B.Tech. – I Year II Semester (for Group-B Branches) EEE, ECE, CSE & AI ML

S.No.	Category	Title	L	T	P	Credits
1	BS&H	Communicative English	2	0	0	2
2	BS & H	Engineering Chemistry / Chemistry / Fundamental Chemistry	3	0	0	3
3	Engineering Science	Differential Equations & Vector Calculus	3	0	0	3
4	Engineering Science	Basic Civil & Mechanical Engineering	3	0	0	3
5	Professional Core	Engineering Mechanics/Network Analysis/ Data structures (Branch specific)	3	0	0	3
6	BS&H	Communicative English Lab	0	0	2	1
7	BS&H	Engineering Chemistry / Chemistry / Fundamental Chemistry Lab	0	0	2	1
8	Engineering Science	Engineering Workshop	0	0	3	1.5
9	Professional Core	Engineering Mechanics & Building Practices Lab Engineering Mechanics Lab/Network Analysis Lab/ Data structures Lab	0	0	3	1.5
10		Health and wellness, Yoga and Sports	-	-	1	0.5
Total			**14**	**00**	**11**	**19.5**

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA (AUTONOMOUS)
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA (R23)

L	T	P	C
2	0	0	2

COMMUNICATIVE ENGLISH

(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues.
CO2: Apply grammatical structures to formulate sentences and correct word forms.
CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions.
CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts.
CO5: Create a coherent paragraph, essay, and resume.

UNIT I

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

Listening:	Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking:	Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading:	Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing:	Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar:	Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary:	Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II

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

Listening:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar:	Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

UNIT III
Lesson: **BIOGRAPHY: Elon Musk**

Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Note-making, paraphrasing
Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations
Vocabulary: Compound words, Collocations

UNIT IV
Lesson: **INSPIRATION: The Toys of Peace by** Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters, Resumes
Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice
Vocabulary: Words often confused, Jargons

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

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts
Reading: Reading comprehension.
Writing: Writing structured essays on specific topics.
Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Vocabulary: Technical Jargons

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

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

Web Resources:

GRAMMAR:

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

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

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L	T	P	C
0	0	2	1

COMMUNICATIVE ENGLISH LAB
(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
CO2: Apply communication skills through various language learning activities.
CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.
CO5: Create effective Course Objectives

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

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

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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L	T	P	C
3	0	0	3

CHEMISTRY

(Common to EEE, ECE, CSE, IT &allied branches)

Course Objectives:

- To familiarize engineering chemistry and its applications.
- To train the students on the principles and applications of electrochemistry and polymers.
- To introduce instrumental methods.

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

CO1: Explain basic concepts of quantum mechanics and molecular bonding.
CO2: Apply applications of semiconductors, superconductors, supercapacitors and nanomaterials.
CO3: Familiarize construction of batteries and electrochemical sensors.
CO4: Explain preparation and applications of plastics, elastomers and conducting polymers.
CO5: Explain the principles of spectrometry, HPLC in separation of solid and liquid mixtures.

UNIT I Structure and Bonding Models:

Fundamentals of Quantum mechanics - Schrodinger wave equation - significance of Ψ and Ψ^2 - particle in one dimensional box - molecular orbital theory - bonding in homo and heteronuclear diatomic molecules - energy level diagrams of O_2 and CO - π-molecular orbitals of butadiene and benzene - calculation of bond order.

UNIT II Modern Engineering materials

Semiconductors: Introduction, basic concept (preparation methods: distillation, zone refining, Czochralski crystal pulling, epitaxy, diffusion, ion implantation) - chalcogen semiconductors - applications.
Superconductors: Introduction - basic concept (type-I, type-II) - applications.
Super capacitors: Introduction, basic concept - classification - applications.
Nano materials: Introduction - carbon nanotubes and fullerenes (classification, properties and applications) - applications of graphine nanoparticles.

UNIT III Electrochemistry and Applications

Electrochemical cell - Nernst equation - cell potential calculations and numerical problems - potentiometric titrations (redox titrations) - concept of conductivity - conductivity cell - conductometric titrations (acid-base titrations).
Electrochemical sensors: potentiometric sensors with examples, amperometric sensors with examples.

