. **Reading**: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words) (Antonyms and Synonyms, Word applications)

Grammar: Use of articles and zero article; prepositions.
Pronunciation: Past tense markers, word stress-di-syllabic words

UNIT III:

Stephen Hawking-Positivity 'Benchmark'

Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing.
Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Critical reading.
Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. Letter writing-types, format and principles of letter writing.E-mail etiquette, Writing CV's.
Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Association, sequencing of words
Grammar: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.
Pronunciation: word stress-poly-syllabic words.

UNIT IV:
Liking a Tree, Unbowed: Wangari Maathai-biography
Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, Inviting.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.Writing SOP, writing for media.
Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Cloze Encounters.
Grammar: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Pronunciation: Contrastive Stress

UNIT V:
Stay Hungry-Stay foolish

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.
Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Functional English: Suggesting/Opinion giving.
Reading: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques.
Reading for Writing: Writing academic proposals- writing research articles: format and style.
Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

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

Pronunciation: Stress in compound words

Course Outcomes:

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

(i) Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

(ii) Ask and answer general questions on familiar topics and introduce oneself/others

(iii) Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information

(iv) Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs

(v) Form sentences using proper grammatical structures and correct word forms

Prescribed text books:

(i) "**Infotech English**", Maruthi Publications. (Detailed)

Reference Books

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012
5. Martin Hewings , Advanced English Grammar, Cambridge university press
6. William Strunk JR. and E B White, Elements of Style, 4th Edition, Pearson
7. *Language and Life: A Skills Approach* Board of Editors, Orient Black Swan Publishers, India. 2018.
8. *Practical English Usage*, Michael Swan. OUP. 1995.
9. *Remedial English Grammar*, F.T. Wood. Macmillan.2007
10. *On Writing Well*, William Zinsser. Harper Resource Book. 2001
11. *Study Writing*, Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
12. *Communication Skills*, Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
13. *Exercises in Spoken English*, Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
14. *Advanced English Grammar*, Martin Hewings. Cambridge University Press. 2016
15. *Elements of Style,* William Strunk and EB White. Pearson. 1999.

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I Year-I / II Semester		L	T	P	C
		0	0	3	1.5
NAME OF THE LAB: ENGLISH COMMUNICATION SKILLS LAB					

(Common to all branches)

Course Objectives

(i) To impart grammar as well as communication through pronunciation. By introduction, pure vowels, consonants, diphthongs, phonetic transcription, common errors in pronunciation.

(ii) To impart better knowledge on Stress. Stress of kinds- mono syllabic, di syllabic, poly syllabic, strong and weak forms of stress along with contrastive stress.

(iii) To impart learner grammar as well as communication through compound words, rhythm, intonation and accent neutralization

(iv) To impart learner grammar as well as communication through listening, by identifying the context and specific pieces of information to answer a series of questions in speaking

(v) To improve the spoken skills of students by making them read news papers in order to understand and identify key terms context they read .

UNIT I:
Vowels, Consonants, Pronunciation, Phonetic Transcription, Common Errors in Pronunciation,

UNIT II:
Word stress-di-syllabic words, poly-syllabic words, weak and strong forms, contrastive stress (Homographs)

UNIT III:
Stress in compound words, rhythm, intonation, accent neutralisation.

UNIT IV:
Listening to short audio texts and identifying the context and specific pieces of information to answer a series of questions in speaking.

UNIT V:
Newspapers reading; Understanding and identifying key terms and structures useful for writing reports.

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

(i) The learner will improve phonetic understanding, transcription, common errors both in pronunciation and written English.

(ii) The learner will improve syllabic division, and how to use right stress in their pronunciation.

(iii) The learner will improve speaking skills with right intonation and rhythm and intonation and how to reduce mother tongue influence in English.

(iv) The learner will Improve speaking skills as well as listening skills by listening through the audio clips prescribed.

(v) The learner will Improve speaking skills along with reading skills.

Prescribed text book:

 (i) "**InfoTech English**", Maruthi Publications.

References:
1. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
2. English Pronunciation in use- Mark Hancock, Cambridge University Press.
3. English Phonetics and Phonology-Peter Roach, Cambridge University Press.
4. English Pronunciation in use- Mark Hewings, Cambridge University Press.
5. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
6. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.

