K. S. R. M. College of Engineering - KADAPA

(AUTONOMOUS)

Detailed Syllabus for B. Tech. (Regular) (R20)

Department of Electrical & Electronics Engineering

Semester - 0 (Theory - 8, Lab - 7) Induction Program

S. No.	Course Name	Category	L	T	P	C
1	Physical Activities - Sports, Yoga & Meditation, plantation	MC	0	0	6	0
2	Career Counselling	MC	2	0	2	0
3	Orientation to all branches - career options, tools etc.ESC	MC	3	0	0	0
4	Orientation on admitted branch - corresponding labs, tools & platforms	EC	2	0	3	0
5	Proficiency Modules & Productivity Tools	ES	2	1	2	0
6	Assessment on basic aptitude and mathematical skills	MC	2	0	3	0
7	Remedial Training in foundation courses	MC	2	1	2	0
8	Human values & Professional ethics	MC	3	0	0	0
9	Communication skills - focus on listening, speaking, reading, writing skills	BS	2	1	2	0
10	Concepts of programming	ES	2	0	2	0

L - Lecture, T - Tutorial, P - Practical

I Semester (Theory – 05, Labs – 04)

S. No.	Subject Code	SUBJECT	SC	L	T	P	IM	EM	CR
1	2021101	Linear Algebra and Calculus	BSC	3	0	0	30	70	3
2	20AP102	Applied Physics	BSC	3	0	0	30	70	3
3	2024103	Communicative English	HSMC	3	0	0	30	70	3
4	2005103	C-Programming & Data Structures	ESC	3	0	0	30	70	3
5	2003105	Engineering Drawing	ESC	1	0	2	30	70	2
6	2003106	Engineering Drawing Lab	ESC	0	0	2	40	60	1
7	20AP107	Applied Physics Lab	BSC	0	0	3	40	60	1.5
8	2024108	Communicative English Lab	HSMC	0	0	3	40	60	1.5
9	2005108	C-Programming & Data Structures Lab	ESC	0	0	3	40	60	1.5
Total				13	00	13	310	590	19.5

II Semester (Theory – 05, Lab – 05)

S. No.	Subject Code	SUBJECT	SC	L	T	P	IM	EM	CR
1	2021201	Differential Equations & Vector Calculus	BSC	3	0	0	30	70	3
2	2023202	Chemistry	BSC	3	0	0	30	70	3
3	2002203	Electrical Circuits Analysis-I	ESC	3	0	0	30	70	3
4	2004204	Electronic Devices & Circuits	ESC	3	0	0	30	70	3
5	20EW205	Engineering Workshop	ESC	0	0	3	40	60	1.5
6	2005206	IT Workshop	ESC	0	0	3	40	60	1.5
7	2023207	Chemistry Lab	BSC	0	0	3	40	60	1.5
8	2002208	Electrical Circuits Analysis-I Lab	ESC	0	0	3	40	60	1.5
9	2004209	Electronic Devices & Circuits Lab	ESC	0	0	3	40	60	1.5
10	20MC210	Environmental Science	MC	2	0	0	30	00	0.0
Total				15	00	10	350	580	19.5

B.Tech., I Semester

Course Title	Linear Algebra and Calculus				B.Tech. I Semester (EEE)		
Course Code	Category	Hours / Week			Credits	Maximum Marks	
2021101	Basic Science Course (BSC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	--	3	30	70	100
Mid Exam Duration : 2Hrs						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn concepts of Matrices, Mean value Theorem, Multivariable Calculus, Multiple Integrals and Beta, Gamma functions. Using these concepts the students can analyze their engineering applications.

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

CO 1	Define Beta and Gamma functions
CO 2	Classify the functions of several variables which is useful in optimization techniques.
CO 3	Evaluate multiple integrals
CO 4	Utilize mean value theorems to real life problems
CO 5	Develop the matrix algebra techniques for practical applications.

UNIT I

Matrices: Rank of a matrix by Echelon form, Normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigenvalues and Eigenvectors for real matrices – Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley–Hamilton theorem. Diagonalisation by orthogonal transformation.

UNIT II

Mean Value Theorems: Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof), related problems.

UNIT III

Multivariable Calculus: Partial derivatives, total derivative, chain rule, change of variables, Jacobians, Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV

Multiple Integrals: Evaluation of double integrals in Cartesian coordinates and polar coordinates – Change of variables in double integrals – Change the order of integration in double integrals – Evaluation of triple integrals in Cartesian and polar coordinates – Change of variables between cartesian, cylindrical and spherical polar coordinates.

UNIT V

Beta and Gamma functions: Beta and Gamma functions and their properties, relation between Beta and Gamma functions, evaluation of definite integrals using Beta and Gamma functions.

Text Books

1. Higher Engineering Mathematics, Dr. B.S. Grewal, Khanna Publishers-43 edition 2014.
2. 2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Publications, 9th edition- 2013.