Batteries: Working of the batteries including cell reactions of zinc-air battery, primary cells (dry cell) and secondary cells (lithium ion) - Fuel cells [working of hydrogen-oxygen fuel cell and polymer electrolyte membrane fuel cells (PEMFC)].

UNIT IV Polymer Chemistry

Introduction to polymers - functionality of monomers - chain growth and step growth polymerization - coordination polymerization - mechanisms of polymer formation (suspension and emulsion).
Plastics: Thermoplastics and Thermosetting plastics - moulding techniques (compression, injection, extrusion, blow film) - preparation, properties and applications of Poly vinyl chloride (PVC), Teflon, Bakelite, Nylon-6,6 and carbon fibres.
Elastomers: Preparation, properties and applications of Buna-S and Buna-N.
Conducting polymers: Mechanism of conduction and applications of polyacetylene and polyaniline - Bio-degradable polymers [poly glycolic acid (PGA) and poly lactic acid (PLA)].

UNIT V Instrumental Methods and Applications

Electromagnetic spectrum - law of absorption (Beer-Lambert's law) - UV-Visible spectroscopy (electronic transitions, instrumentation, applications) - IR spectroscopy (fundamental modes and selection rules, instrumentation) - Chromatography (basic principle, classification) - High pressure liquid Chromatography HPLC (principle, instrumentation and applications).

Textbooks:

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

ReferenceBooks:

1. Skoog and West, Principles of Instrumental Analysis, 6/e,Thomson, 2007.
2. J.D.Lee,Concise Inorganic Chemistry, 5thEdition,Wiley Publications,Feb.2008.
3. Text bookofPolymerScience,Fred W.BillmayerJr,3rdEdition.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA (AUTONOMOUS)
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L	T	P	C
0	0	2	1

CHEMISTRY LAB

(Common to EEE, ECE, CSE, IT & allied branches)

Course Objectives:

- To verify the fundamental concepts with experiments

Course Outcomes: At the end of the course, the students will be able to:
CO1: Determine the cell constant and conductance of solutions.
CO2: Prepare advanced polymer Bakelite materials.
CO3: Measure the strength of an acid present in secondary batteries.
CO4: Analyze the IR spectra of some organic compounds.
CO5: Calculate the hardness of water.

List of Experiments:

1. Measurement of 10 Dq by spectrophotometric method.
2. Conductometric titration of strong acid vs. strong base.
3. Conductometric titration of weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry determination of redox potentials and emfs.
6. Determination of strength of an acid in Pb-Acid battery.
7. Preparation of Bakelite.
8. Verify Lambert-Beer's law.
9. Wavelength measurement of sample through UV-Visible spectrophotometer.
10. Identification of simple organic compounds by IR spectrophotometer.
11. Preparation of nanomaterials by precipitation method.
12. Estimation of ferrous Iron by dichrometry.
13. Determination of Mn^{2+} using standard oxalic acid solution.
14. Determination of concentration of acetic acid by p^H meter.
15. Determination of hardness of a groundwater sample.
16. Estimation of Zn^{2+} using standard EDTA solution.

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

Reference:

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

R23

University Engineering College(A): J N T University Kakinada

Department of Mathematics

I Year II Semester

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to all branches)

COURSE OBJECTIVES
This course is aimed to provide the learner with several of methods of solving differential equations and partial differential equations. To prepare the student to calculate gradient, surface and volume integrals by applying standard theorems.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Model simple physical problems involving rate as first order differential equations and solve the resulting equation.	K2 or K3
CO2	Model electrical circuits problems or vibrating systems problems as linear higher order ordinary differential equations and solve.	K2 or K3
CO3	Solve partial differential equations that model physical processes.	K2 or K3
CO4	Apply the knowledge of gradient, divergence and curl and interpret the physical meaning of different operators.	K2 or K3
CO5	Compute the work done against a field, circulation and flux using vector calculus methods.	K2 or K3

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

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

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

Members of BoS:

Dr. V.Ravindranath (Chairman)	Dr. T.V.S. Sekhar (Member)	Dr. Ch. Ramireddy (Member)	Dr. T. Hymavathi (Member)	Dr.G.V.S.R. Deekshitulu (Member)	Dr. S.K.Vali (Member)	Dr.K.Sobhan Babu (Member)

R23

R23

University Engineering College(A): J N T University Kakinada

Department of Mathematics

SYLLABUS

UNIT I

Differential equations of first order and first degree:

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT II

Linear differential equations of higher order (Constant Coefficients):

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

UNIT III

Partial Differential Equations:

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

UNIT IV

Vector differentiation:

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

UNIT V

Vector integration:

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

TEXT BOOKS

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

REFERENCE BOOKS

1. ThomasCalculus,GeorgeB.Thomas,MauriceD.WeirandJoelHass,PearsonPublishers,2018, 14th Edition.
2. AdvancedEngineeringMathematics,DennisG.ZillandWarrenS.Wright,JonesandBartlett,2018.
3. AdvancedModernEngineeringMathematics,GlynJames,Pearsonpublishers,2018,5th Edition.
4. AdvancedEngineeringMathematics,R.K.JainandS.R.K.Iyengar,AlphaScienceInternationalLtd.,

Members of BoS:

Dr. V.Ravindranath (Chairman)	Dr. T.V.S. Sekhar (Member)	Dr. Ch. Ramireddy (Member)	Dr. T. Hymavathi (Member)	Dr.G.V.S.R. Deekshitulu (Member)	Dr. S.K.Vali (Member)	Dr.K.Sobhan Babu (Member)

L	T	P	C
3	0	0	3

BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to All branches of Engineering)

Course Objectives:
- Get familarized with the scope and importance of Civil Engineering sub-divisions.
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation's economy.
- Get familarized with the importance of quality, conveyance and storage of water.
- Introduction to basic civil engineering materials and construction techniques.

Course Outcomes: On completion of the course, the student should be able to:
CO1. Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.
CO2. Know the concepts of surveying and to understand the measurements of distances, angles and levels through surveying.
CO3. Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.
CO4. Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of Civil Engineers will be appreciated.
CO5. Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geotechnical Engineering- Transportation Engineering- Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline. Building Construction and Materials: Construction Materials-Cement - Aggregate - Bricks - Cement concrete - Steel. Introduction to Prefabricated construction Techniques.

OK

UNIT II

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

OK

UNIT III

Transportation Engineering **importance of Transportation** in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.
Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

OK

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PROFESSOR & HEAD
Department of Civil Engineering
University College of Engineering
JNTUK, KAKINADA-533 003

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

Reference Books:
1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019, Fifth Edition
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi, 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023, 38th Edition.

L: 3 T:1 P:0

PART B: BASIC MECHANICAL ENGINEERING

Course Objectives: The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.
- Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

Course Outcomes: On completion of the course, the student should be able to

CO1: Explain the role of mechanical engineering in industrial sectors. Identity different materials used in engineering applications.

CO2: Enlist different manufacturing processes and their practical applications. Explain the working principles of Boilers and I.C engines and power cycles.

CO3: Describe the construction and working of different power transmission systems. Explain the working principle of different power plants. Describe the basic components of a robot and its applications.

UNIT I

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

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

UNIT II

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

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

UNIT III

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

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

Introduction to Robotics - Joints & links, configurations, and applications of robotics. Demo on operation of a robot

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

Textbooks:

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

Reference Books:

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

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA (AUTONOMOUS) :: JNTUK,KAKINADA
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech II Semester

COURSE CODE – R2011XXYY	ELECTRICAL CIRCUIT ANAYSIS - I	CATEGORY Professional Core	L-T-P 3-0-0	CREDITS 3

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

		Knowledge Level (K)#
CO1	Explain the basics of single phase AC systems, series resonance & parallel resonance concepts.	2
CO2	Apply node & mesh analysis to solve AC circuits. Perform steady state analysis of R, L & C circuits.	3
CO3	Solve DC & AC circuits using network theorems. Draw the locus diagrams of RL, RC, RLC with R, L and C variables.	3
CO4	Analyse three balanced & unbalanced circuits.	4