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		L	T	P	C
I Year-I / II Semester		0	0	3	1.5
NAME OF THE LAB: APPLIED PHYSICS LAB					
(Common to CSE, ECE, EEE & IT)					

Course Objectives:
The objectives of this course is to acquire knowledge on the
   i. To **impart skills** in measurements with accurate error propagation.
   ii. To **plan** the experimental procedure, **design** and to record and **analysis** results.
   iii. To reach non trivial conclusions of significant of the experiments.
   iv. To **develop** the skills to handle different instruments without taking erroneous readings and ability to enhance the skills to fabricate engineering and technical equipments.

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

Course Outcomes:
The students should be able to:
   i. **Describe** the methodology of science and the relationship between observation and theory.
   ii. **Develop** scientific problem solving skills, including organization of given information, identification and application of pertinent principles, quantitative solutions, interpreting results, and evaluating the validity of results.
   iii. **Discover** of physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry.
   iv. **Learn** to minimize contributing variables and recognize the limitations of equipment.
   v. **Apply** conceptual understanding of the physics to general real-world situations.
   vi. **Develop** interpersonal and communication skills including communicating in small groups, writing, working effectively with peers.

Reference Books:
   i. S. Balasubramanian, M.N. Srinivasan "A Text Book of Practical Physics"- S Chand Publishers, 2017.

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-I Semester		0	0	3	1.5
NAME OF THE LAB: PROBLEM SOLVING AND PROGRAMMING USING C LAB					

<div align="center">(Common to ALL)</div>

Course Objectives:
The objectives of this course is to acquire knowledge on the
- To impart knowledge on basic Linux commands, various Editors, Raptor.
- To make the students understand the concepts of C programming.
- To nurture the students on Control Structures and develop different operations on arrays.
- To make use of String fundamentals and modular programming constructs.
- To implement programs using dynamic memory allocation.
- To explain the concepts of Structure, Unions and files for solving various problems.

List of Experiments:

1. Introduction to Algorithms and Flowcharts
1.1) Implement Algorithm Development for Exchange the values of Two numbers.
1.2) Given a set of n student's examination marks (in the range 0-100) make a count of the number of students that passed the examination. A Pass is awarded for all of 50 and above.
1.3) Given a set of n numbers design an algorithm that adds these numbers and returns the resultant sum. Assume N is greater than or equal to zero.

2. Introduction to C Programming
2.1) Basic Linux Commands.
2.2) Exposure to Turbo C, Vi, Emacs, Code Blocks IDE, Dev C++.
2.3) Writing simple programs using printf(), scanf() .

3. Raptor
3.1) Installation and Introduction to Raptor.
3.2) Draw a flow chart to find the Sum of 2 numbers.
3.3) Draw a flow chart to find Simple interest.

4. Basic Math
4.1) Write a C Program to convert Celsius to Fahrenheit and vice versa.
4.2) Write a C Program to find largest of three numbers using ternary operator.
4.3) Write a C Program to Calculate area of a Triangle using Heron's formula.

5. Control Flow- I
5.1) Write a C Program to Find Whether the Given Year is a Leap Year or not.
5.2) Write a C program to find the roots of a Quadratic Equation.
5.3) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using Switch...case.

6. Control Flow- II
6.1) Write a C Program to Find Whether the Given Number is Prime number or not.
6.2) Write a C Program to Find Whether the Given Number is Armstrong Number or not.
6.3) Write a C program to print Floyd Triangle.

7. Control Flow- III
7.1) Write a C program to find the sum of individual digits of a positive integer.
7.2) Write a C program to check whether given number is palindrome or not.
7.3) Write a C program to read two numbers, x and n, and then compute the sum of the geometric progression $1+x+x'+x^3 +..............+x^n$.

8. Arrays
8.1) Write a C program to search an element in the given array (Linear Search).
8.2) Write a C program to perform matrix addition.
8.3) Write a C program to perform matrix multiplication.

9. Pointers
9.1) Write a C Program to Perform Addition. Subtraction, Multiplication and Division of two numbers using Command line arguments.
9.2) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
9.3) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

10. Functions, Array & Pointers
10.1) Write a C Program to demonstrate parameter passing in Functions.
10.2) Write a C Program to find Fibonacci. Factorial of a number with recursion and without recursion.
10.3) Write a C Program to find the sum of given numbers with arrays and   pointers.