Reference Books

1. Higher Engineering Mathematics, B.V. Ramana, Mc. Graw Hill Education (India) Pvt. Ltd, New Delhi, 11th Edition, Reprint 2010.
2. Linear Algebra: A Modern Introduction, D Poole, 2nd Edition, Brooks/Cole, 2005.
3. A Textbook of Engineering Mathematics, N.P. Bali and Manish Goyal, Lakshmi Publications, Reprint 2008

Course Title	Applied Physics					B. Tech. I Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20AP102	Basic Science Course (BSC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	--	3	30	70	100
Mid Exam Duration : 2Hrs						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn optical phenomenon i.e. interference, diffraction, the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, concepts of dielectric and magnetic materials, Quantum Mechanics, semiconductors and superconductors.

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

CO 1	Study the different realms of physics and their applications in both scientific and technological systems through physical optics
CO 2	Identify the wave properties of light and the interaction of energy with the matter
CO 3	Assess the electromagnetic wave propagation and its power in different media
CO 4	Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields
CO 5	Study the quantum mechanical picture of subatomic world along with the discrepancies between the classical estimates and laboratory observations of electron transportation phenomena by free electron theory and band theory
CO 6	Elaborate the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors

UNIT I

Wave Optics

Interference: Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – 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 and N-slits (qualitative) – Grating spectrum.

UNIT II

Lasers and Fiber optics

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Semiconductor diode 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 Optical fiber Communication system – Propagation Losses (qualitative) – Applications.

UNIT III

Dielectric and Magnetic Materials

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

Magnetic Materials: Introduction to magnetic materials (Origin of magnetic moment of an atom and Classification of magnetic materials) – Weiss theory of ferromagnetism-soft ferrites and hard ferrites-Hysteresis – Soft and Hard magnetic materials- Applications magnetic materials.

UNIT IV

Quantum Mechanics and Free Electron Theory

Quantum Mechanics: Dual nature of matter – Schrodinger's time independent and dependent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Merits and demerits only) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Density of states – Fermi energy.

UNIT V

Semiconductors and Superconductors

Semiconductors- Introduction – Intrinsic semiconductors – Electrical conductivity – Fermi level – Extrinsic semiconductors –Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) –High T_c superconductors – Applications of superconductors.

Text books

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, Cengage Learning.

Reference Books

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
3. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
4. Semiconductor physics and devices- Basic principle – Donald A, Neamen, McGraw Hill

Course Title	Communicative English					B. Tech. I Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2024103	Humanity & Social Sciences Course (HSMC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	--	3	30	70	100
Mid Exam Duration : 2Hrs						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn, listening skills for better comprehension, improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations, Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information, knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

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

CO 1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO 2	Apply grammatical structures to formulate sentences and correct word forms
CO 3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO 4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO 5	Create a coherent paragraph interpreting a figure/graph/chart/table

UNIT I

Lesson: On the Conduct of Life: William Hazlitt

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: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Parts of Speech; Word formation, synonyms and antonyms; Idioms and Phrases; phrasal verbs.

UNIT II

Lesson: The Brook: Alfred Tennyson

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 structured talks.

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

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Sentence structure; articles; Tenses; Prepositions.

UNIT III

Lesson: A City Night Piece - Oliver Goldsmith

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, Paragraph Writing Grammar and Vocabulary: Voice; Reported Speech; Degrees of Comparison, Subject with agreement.

UNIT IV

Lesson: Being Rich, Being Good - Chetan Bhagat

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/Report Writing
Grammar and Vocabulary: Information Transfer; Simple, Compound and Complex sentences; Question Tags

UNIT V

Lesson: Politics and the English Language: George Orwell

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 - without the use of PPT slides.
Reading: Reading for comprehension.
Writing: Writing structured essays on specific topics using suitable claims and evidence.
Grammar and Vocabulary: Reading Comprehension; Dialogue Writing; Common Errors.

Text Book

1. Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

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. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011.
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler.

Web links:

www.englishclub.com
www.easyworldofenglish.com
www.languageguide.org/english/
www.bbc.co.uk/learningenglish
www.eslpod.com/index.html
www.myenglishpages.com

Course Title	C-Programming & Data Structures					B. Tech. I Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005103	Engineering Science Course (ESC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	--	3	30	70	100
Mid Exam Duration : 2Hrs						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn problem-solving through programming, the basic concepts of the C programming language and gain knowledge on data structures and their applications.

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

CO 1	Formulate simple algorithms for arithmetic and logical problems and to translate the algorithms to programs (in C Language).
CO 2	Choose the loops and decision-making statements to solve the problem
CO 3	Implement different Operations on arrays
CO 4	Use functions to solve the given problem
CO 5	Understand structures, unions and pointers
CO 6	Understand need of data structures in real time situations

UNIT I

Introduction to C programming: C language elements, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements.Jumping statements: break, continue and goto statements

UNIT II

Arrays: Introduction, Declaration and initialization of 1D and 2D arrays, Functions:Introduction, Category of functions, parameter passing methods, Storage Classes, Recursive functions.Strings:String I/O functions, string handling functions, array of strings

UNIT III

Pointers: Introduction to pointers, declaring and initialization of pointer variables, accessing the address of variables, accessing a variable through its pointer, chain of pointers. Structures and unions: Introduction, defining a structure, declaring structure variable, structure initialization, accessing members of structure, copying and comparing structure variables, structures within structures, array of structures, and introduction of union.