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															

(Please fill the above with Levels of Correlation, viz., L, M, H)

UNIT	CONTENTS	Contact Hours
UNIT - 1	**Single Phase A.C Systems** Periodic waveforms - average value, rms value, peak factor and form factor, concept of phasor, phase angle and phase difference, phasor diagrams for lagging, leading networks, complex and polar forms of representations. node and mesh analysis. Steady state analysis of R, L and C circuits, power factor and its significance, real, reactive and apparent power, waveform of instantaneous power and complex power .	
UNIT - 2	**Resonance and Locus Diagrams** Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth; Locus diagram: RL, RC, RLC with R, L and C variables.	

Dr. R. Srinivasa Rao (Member)	Dr. K. Venkata Reddy (Member)	Dr. M. Nageswara Rao (Member)	Dr. Ch.V.V.S. Bhaskar Reddy (Member)	Dr. K. Ravindra (Chairman)
			Attended Online	

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA (AUTONOMOUS) :: JNTUK,KAKINADA
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT - 3	**Network Theorems (DC & AC Excitations)** Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem, Compensation theorem and Telligen's theorem.	
UNIT - 4	**Balanced Three Phase Circuits** Phase sequence, star and delta connection of sources and loads, relation between line and phase voltages and currents, analysis of balanced three phase circuits, measurement of active and reactive power.	
UNIT - 5	**Unbalanced Three Phase Circuits** Loop method, Star-Delta transformation technique, two wattmeter method for measurement of three phase power.	
	Total	

Textbooks:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition.

Reference Books:

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition
2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2017, Fifth Edition.
3. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition.
4. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023, Fourteenth Edition.
5. Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023.

Dr. R. Srinivasa Rao (Member)	Dr. K. Venkata Reddy (Member)	Dr. M. Nageswara Rao (Member)	Dr. Ch.V.V.S. Bhaskar Reddy (Member)	Dr. K. Ravindra (Chairman)
			Attended Online	

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA (AUTONOMOUS) :: JNTUK,KAKINADA
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech II Semester

COURSE CODE – R2011XXYY	ELECTRICAL CIRCUITS LAB	CATEGORY Professional Core	L-T-P 0-0-3	CREDITS 1.5

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

		Knowledge Level (K)#
CO1	Apply node & mesh analysis to solve the circuits & compare practical results obtained with theoretical calculations.	3
CO2	Draw locus diagrams of RL, RC series circuits and examine series resonance	3
CO3	Calculate the self, mutual inductances and coefficient of coupling values for a magnetically coupled circuit and find parameters of choke coil.	4
CO4	Calculate power consumed by 3-ϕ balanced and unbalanced loads	3

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															

(Please fill the above with Levels of Correlation, viz., L, M, H)

S. No.	List of Experiments	Contact Hours
1.	Verification of network reduction techniques.	
2.	Verification of node and mesh analysis.	
3.	Determination of cold and hot resistance of an electric lamp	
4.	Determination of Parameters of a choke coil.	
5.	Determination of self, mutual inductances, and coefficient of coupling	
6.	Series resonance	
7.	Locus diagrams of R-L (L Variable) and R-C (C Variable) series circuits	
8.	Verification of Superposition theorem	
9.	Verification of Thevenin's and Norton's Theorems	
10.	Verification of Maximum power transfer theorem	
11.	Verification of Compensation theorem	
12.	Verification of Reciprocity and Millman's Theorems	
13.	Measurement of 3-phase power by two wattmeter method for balanced loads	
14.	Measurement of 3-phase power by two wattmeter method for unbalanced loads	

Dr. R. Srinivasa Rao (Member)	Dr. K. Venkata Reddy (Member)	Dr. M. Nageswara Rao (Member)	Dr. Ch.V.V.S. Bhaskar Reddy (Member)	Dr. K. Ravindra (Chairman)
			Attended Online	

ENGINEERING WORKSHOP

(Common to All branches of Engineering)

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicle.

Course Outcomes:

CO1: Identify workshop tools and their operational capabilities.

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

SYLLABUS

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

Textbooks:

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

Reference Books:

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

MR

L	T	P	C
3	0	0	3

DATA STRUCTURES

(Common to CSE, IT & allied branches)

Course Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

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

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.