11. Strings
11.1) Implementation of string manipulation operations with library function:
   a. copy
   b. concatenate
   c. length
   d. compare

I 1.2) Implementation of string manipulation operations without library function:
   a. copy
   b. concatenate
   c. length
   d. compare

12.   Structures
12.1) Write a C Program to Store Information of a book Using Structure.
12.2) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function.

13.   Files
13.1) Write a C program to open a file and to print the contents of the file on screen.
13.2) Write a C program to copy content of one file to another file.
13.3) Write a C program to merge two files and store content in another file.

14.   Application

Creating structures to capture the student's details save them in file in proper record format. search and prints the student details requested by the user.

Note: Draw the flowcharts using Raptor from Experiment 3 to Experiment 6.

Course Outcomes:
- Implement basic programs in C and design flowcharts in Raptor.
- Use Conditional and Iterative statements to solve real time scenarios in C.
- Implement the concept of Arrays and Modularity and Strings.
- Apply the Dynamic Memory Allocation functions using pointers.
- Develop programs using structures, and Files.

Text Books:
i.   Let us C , Yaswanth Kanetkar, 16th Edition,BPB Publication.
ii.   How to solve it by Computer, R. G. Dromey, and Pearson Education.
iii.   Computer Programming. Reema Thareja, Oxford University Press

Reference Books:
i.   Programming in C A-Practical Approach Ajay Mittal. Pearson Education.
ii.   The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
iii.   Problem solving using C , K Venugopal,3'd Edition,TMG Publication.

Web Links:
1. https://www.hackerrank.com/
2. https://www.codechef.com/
3. https://www.topcoder.com/
4. https://code-cracker.github.io/
5. https://raptor.martincar1is1e.com/
6. httos://npte1.ac.in/courses/106105055/2

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-I/II Semester		L	T	P	C
		2	0	0	0
NAME OF THE SUBJECT: ENVIRONMENTAL SCIENCE					

(Common to All branches)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i)   The natural resources and their sustenance of the life and recognize the need to conserve the natural resources.

(ii)   The concepts of ecosystem and its functions in the environment. The need for protecting the producers and consumers and their role in the food web.

(iii)   The biodiversity of India and the threats to biodiversity, and the conservation practices to protect the biodiversity.

(iv)   Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management.

(v)   Social issues both rural and urban environment and the possible means to combat the challenges.

UNIT - I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES   7hrs

Definition, Scope and Importance - Need for public Awareness.

Natural Resources : Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over - exploitation, deforestation,– Timber extraction - Mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water -dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources,Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modem agriculture, fertilizer-pesticide problems, water logging, salinity.

UNIT - II: ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION   7hrs

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 ecosystems.

Biodiversity and its Conservation : 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 - Hot-sports 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 AND SOLID WASTE MANAGEMENT 6hrs

Environmental pollution: Definition, Cause, effects and control measures of: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, nuclear hazards.

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

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMBNT   6hrs
Social Issues and the Environment: From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions - Climate change, global warming, acid rain and ozone layer depletion, 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.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT   6hrs
Human population and the Environment: Population growth, variation among nations' Population explosion - Family Welfare programme. - Environment and human health - Human Rights - Value Education - HIV/AIDS - Women and Child Welfare - Role of information Technology in Environment and human health.
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.

Course Outcomes:
The students should be able to:
    (i)Gain a higher level of personal involvement and interest in understanding and
         solving environmental problems.
  (ii)Comprehend environmental problems from multiple perspectives with emphasis on human
       modern lifestyles and developmental activities.
   (iii)Demonstrate knowledge relating to the biological systems involved in the major global
environmental problems of the 2lst century.
   (iv) Influence their society in proper utilization of goods and services, Recognize
       the interconnectedness of human dependence on the earth's ecosystems.
  (v)Learn the management of environmental hazards and to mitigate disasters and have a
       clear understanding of environmental concerns and follow sustainable development practices.
Text Books:
    (i)Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for
       University Grants Commission, Universities Press.
    (ii)Environmental Studies by Palaniswamy - Pearson education.
    (iii)Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company.
Reference Books:
    (i)Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage
       Publications.
  (ii)Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
  (iii)Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
  (iv) Environmental sciences and engineering - J. Glynn Henry and Gary W. Heinke –
       Prentice hall India Private limited.
  (v) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House.
  (vi) Introduction to Environmental engineering and science by Gilberl M. Masters and
       Wendell   P.Ela - Prentice hall of India Private limited.