UNIT IV

Data Structures: Overview on data structures, stack,basic operations on stack, Applications of stacks; Queues - various classification of queues,basic operations on queues.Searching and sorting: linear search, binary search, bubble sort, selection sort, insertion sort.

UNIT V

Linked Lists – Single linked list, Operations on Single Linked List: insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations. Trees - Tree terminology, representation, Binary trees, representation, binary tree traversals. Binary tree operations.

TEXT BOOKS

1. E. Balagurusamy, C Programming and Data structures,Fourth Edition, McGrawHill.
2. Rema Theraja, Programming in C, second edition,Oxford.

3. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education

REFERENCE BOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer,Pearson.
3. YashavantKanetkar, Let us C, 15th edition, BPBPublications.
4. Dr. P. ChennaReddy, Computer Fundamentals and C Programming, SecondEdition.

Course Title	Engineering Drawing					B. Tech. I Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2003105	Engineering Science Course (ESC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		1	0	2	2	30	70	100
Mid Exam Duration : 2Hrs						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to practice for accuracy and clarity in presenting the technical information, develop the engineering imagination essential for successful design and awareness on Engineering Drawing.

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

CO 1	Draw various curves applied in engineering
CO 2	Show projections of solids and sections graphically
CO 3	Draw the development of surfaces of solids
CO 4	Draw orthographic and isometric projections
CO 5	Evaluate different methods of perspective view

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Drawing and its Significance-Conventions in drawing-lettering - BIS conventions.

1. Conic sections including the rectangular hyperbola- general method only,
2. Cycloid, epicycloids and hypocycloids
3. Involutes

UNIT II

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary view method.

UNIT III

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

UNIT IV

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

UNIT V

Perspective projection – applications of perspective view –terminology of perspective view- methods of drawing perspective view-simple problems.

Text Books

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers,2016.

Reference Books

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, CopyRight,2009
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers,2000
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education,2009
4. K.C.John, Engineering Graphics, 2/e, PHI,2013
5. Basant Agarwal & C.M.Agrawal, Engineering Drawing, Tata McGraw-Hill, CopyRight, 2008.

Additional Sources

Youtube: http-sewor, Carleton. cag,kardos/88403/drawings.html conic sections-online, red woods.edu

<table>
<tr><td>Course Title</td><td colspan="5">Engineering Drawing Lab</td><td colspan="3">B. Tech. I Semester (EEE)</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2003106</td><td rowspan="2">Engineering Science Course (ESC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="6"></td><td colspan="3">End Exam Duration : 3Hrs</td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to practice for accuracy and clarity in presenting the technical information, develop the engineering imagination essential for successful design and awareness on Engineering Drawing.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to</td></tr>
<tr><td>CO 1</td><td colspan="8">Make Use of computers as a drafting tool</td></tr>
<tr><td>CO 2</td><td colspan="8">Apply isometric drawings using CAD packages</td></tr>
<tr><td>CO 3</td><td colspan="8">Analyze orthographic drawings using CAD packages</td></tr>
</table>

- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3Dmodeling.
- Instruct graphical representation of machine components.

Computer Aided Drafting

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets,arrays,dimensions.

Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Text Books

1. K. Venugopal, V.Prabhu Raja, Engineering Drawing + AutoCad, New Age International Publishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with AutoCad, PHI Learning, Eastern Economy editions.

Reference Books

1. T. Jeyapoovan, Engineering Graphics using AutoCad, Vikas Publishing House
2. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3. Linkan Sagar, BPB Publications, AutoCad 2018 Training Guide.
4. K.C.John, Engineering Graphics, 2/e, PHI,2013
5. Basant Agarwal & C.M.Agrawal, Engineering Drawing, Tata McGraw-Hill, CopyRight, 2008.

Additional Sources

Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu

<table>
<tr><td>Course Title</td><td colspan="5">Applied Physics Lab</td><td colspan="3">B. Tech. I Semester (EEE)</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">20AP107</td><td rowspan="2">Basic Sciences Course (BSC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>3</td><td>1.5</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="6"></td><td colspan="3">End Exam Duration : 3Hrs</td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to learn, understand the concepts of interference, diffraction and their applications, the role of optical fiber parameters in communication, Recognize the importance of energy gaps in the study of conductivity and the Hall Effect in a semiconductor., Illustrates the magnetic and dielectric materials applications and apply the principles of semiconductors in various electronic devices.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to,</td></tr>
<tr><td>CO 1</td><td colspan="8">Operate various optical instruments</td></tr>
<tr><td>CO 2</td><td colspan="8">Estimate wavelength of laser and particles size using laser, the susceptibility and related magnetic parameters of magnetic materials</td></tr>
<tr><td>CO 3</td><td colspan="8">Evaluate the acceptance angle of an optical fiber and numerical aperture</td></tr>
<tr><td>CO 4</td><td colspan="8">Plot the intensity of the magnetic field of circular coil carrying current with distance</td></tr>
<tr><td>CO 5</td><td colspan="8">Determine magnetic susceptibility of the material and its losses by B-H curve</td></tr>
<tr><td>CO 6</td><td colspan="8">Apply the concepts of ultrasonics by acoustic grating</td></tr>
</table>