CO5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.

CO6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

UNIT I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

UNIT II

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT IV

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

UNIT V

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

L	T	P	C
0	0	3	1.5

DATA STRUCTURES LAB
(Common to CSE, IT & allied branches)

Course Objectives:

The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

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

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.
CO5: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

List of Experiments:

Exercise 1: Array Manipulation
i) Write a program to reverse an array.
ii) C Programs to implement the Searching Techniques – Linear & Binary Search
iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation
i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications
i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation
i) Implement a doubly linked list and perform various operations to understand its properties and applications.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

i) Implement a stack using arrays and linked lists.
ii) Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

i) Implement a queue using arrays and linked lists.
ii) Develop a program to simulate a simple printer queue system.
iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

i) Use a stack to evaluate an infix expression and convert it to postfix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree

i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise 9: Hashing

i) Implement a hash table with collision resolution techniques.
ii) Write a program to implement a simple cache using hashing.

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
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I Year - I Semester		L	T	P	C
		3	0	0	3
NETWORK ANALYSIS					

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

		Knowledge Level (K)#
CO1	Analyze the circuit using Kirchhoff's law	K4
CO2	Evaluate transient response, Steady state response and network functions	K3
CO3	Apply Thevenin and Norton theorems to analyze and design for maximum power transfer and Analyze the R-L, R-C and R-L-C circuits	K2
CO4	Analyze the series and parallel resonant circuits	K4
CO5	Evaluate two-port network parameters, design attenuators and equalizers	K3

UNIT CONTENTS

UNIT– 1 **Introduction to Network Analysis**: Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis, Star-Delta conversion, problem solving with resistances only including dependent sources also.

A.C Fundamentals: Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor- problem solving, Phase angle, Phasor representation, Addition and subtraction of phasors, mathematical representation of sinusoidal quantities, explanation with relevant theory, problem solving. Principal of Duality with examples.

UNIT– 2 **Transients:** First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation,evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation.

Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, heaviside's expansions, problem solving using Laplace transform .

UNIT– 3 **Steady State Analysis of A.C Circuits:** Impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving using Laplace transforms also.

Network Theorems: Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, MaxPower Transfer, Tellegens- problem solving using dependent sources also.

UNIT– 4 **Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case-resistance present in bothbranches, anti resonance at all frequencies.

Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, Dot rule of coupled circuits, Problem solving.

UNIT– 5 **Two-port Networks**: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h- parameters, image transfer constant, Image and iterative impedance, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving using dependent sources also.

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TEXT BOOKS:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition
3. Engineering Network Analysis and Filter Design by Gopal –G. Bhise & Prem Chadha, Umesh Publications, 2000.

REFERENCES:

1. Electric circuits by Joseph A Edminister, Schaum's Outline Series, 5th Edition
2. Electrical Circuit Analysis (Including Passive Network Synthesis) by C.L.Wadhwa, New Age International Publications, second edition
3. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku, McGraw-Hill Education

NETWORK ANALYSIS AND SIMULATION LABORATORY

PART-A

The following experiments need to be performed using both Hardware and Software

1. Study of Components of a circuit and Verification of KCL and KVL.
2. Perform Mesh and Nodal Analysis of a given circuit.
3. Determination of frequency response of current in RLC circuit with sinusoidal AC input.
4. Verification of principle of Superposition and Maximum power transfer theorems.
5. Verification of Thevenin and Norton theorems.
6. Verification of Tellegen's theorem for two networks of the same topology.
7. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
8. Verification of Z and Y Parameters of a two-port network(Only Hardware Implementation).
9. Verification of Transmission and Hybrid parameters of a two-port network (Only Hardware Implementation).
10. Verification of ABCD Parameters for a two-port network(Only Hardware Implementation).

PART-B

The experiments need to be simulated using software

1. Determination of transient response of current in RLC circuit with step voltage input for under damp, critically damp and over damp cases.
2. Determination of transient response of current in RL and RC circuits with step voltage input.

Hardware Requirements:

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

Software requirements:

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