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: LINEAR ALGEBRA AND NUMERICAL METHODS					

(Common to all branches)

Course Objectives:
The objectives of this course is to acquire knowledge on the

- (i) To instruct the concept of Matrices in solving linear algebraic equations
- (ii) To elucidate the different numerical methods to solve nonlinear algebraic equations
- (iii) To disseminate the use of different numerical techniques for carrying out numerical integration.
- (iv) To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

UNIT – I: Systems of linear equations, Eigen values and Eigen vectors: **(10 hrs)**

Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss Elimination method – Eigenvalues and Eigen vectors and their properties.
Applications: Free vibration of a two-mass system.

UNIT – II: Cayley-Hamilton theorem and Quadratic forms: **(10 hrs)**

Cayley-Hamilton theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton theorem –Reduction to Diagonal form– Quadratic forms and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation.

Singular values of a matrix, singular value decomposition (Ref. Book – 1).

UNIT – III: Iterative methods: **(8 hrs)**

Introduction– Solutions of algebraic and transcendental equations : Bisection method–Secant method – Method of false position– Iteration method – Newton-Raphson method (One variable and simultaneous Equations)
Solutions of system of equations - Jacobi and Gauss-Seidel methods
Evaluation of largest eigenvalue –eigenvector using Power Method.

UNIT – IV: Interpolation: **(10 hrs)**

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

UNIT–V:Numerical integration and solution of differential equations with initial conditions:
(10 hrs)

Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rule– Solution of differential equations with initial conditions by Taylor's series– Picard's method of successive approximations– Euler's method – Runge-Kutta method (second and fourth order) – Milne's Predictor and Corrector Method.

Course Outcomes: The student will be able to
  (i)   Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
  (ii)   Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
  (iii)   Evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)
  (iv)   Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
  (v)   Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)

Text Books:
  (i) **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
  (ii) **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:
  (i) **David Poole,** Linear Algebra- A modern introduction, 4th Edition, Cengage.
  (ii) **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
  (iii)**M. K. Jain, S. R. K. Iyengar and R. K. Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
  (iv)**Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-I / II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: APPLIED CHEMISTRY					

(Common to EEE,ECE,CSE,IT)

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

Course Objectives:

- *Importance* of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- *Outline* the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- *Explain* the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- *Recall* the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- *Outline* the basics of computational chemistry and molecular switches

.
UNIT I: POLYMER TECHNOLOGY   8 hrs
Polymerisation:- Introduction, methods of polymerization (emulsion and suspension), mechanical properties.

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

Elastomers:- Introduction, preparation, properties and applications (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics, conducting polymers, biodegradable polymers, biopolymers, biomedical polymers

UNIT II: ELECTROCHEMICAL CELLS AND CORROSION   10 hrs
Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, construction of glass electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H_2-O_2, CH_3OH-O_2, phosphoric acid and molten carbonate).

*Corrosion:-*Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (proper designing and cathodic protection), Protective coatings (surface preparation, cathodic coatings, anodic coatings, electroplating and electroless plating [nickel]), Paints (constituents, functions and special paints).

UNIT III: MATERIAL CHEMISTRY   10 hrs
Part I *: Non-elemental semiconducting materials:-* Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling, epitaxy, diffusion, ion implantation) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

Insulators & magnetic materials: electrical insulators-ferro and ferri magnetism-Hall effect and its applications.

Part II:

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

Liquid crystals:- Introduction-types-applications.

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

UNIT IV: SPECTROSCOPIC TECHNIQUES & NON-CONVENTIONAL ENERGY SOURCES   10 hrs

Part A: **SPECTROSCOPIC TECHNIQUES**

Electromagnetic spectrum-UV (laws of absorption, instrumentation, theory of electronic spectroscopy, Frank-condon principle, chromophores and auxochromes, intensity shifts, applications), FT-IR [instrumentation and differentiation of sp, sp^2, sp^3 and IR stretching of functional groups (alcohols, carbonyls, amines) applications], magnetic resonance imaging and CT scan (procedure & applications).