List of Experiments: (Any Eight)

1. Determine the thickness of the wire using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
8. Determination of dielectric constant by charging and discharging method.
9. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.
10. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
11. To determine the resistivity of semiconductor by Four probe method
12. To determine the energy gap of a semiconductor

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand, Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

Course Title	Communicative English Lab					B. Tech. I Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2024108	Humanity & Social Science Course (HSC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn a variety of self instructional, friendly modes of language learn, better pronunciation through stress, intonation and rhythm, effective language to face interviews, group discussions, public speaking and will be initiated into greater use of the computer in resume preparation, report writing, format making etc.

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

CO 1	Listening and repeating the sounds of English Language
CO 2	Understand the different aspects of the English language, proficiency with emphasis on LSRW skills
CO 3	Apply communication skills through various language learning activities
CO 4	Analyze the English speech sounds, stress, rhythm, intonation and syllable, division for better listening and speaking comprehension.
CO 5	Evaluate and exhibit acceptable etiquette essential in social and professional, settings
CO 6	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

The following skills that will be learnt in the lab are

1. Listening Skills, Phonetics, Introducing oneself
2. Describing objects, JAM / Interpretation of Hypothetical Situations, Role play
3. Hypothetical situations (If…….. were), Elocution, TED talks videos
4. Visual Description, Situational conversations
5. Oral Presentations, PowerPoint presentations

Suggested Software

1. Orell
2. Walden Infotech
3. Young India Films
4. K-Van solutions

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. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

www.esl-lab.com, www.englishmedialab.com, www.englishinteractive.net

<table>
<tr><td>Course Title</td><td colspan="5">C-Programming & Data Structures Lab</td><td colspan="3">B. Tech. I Semester (EEE)</td></tr>
<tr><td>Course Code</td><td colspan="2">Category</td><td colspan="2">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2005108</td><td rowspan="2">Engineering Science Course (ESC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>3</td><td>1.5</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="6"></td><td colspan="3">End Exam Duration : 3Hrs</td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to learn. how to write and debug programs, the principles of designing structured programs, Write basic C programs using, Selection statements, Repetitive statements, Functions, Pointers, Arrays, Strings and Structures and apply suitable data structure to solve real world problems.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to,</td></tr>
<tr><td>CO 1</td><td colspan="8">Formulate the algorithms for simple problems</td></tr>
<tr><td>CO 2</td><td colspan="8">Translate given algorithms to a working and correct program</td></tr>
<tr><td>CO 3</td><td colspan="8">Correct syntax errors as reported by the compilers</td></tr>
<tr><td>CO 4</td><td colspan="8">Identify and correct logical errors encountered at runtime</td></tr>
<tr><td>CO 5</td><td colspan="8">Write iterative as well as recursive programs, programs on data structures like stack, queue, linked list, trees etc</td></tr>
<tr><td>CO 6</td><td colspan="8">Represent data in arrays, strings and structures and manipulate them through a program</td></tr>
</table>

List of Experiments

1. Ramesh ‘s basic salary is input through the keyboard. His dearness allowance is 40% of basic salary and house rent allowance is 20% of basic salary. Write a C program to calculate his gross salary.
2. Write a program to take input of name, roll no and marks obtained by a student in 5 subjects each have its 100 full marks and display the name, roll no with percentage score secured.
   a) Write a C program to find out whether a given number is even number or odd number
   b) Write a C program to check whether a given year is leap year or not.
3. Design and develop an algorithm that takes three coefficients (*a*, *b*, and *c*) of a Quadratic equation ($ax^2+bx+c=0$) as input and compute all possible roots. Implement a C program for the developed algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.
4. If the ages of Ramesh, Suresh and Mahesh are input through the keyboard, write a C program to determine the youngest of the three.
5. A character is entered through a keyboard. Write a C program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol using if- else and switch case. The following table shows the range of ASCII values for various characters.

Characters	**ASCII values**
A–Z	65 – 90
a– z	97 – 122
0 – 9	48 – 57
Special Symbols	0 – 47, 58 – 64, 91 – 96, 123 – 127.

6. Write a C program which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use switch statement).
7. Design and develop an algorithm to find whether a given number is Armstrong number or not. Implement a C program for the developed algorithm.