Part B*:* NON-CONVENTIONAL ENERGY SOURCES

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

UNIT V: ADVANCED CONCEPTS/TOPICS IN CHEMISTRY   8 hrs

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

Molecular switches: characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor

Course Outcomes

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

   (i) ***Analyze*** the different types of composite plastic materials and ***interpret*** the mechanism of conduction in conducting polymers.
   (ii) ***Utilize*** the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
   (iii) ***Synthesize*** nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.
   (iv) ***Analyze*** the principles of different analytical instruments and their applications. Design models for energy by different natural sources.
   (v) ***Obtain*** the knowledge of computational chemistry and molecular machines

Text Books:
   1. P.C. Jain and M. Jain "**Engineering Chemistry**", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
   2. Shikha Agarwal, "**Engineering Chemistry**", Cambridge University Press, New Delhi, (2019).
   3. S.S. Dara, "**A Textbook of Engineering Chemistry**", S.Chand & Co, (2010).
   4. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai Publicating Co. (Latest edition).

Reference Books:
1. K. Sesha Maheshwaramma and Mridula Chugh, "**Engineering Chemistry**", Pearson India Edn.
2. O.G. Palana, "**Engineering Chemistry**", Tata McGraw Hill Education Private Limited, (2009).
3. CNR Rao and JM Honig (Eds) "**Preparation and characterization of materials**" Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, "**Textbook of Nanoscience and Nanotechnology**", University press (latest edition)

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year- II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: NETWORK ANALYSIS AND SYNTHESIS					

COURSE OBJECTIVES:
The main objectives of the course are
1. Understand and apply basic concepts of networks
2. Practicing network theorems to solve two port networks
3. Analysis of AC circuits using Time Domain and Frequency Domain
4. Calculation of network functions
5. Synthesis of RC,RL and LC networks

UNIT-1
Basic Circuit Fundamentals:
Fundamental concepts of R, L and C elements, Electric charge and current, Electric energy and potential, , DC circuits, series and parallel circuits, Ideal, Non-ideal, Independent and dependent sources, Source transformation,-Kirchhoff's laws, Mesh and Nodal Analysis - Super-mesh and Super-Node Analysis, Source transformation, Duality Principal , Star to Delta Conversion.

UNIT-2
Network Theorems:
Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens- problem solving using dependent sources also.
Two Port Networks:
Z, Y, h and ABCD parameters, analysis of interconnected (magnetically coupled) two ports, three terminal networks. Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources.

UNIT-3
Steady State Analysis of A.C Circuits:
Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits
Time and Frequency Domain Analysis:
Initial conditions, Procedure for evaluating initial conditions, Transient analysis of DC & AC circuits. Laplace transform of standard signals, Shifting theorem, initial and final value theorem, Solution of circuit equations by Laplace transform, Evaluation of circuit response for various signals.

UNIT-4
Network Functions:
Calculation of network functions, Poles and Zeros of network functions and their restriction, time domain behavior from pole - zero plot.

UNIT-5
Network Synthesis:
Hurwitz Polynomial, Properties of positive real function, necessary and sufficient conditions, basic synthesis procedure, synthesis of L-C, R-L and R-C driving point functions.

RL & RC Network Synthesis:
Synthesis of one-port networks, transfer function synthesis, basics of filter design.

Text Books
1. Hayt W. H., Kemmerly J. E. and Durbin S. M., "Engineering Circuit Analysis", 6th Ed., Tata McGraw-Hill Publishing Company Ltd.,2008.
2. M.E. Van Valkenburg, "Network Synthesis," PHI 2007.
3. A. Chakrabarti , Circuit Theory- Analysis and Synthesis, Dhanpat Rai & Co.
4. F.F. Kuo, "Network analysis and Synthesis", Wiley International Edition, 2008.

Reference Books
1. M.E. Van Valkenburg, "Network Analysis", 3rd ed., Pearson, 2006.
2. B.S.Nair and S.R.Deepa, "Network analysis and Synthesis", Elsevier, 2012.