8. Design and develop an algorithm to check whether a given number is palindrome or not. Implement a C program for the same.
9. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
10. Write a C program to generate the first N terms of Fibonacci sequence.
11. Write a C program to find the smallest and largest number in a given array.
12. Write a C program to find the frequency of a particular number in a list of integers.
13. Write a C program to sort the list of elementsusing
    a) BubbleSort b) Selection Sort.
14. Write a C program to search for an element in a list of elements using
    a) Linear search b) Binary search
15. Write a C program to read two matrices and perform the following operations
    a) Addition of two matrices
    b) Multiplication of two matrices
16. **Partitioning an array**
    Given a randomly ordered array of n elements, write a C program to partition the elements into two subsets such that elements ≤X are in one subset and elements ≥X are in another subset.
17. Write a C program to rearrange the elements in an array so that they appear in reverse order.
18. If a string and its reversed string are the same then the string is called a palindrome string. Design and develop an algorithm to check whether a given string is a palindrome or not and implement a C program for the same.
19. Write a C program to read two strings and perform the following operations without using built string library functions.
    i) String length ii) String reversing
    iii) Comparison of two strings iv) Concatenation of two strings
20. Write a C program to count the number of vowels, consonants, digits, blank spaces and special characters in a given string.
21. Write a C program to swap the contents of two variables using
    a) Call by value
    b) Call by reference.
22. Write a C program using recursion
    a) Find the factorial of a given number
    b) Print the Fibonacci series up to a given number.
    c) Find the GCD of two integers.
23. Write a C program to define a structure with the following members.
    Roll No., Name, marks in Sub1, Sub2, Sub3. Read the n students records and find the total marks of each student and print the result in the following format.

Roll Number	Name	Sub 1	Sub 2	Sub 3	Total Marks	Result
189Y1A0501	Kavya	80	70	75	225	Distinction

24. Write C programs that implement stack (its operations) using i) Arrays ii) Pointers
25. Write C programs that implement Queue (its operations) using i) Arrays ii) Pointers
26. Write a C program that uses Stack operations to perform the following:
    i) Converting infix expression into postfix expression
    ii) Evaluating the postfix expression
27. Write a C program that uses functions to perform the following operations on a single linked list.
    i) Creation ii) Insertion iii) Deletion iv) Traversal
28. Write a C program that uses functions to perform the following operations on Doubly linked list.
    i) Creation ii) Insertion iii) Deletion iv) Traversal
29. Write a C program that uses functions to perform the following:
    i) Creating a Binary Tree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.

TEXT BOOKS

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A.Forouzan and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg& Behrouz A. Forouzan, “Data Structures: A Pseudocode Approach with C”, Second Edition, CENGAGE Learning, 2011
4. E. Balagurusamy, Programming in ANSI C, Fifth Edition, McGrawHill.

B.Tech., II Semester

<table>
<tr><td>Course Title</td><td colspan="5">Differential Equations & Vector Calculus</td><td colspan="3">B. Tech. II Semester (EEE)</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2021201</td><td rowspan="2">Basic Science Course (BSC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>--</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td colspan="6">Mid Exam Duration : 2Hrs</td><td colspan="3">End Exam Duration : 3Hrs</td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to learn the concepts of differentiation and integration. The students will be applying these fundamentals to their engineering applications.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to,</td></tr>
<tr><td>CO 1</td><td colspan="8">Understand vector differentiation concepts</td></tr>
<tr><td>CO 2</td><td colspan="8">Classify second and higher order linear differential equations with constant coefficients</td></tr>
<tr><td>CO 3</td><td colspan="8">Solve partial differential equations</td></tr>
<tr><td>CO 4</td><td colspan="8">Apply vector integration concepts</td></tr>
<tr><td>CO 5</td><td colspan="8">Analyze the applications of partial differential equations</td></tr>
</table>

UNIT I

Linear differential equations of higher order (constant coefficients) **:** Definitions, homogeneous and non-homogeneous, complementary function, general solution, particular integral, Wronskian, Method of variation of parameters.

UNIT II

Partial Differential Equations**:** Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method.

UNIT III

Applications of Partial Differential Equations**:**Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation.

UNIT IV

Vector differentiation**:** Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V

Vector integration**:** Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Text Books

1. Higher Engineering Mathematics, Dr. B.S. Grewal, Khanna Publishers-43 edition 2014.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Publications, 9th edition- 2013.
3. Calculus and Analytic geometry, G.B. Thomas and R.L. Finney, Pearson, 9th Edition, Reprint, 2002.

Reference Books

1. Higher Engineering Mathematics, B.V. Ramana, Mc. Graw Hill Education (India) Pvt. Ltd, New Delhi, 11th Edition, Reprint 2010.
2. A TextBook of Engineering Mathematics, N.P. Bali and Manish Goyal, Lakshmi Publications, Reprint 2008.
3. Differential Equations and Vector Calculus, Dr. B.Rama Bhupal Reddy, G.Sreedhar, Dr. V.Ramachandra Reddy, Research India Publications, Delhi, 2020.

Course Title	Chemistry					B. Tech. II Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2023202	Basic Science Course (BSC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	--	3	30	70	100
Mid Exam Duration : 2Hrs						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn

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

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

CO 1	Compare the materials of construction for battery and electrochemical sensors.
CO 2	Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers.
CO 3	Understand the principles of spectrometry, slc in separation of solid and liquid mixtures.
CO 4	Remember the principle of Band diagrams in application of conductors and semiconductors
CO 5	Analyze the principles and different application of analytical instruments.

UNIT I: Structure and Bonding Models

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2, applications to hydrogen, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O2 , NO and CO, etc., calculation of bond order.

UNIT II: Modern Engineering materials

i). Understanding of materials: Crystal field theory – salient features – splitting in octahedral, tetrahedral and square planar geometry. Properties of coordination compounds-Oxidation state, coordination, magnetic properties and colour.

ii). Semiconductor materials, superconductors- basic concept, band diagrams for conductors, semiconductors and insulators, Effect of doping on band structures.

iii). Nanochemistry: Introduction, classification of nanomaterials, properties and applications of Fullerenes, carbon tubes and Graphines nanoparticles.

UNIT III: Electrochemistry and Applications

Introduction to Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, Potentiometry- Potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), pH metric concepts.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

UNIT IV: Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.
Conducting polymers – polyacetylenes,– mechanism of conduction and applications.

UNIT V: Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Regions of Electromagnetic radiation. UV-Visible, IR Spectroscopy'- (selection rules, principles and applications). Solid-Liquid Chromatography–TLC, retardation factor.

Text Books

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

Reference Books

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, McGraw Hill, 2020.
2. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
4. J.M.Lehn, SupraMolecular Chemistry, VCH Publications.

<table>
<tr><td>Course Title</td><td colspan="5">Electrical Circuit Analysis - I</td><td colspan="3">B. Tech. II Semester (EEE)</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2002203</td><td rowspan="2">Engineering Science Course (ESC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>--</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td colspan="6">Mid Exam Duration : 2Hrs</td><td colspan="3">End Exam Duration : 3Hrs</td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to learn the basic concepts of DC and AC circuits, Network Theorems , Three phase circuits, Magnetic Circuits & Graph Theory.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to,</td></tr>
<tr><td>CO 1</td><td colspan="8">Understand the basic fundamentals of DC & AC circuits, network reduction techniques, magnetic circuits, graph theory, dual & duality networks.</td></tr>
<tr><td>CO 2</td><td colspan="8">Determine the currents, voltages using mesh and nodal analysis, Average and RMS values for different waveforms.</td></tr>
<tr><td>CO 3</td><td colspan="8">Obtain self and mutual inductances for magnetic circuits, incidence matrix, cutset and tie set matrices for planar networks.</td></tr>
<tr><td>CO 4</td><td colspan="8">Evaluate the active and reactive powers, voltage and currents for balanced and unbalanced networks.</td></tr>
<tr><td>CO 5</td><td colspan="8">Solve DC & AC circuits by using various network theorems.</td></tr>
</table>

UNIT I

Electrical Circuits: Circuit Concept – Types of elements - Source Transformation-Voltage - Current Relationship for Passive Elements. Kirchhoff's Laws – Network Reduction Techniques- Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation.

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction-Concept of Self and Mutual Inductance-Dot Convention-Coefficient of Coupling-Composite Magnetic Circuits -Analysis of Series and Parallel Magnetic Circuits.

UNIT II

Single Phase A.C Circuits: Sinusoidal Alternating Quantities - Average Value, R.M.S, Form Factor and Peak Factor for Different Periodic Waveforms – Phasor Representation of alternating quantities– Complex and Polar Form of Representation, j-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation- Phasor diagrams - Concept of Reactance, Impedance, Susceptance and Admittance- Apparent Power, Active and Reactive Power - Concept of Power Factor.

UNIT III

Network Theorems: Superposition Theorem - Reciprocity Theorem - Thevenin's Theorem - Norton's Theorem - Maximum Power Transfer Theorem - Millmann's Theorem - Tellegen's Theorem - Compensation Theorem (All theorems for both D.C and A.C Excitation).

UNIT IV

Three Phase A.C. Circuits: Introduction - Analysis of Balanced and Unbalanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems – Representation and Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems - Advantages of Three Phase System.

UNIT V

Network Topology: Definitions – Graph – Oriented Graph-Tree, Cutset, Tieset, Basic Cutset, Basic Tie Set Matrices for Networks – Loop and Nodal Analysis of Networks with Independent and Dependent Voltage and Current Sources – Incidence Matrices - Duality & Dual Networks.

Text Books

1. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, McGraw Hill, 5th Edition, 2013.
2. Engineering circuit analysis William Hayt and Jack E. Kemmerly, McGraw Hill Company, 7th Edition, 2006.

Reference Books

1. Circuit Theory Analysis & Synthesis A. Chakrabarti, Dhanpat Rai & Sons, 7th Revised Edition, 2018.
2. Network Analysis M.E Van Valkenburg, Prentice Hall (India), 3rd Edition, 1999.
3. Electrical Engineering Fundamentals V. Del Toro, Prentice Hall International, 2nd Edition, 2019.
4. Electric Circuits- Schaum's Series, McGraw Hill, 5th Edition, 2010.
5. Fundamentals of Electrical Engineering NPTEL Lectures by Prof. Debapriya Das, IIT Kharagpur.