COURSE OUTCOMES:
Students are able to
1. Apply the knowledge of basic circuital law and simplify the network using reduction techniques
2. Analyze the circuit using Kirchhoff's law and Network simplification theorems
3. Infer and evaluate transient response, Steady state response, network functions and evaluate two-port network parameters
4. Obtain the maximum power transfer to the load , and Analyze the series resonant and parallel resonant circuit
5. Synthesis of RC,RL and LC networks

University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year – II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: BASIC ELECTRICAL MACHINES					

Course objectives:

The objectives of this course is to acquire knowledge on

i.   the principle of operation and construction of DC generators and DC motors, characteristics of DC generators.

ii.   speed control methods, starting and performance characteristics of DC shunt motor

iii. principle of operation, construction of AC machines (transformers, synchronous machines and 3-phase &1-phase induction motors)

iv.   performance characteristics of transformers & 3-phase Induction motors and regulation of transformer and alternators

UNIT - I
DC Machines
Principle of operation of DC generator – EMF equation – types of DC machines – OCC & load characteristics of DC shunt generator - Principle of operation of DC motor - torque equation - speed control methods – losses and efficiency – three point starter - applications – Swinburne's test - brake test - numerical problems.

UNIT – II
Transformers
Principle of operation and construction of single phase transformer – EMF equation – Losses - OC & SC tests - efficiency and voltage regulation of transformer – Numerical Problems.

UNIT - III
Synchronous Machines
Principle of operation and construction of alternators- types of alternators – EMF equation - regulation of alternator by synchronous impedance method (EMF Method) - principle of operation and construction of synchronous motor – applications.

UNIT IV
Three-Phase Induction Motors
Principle of operation – construction – revolving magnetic field - types of three-phase induction motors – slip-torque characteristics - maximum, starting and running toques - losses and efficiency - starting methods –brake test on 3-phase induction motor.

UNIT V
Special Machines:
Principle of operation of single phase induction motor - different types of single phase induction motors (split-phase motor, capacitor-start motor, capacitor-start capacitor-run motor, shaded-pole motor) – Linear induction motor – stepper motor - universal motor.

Course Outcomes:

The student should be able to:

i. understand the operation and characteristics of DC machines
ii. acquire the skills to analyze the starting and speed control methods of DC shunt motors.
iii. able to explain the operation of synchronous machines and determine regulation using synchronous impedance method
iv. understand the principle, speed-torque characteristics, performance and starting methods of 3-phase induction motor
v. understand the operation of various special machines.

Text books:

i. Principles of Electrical Machines by V.K. Mehta & Rohit Mehta, S.Chand publications
ii. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria & Sons
iii. Electrical Machinery by P.S. Bhimbra, Khanna Publishers.

Reference books:

i. Basic Electrical Engineering by M.S.Naidu & S.Kamakshiah, TMH Publications
ii. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition
iii. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition

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University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year – II SEMESTER		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: ELECTRONIC DEVICES					

Course Objectives:

The main objectives of the course are

1. The basic concepts of Electron Dynamics in Electric & Magnetic fields are reviewed.
2. The physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes are studied.
3. The application of diode such as Rectifiers operation and characteristics with and without filters are discussed.
4. The principle of operation of Bipolar Junction Transistor and Field Effect Transistor with their V-I characteristics is explained.
5. Advance topic such as CMOS and Bi-CMOS logic is introduced.

Chapter 1: Electron Ballistics

Introduction, Charged Particles, Force, Field Intensity, Potential and Energy, Motion of an Electron in Electric and Magnetic Fields, Cathode Ray Oscilloscope - Operation and Applications, Electrostatic and Magnetic Deflection in Cathode Ray Tube, Comparison Between Electric and Magnetic Deflection Systems.

Chapter 2: Junction Diode Characteristics

Review on Semiconductors, Variation in Semiconductor Parameters with Temperature, Continuity Equation, Open Circuited p-n Junction, The current components in a p-n Diode, Diode Current Equation, The Volt-ampere Characteristics of p-n Diode and Temperature dependence, Diode Resistance and Diode Capacitance , Junction-diode Switching times.
p-n Junction Diode as a Rectifier, Quantitative Analysis of Half-Wave and Full-wave Rectifiers, Qualitative Analysis of Filter Circuits.

Chapter 3: Special Diode Characteristics

Breakdown Mechanisms, Zener diode ,Zener diode as a Regulator, Tunnel diode, Varactor diode, LED, Photo diode, Schottkey diode, Gunn diode, Impatt diode, PIN diode, PIN-Photo diode, Avalanche Photo Diode (APD), LASER diode, SCR, UJT -Construction, operation and characteristics of the diodes are required to be considered.

Chapter 4: BJT Characteristics

The Junction Transistor, Transistor Current Components, Transistor construction, Characteristics of Common-Base, Common Emitter and Common-Collector Configurations, Transistor Current equation, The Transistors as an Amplifier, Punch through/Reach through, Comparison of Transistor Configurations, Typical Transistor-

Junction Voltages, Analytical Expressions for Transistor Characteristics, The Ebers-Moll Model of a Transistor, The Photo Transistor.

Chapter 5: FET Characteristics

The Junction Field-effect Transistor-Types, Construction and operation, The Pinch-off Voltage, The JFET Volt-Ampere Characteristics, JFET parameters, JFET applications, The comparison between BJT and JFET, The Metal-oxide-Semiconductor FET (MOSFET) - Types, Construction, Operation and Characteristics, The comparison between JFET and MOSFET. Introduction to CMOS and Bi-CMOS Logic.

TEXT BOOKS:

1. Integrated Electronics – Jacob Millman, C. Halkias, C.D.Parikh , Tata Mc-Graw Hill, Second Edition, 2011.

2. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.

REFERENCES:

1. Electronic Devices and Circuits- S Salivahanan, N Suresh Kumar, Tata Mc-Graw Hill, Third Edition, 2012.

2. Electronic Devices and Circuit Theory-R.L. Boylestad and LouisNashelsky, Pearson Publications, Tenth Edition.

Course Outcomes (COs):

At the end of this course the student can able to :

1. Acquire the knowledge on Electron Dynamics in Electric & Magnetic fields and operation of CRO.
2. Understand the construction, working principle and electrical characteristics of Junction Diode and Special Diodes
3. Analyse operation of Rectifiers with and without filters along with relevant expressions and necessary comparisons.
4. Compare the principle of operation for both BJT and FET with their V-I characteristics in different configurations and understand the concept of transistor as an amplifier.
5. Know the Basics of CMOS and Bi-CMOS logic.

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-I/II Semester		L	T	P	C
		0	0	3	1.5

NAME OF THE LAB: APPLIED CHEMISTRY LAB
(Common to EEE,ECE,CSE,IT)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i) Normality , molaritiy ,theory of indicators used in different volumetric and chemical analysis.

(ii) Alkalinity and hardness of water by E DTA method.

(iii)Volumetric analysis-Red-Ox titrations of different chemical compounds.

(iv)Determination of concentration of acids and bases using conductometer and potentiometer

(v) Determination of P^H and color metric analysis

Introduction to Chemistry laboratory – Molarities, normality, primary, secondary standard solutions,
  Volumetric titrations, quantitative analysis

1. Determination of HCl using standard Na_2CO_3 solution.

2. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.

3. Determination of Mn^{+2} using standard oxalic acid solution.

4. Determination of ferrous iron using standard $K_2Cr_2O_7$ solution.

5. Determination of Cu^{+2} using standard hypo solution.

6. Determination of temporary and permanent hardness of water using standard EDTA solution.

7. Determination of Fe^{+3} by a colorimetric method.

8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).

9. Determination of iso-electric point of amino acids using pH-metry method/conductometric method.

10. Determination of the concentration of strong acid vs strong base (by conductometric method).

11. Determination of strong acid vs strong base (by potentiometric method).

12. Determination of Mg^{+2} present in an antacid.

13. Determination of $CaCO_3$ present in an egg shell.

14. Estimation of Vitamin C.

15. Determination of phosphoric content in soft drinks.

16. Adsorption of acetic acid by charcoal.

17. Preparation of nylon-6, 6 and Bakelite (demonstration only).

18. Determination of Lead in drinking water.

19. Determination of percentage of copper in Brass.

Of the above experiments at-least 10 assessment experiments should be completed in a semester.

Course Outcomes:

(i) Student is exposed to volumetric titrations acquires some volumetric skills.