<table>
<tr><td>Course Title</td><td colspan="5">Electronic Devices & Circuits</td><td colspan="3">B. Tech. II Semester (EEE)</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2004204</td><td rowspan="2">Engineering Science Course (ESC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>--</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td colspan="6">Mid Exam Duration : 2Hrs</td><td colspan="3">End Exam Duration : 3Hrs</td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to learn the basic principles of all semiconductor devices, to diode circuits, and amplifier circuits, biasing and small signal equivalent circuits of amplifiers, compare the performance of BJTs and MOSFETs and design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to,</td></tr>
<tr><td>CO 1</td><td colspan="8">Understand principle of operation, characteristics and applications of Semiconductor diodes, Bipolar Junction Transistor and MOSFETs.</td></tr>
<tr><td>CO 2</td><td colspan="8">Applying the basic principles solving the problems related to Semiconductor diodes, BJTs, and MOSFETs.</td></tr>
<tr><td>CO 3</td><td colspan="8">Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze biasing circuits of BJTs, and MOSFETs</td></tr>
<tr><td>CO 4</td><td colspan="8">Design of diode circuits and amplifiers using BJTs, and MOSFETs.</td></tr>
<tr><td>CO 5</td><td colspan="8">Compare the performance of various semiconductor devices.</td></tr>
</table>

UNIT I

Review of Semiconductors: Intrinsic semiconductors, Doped Semiconductors, Current Flow in Semiconductors, PN Junction with Open Circuit, PN Junction with Applied Voltage, Capacitive Effects in PN Junction.

Diodes: Introduction, The Ideal Diode – current voltage characteristic, rectifier, diode logic gates, Terminal Characteristics of Junction Diodes– forward bias, reverse bias, and breakdown regions, Modeling the Diode Forward Characteristics- exponential model, graphical analysis and Iterative analysis using the exponential model, constant voltage drop model, the small signal model.

UNIT II

Zener Diodes: Zener diode Characteristics, Voltage shunt regulator, Temperature Effects, Rectifier Circuits– half-wave, full-wave and bridge rectifier circuits, rectifier with a filter capacitor, C-L-C filter, Clipping and Clamping Circuits– limiter circuit, the clamped capacitor, voltage doubler, Special Diode Types– UJT, Schottky barrier diode, Varactor diode, photo diode, light emitting diode(LED), Problem Solving.

Bipolar Junction Transistors(BJTs): Physical Operation - simplified structure and modes of operation, Operation of the npn, and pnp transistors: cutoff, active, and saturation modes, V-I Characteristics- of different configurations - graphical representation of transistor characteristics, dependence of collector current on collector voltage, the Early Effect.

UNIT III

BJT circuits at DC, Applying the BJT in Amplifier Design - Voltage Amplifier, Voltage Transfer Characteristic (VTC), Small-Signal Voltage Gain, determining the VTC by Graphical Analysis, Q-point, Small-signal operation and models- the transconductance, input resistance at the base, input resistance at the emitter, Voltage gain, separating the Signal and the DC Quantities, The Hybrid-π Model, the T Model, Basic BJT Amplifier Configurations - Common-Emitter (CE) amplifier without and with emitter resistance, Common-Base (CB) amplifier, Common-Collector (CC) amplifier or Emitter Follower, Biasing in BJT Amplifier Circuits- Fixed bias, Self bias, voltage divider bias circuits, biasing using a Constant-Current Source, CE amplifier – Small signal analysis and design, Transistor breakdown and Temperature Effects, Problem solving.

UNIT IV

MOS Field-Effect Transistors (MOSFETs): Introduction, Device Structure and Physical Operation – device structure, operation with zero gate voltage, creating a channel for current flow, operation for different drain to source voltages, the P-channel MOSFET,CMOS, V-I characteristics–i_D - v_{DS} characteristics, i_D – v_{GS} characteristics, finite output resistance in saturation, characteristics of the p-Channel MOSFET, MOSFET Circuits at DC, Applying the MOSFET in Amplifier Design – voltage transfer characteristics, biasing the MOSFET to obtain linear amplification, the small signal voltage gain, graphical analysis, the Q-point. Problem solving.

UNIT V

MOSFET Small Signal Operation Models – the dc bias, separating the DC analysis and the signal analysis, Small signal equivalent circuit models, the transconductance, the T equivalent circuit model, Basic MOSFET Amplifier Configurations – three basic configurations, characterizing amplifiers, common source(CS) amplifier without and with source resistance, common gate (CG) amplifier, source follower, the amplifier frequency response, Biasing in MOSFET Amplifier Circuits– biasing by fixing V_{GS} with and without source resistance, biasing using drain to gate feedback resistor, biasing using constant current source, Common Source Amplifier using MOSFETs – Small signal analysis and design, Body Effect, Problem Solving.