(ii) Student is able to analyze hard and soft water.

(iii) Student is exposed to volumetric skills of red-ox titrations with different indicators

(iv) Students can handle the instruments like conductometer, potentiometer in determinening the concentrations of acids and bases.

(v) Student is able to analyze the different chemical concentrations using colorimeter and P^H meter.

Reference Books
1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co. Latest edition

University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year – II Semester		L	T	P	C
		0	0	3	1.5
NAME OF THE LAB: BASIC ELECTRICAL MACHINES LAB					

Course objectives:

The objectives of this course is to acquire knowledge on the

  i.   To plot the magnetizing characteristics of DC shunt generator and understand the mechanism of self-excitation.
 ii.   To control the speed of DC motors.
iii.   To determine and predetermine the performance of DC machines.
 iv.   To predetermine the efficiency and regulation of transformers and assess their performance.
  v.   To analyze performance of three phase induction motor.
 vi.   To understand the significance of regulation of an alternators using synchronous impedance method.

Any 10 of the following experiments are to be conducted

   1. Magnetization characteristics of DC shunt generator.
   2. Speed control of DC shunt motor.
   3. Brake test on DC shunt motor.
   4. Swinburne's test on DC machine
   5. Load test on DC shunt generator.
   6. Load test on DC series generator.
   7. Separation of losses of DC Machine.
   8. OC & SC tests on Single-phase transformer.
   9. Load test on Single-phase transformer
   10. Brake test on 3-phase Induction motor.
   11. Regulation of alternator by EMF method

Course Outcomes:

The Student should be able to

  i.   Determine and predetermine the performance of DC machines.
 ii.   Control the speed of DC motor.
iii.   Determine and predetermine the performance of Transformers.
 iv.   Perform tests on 3-phase induction motor and alternator to determine their performance

Text Books:

   i.   Electrical Machinery by P.S. Bhimbra, Khanna Publishers.
  ii.   Electrical Machines –I.J.Nagarath, D.P.Kotari, McGraw Hill

References Books:

Laboratory courses in Electrical Engineering, S.G.Tarnekar, P.K.Kharbanda, S.B.Bodkhe, S.D.Naik, D.J.Dahgaonkar, S.Chand and Company Ltd.

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year – II SEMESTER		L	T	P	C
		0	0	3	1.5
NAME OF THE LAB : ELECTRONIC DEVICES LAB					

Course Objectives:
1. To observe experimentally the characteristics of PN junction diode & zener diode.
2. To find ripple factor of half and full wave rectifiers with and without filter.
3. To observe experimentally the characteristics of BJT in CB, CE and CC configuration and observe experimentally the characteristics of JFET.
4. To observe experimentally the characteristics SCR and UJT.
5. To measure the voltage, time period and phase using CRO

Lab Practice:

The Students are required to study and acquire the Prerequisite knowledge from the manuals on the following to carry out the list of experiments mentioned below.

i. Identification and specifications of Passive (R, L, C) Components (Colour Codes),

ii. Identification and utility of bread boards.

iii. Study and operation of Voltmeters, Ammeters and Multi-meters (Analog and Digital)

iv. Study and operation of Regulated Power Supplies.

v. Identification, Specifications and Testing of Active Devices-Diodes & Transistors.

vi. Soldering practice – simple circuits using active and passive components.

LIST OF EXPERIMENTS:

1. P-N Junction Diode V-I Characteristics

2. Zener Diode V-I Characteristics

3. Zener Diode Regulation Characteristics.

4. LED Characteristics

5. Half-wave Rectifier (Without Filters & With C-Filter)

6. Full-wave Rectifier(Without Filters & With C-Filter)

7. BJT Characteristics (CE/CC Configuration)

8. FET Characteristics (CS/CD Configuration)

9. Tunnel Diode Characteristics

10. SCR Characteristics

11. UJT Characteristics

12. CRO Operation and Applications

Course Outcomes:

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

1. Draw the characteristics of PN Diode and Zener Diode.
2. Find the ripple factor of half and full wave rectifiers with and without filter.
3. Explain the characteristics of transistor in CB, CE and CC configurations and Compute the characteristics of JFET.
4. Explain the SCR and UJT.
5. Determine the voltage, current and frequency using CRO.