Text Books

1. Adel S. Sedra and KennethC. Smith, “Microelectronic Circuits – Theory and Applications”, 6th Edition, Oxford Press, 2013.
2. Donald A Neamen, “Electronic Circuits – analysis and design”, 3rd Edition, McGraw Hill (India), 2019.

References

1. J. Milliman and C Halkias, “Integrated electronics”, 2nd Edition, Tata McGraw Hill, 1991.
2. Behzad Razavi, “Microelectronics”, Second edition, Wiley, 2013.
3. R.L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits,” 9th Edition, Pearson, 2006.
4. Jimmie J Cathey, “Electronic Devices and Circuits,” Schaum’s outlines series, 3rd edition, McGraw-Hill (India), 2010.

Course Title	Engineering Workshop					B. Tech. II Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20EW205	Engineering Science Course (ESC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn sheet metal operations, fitting, electrical house wiring skills and wood working.

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

CO 1	Apply wood working skills in real world applications
CO 2	Build different objects with metal sheets in real world applications
CO 3	Apply fitting operations in various applications.
CO 4	Apply different types of basic electric circuit connections
CO 5	Use soldering and brazing techniques

Wood Working

Familiarity with different types of woods and tools used in wood working and make following joints.

1. Half – Lap Joint
2. Mortise and Tenon Joint
3. Corner Dovetail joint or Bridle Joint

Sheet Metal Working

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

1. Taperedtray
2. Conical Funnel
3. Elbow Pipe
4. Brazing

Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises

1. V-fit
2. Dovetail Fit
3. Semi-circular fit
4. square fitting

Electrical Wiring

Familiarities with different types of basic electrical circuits and make the following connections

1. Parallel And Series
2. Two Way Switch
3. Godown Lighting
4. Tubelight
5. Three Phase Motor
6. Soldering of wires

Note: In each section a minimum of three exercises are to be carried out.

Course Title	IT Workshop					B. Tech. II Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005206	Engineering Science Course (ESC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn about the internal parts of a computer, assembling and disassembling a computer from the parts, preparing a computer for use by installing the operating system, Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations and LATEX and Networking of computers and use Internet facility for Browsing and Searching.

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

CO 1	Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
CO 2	Prepare the Documents using Word processors and Prepare spreadsheets for calculations using excel and also the documents using LAteX.
CO 3	Prepare Slide presentations using the presentation tool.
CO 4	Interconnect two or more computers for information sharing.
CO 5	Access the Internet and Browse it to obtain the required information.

Preparing your Computer

Task 1:

Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including the Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2:

Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to troubleshoot the computer and identify working and non-working parts. Students should identify the problem correctly by various methods.

Task 3:

Install Operating system: Student should install Linux on the computer. Students may install another operating system (including proprietary software) and make the system dual boot or multi boot.Students should record the entire installation process.

Task 4:

Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5:

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crumpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Task 6:

Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create email account and send email.

They should get acquaintance with applications like Facebook, skype etc. If an Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating email accounts.

Task 7:

Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8:

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheets and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered,

Image Manipulation tools.

Task 9:

Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 10:

Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet.

Task 11:

LateX: Introduction to Latex and its installation and different IDEs. Creating the first document using Latex, using content into sections using article and book class of LaTeX. Styling Pages: reviewing and customizing different paper sizes and formats. Formatting text (styles, size, alignment, colors and adding bullets and numbered items, inserting mathematical symbols, and images, etc.). Creating basic tables, adding simple and dashed borders, merging rows and columns. Referencing and Indexing: cross-referencing (refer to sections, table, images), bibliography (references).

References

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, PowerPoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Troubleshooting, Maintaining & Repairing PCs, Bigelow's, TMH
6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

<table>
<tr><td>Course Title</td><td colspan="5">Chemistry Lab</td><td colspan="3">B. Tech. II Semester (EEE)</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2023207</td><td rowspan="2">Basic Science Course (BSC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>3</td><td>1.5</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="6"></td><td colspan="3">End Exam Duration : 3Hrs</td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to verify the fundamental concepts with experiments.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to,</td></tr>
<tr><td>CO 1</td><td colspan="8">Determine the cell constant and conductance of solutions.</td></tr>
<tr><td>CO 2</td><td colspan="8">Synthesis of advanced polymer Bakelite.</td></tr>
<tr><td>CO 3</td><td colspan="8">Calculate the strength of an acid present in secondary batteries.</td></tr>
<tr><td>CO 4</td><td colspan="8">Illustrate the IR of some organic compounds</td></tr>
<tr><td>CO 5</td><td colspan="8">Explain acid-base titrations using pH metry.</td></tr>
</table>

List of Experiments

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strong base
3. pH metric titration of strong acid vs. strong base
4. pH metric titration of weak acid vs. strong base
5. Determination of cell constant and conductance of solutions
6. Potentiometry - determination of redox potentials and emfs
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of Bakelite
9. Verify Lambert-Beer's law
10. Thin layer chromatography
11. Identification of simple organic compounds by IR
12. Preparation of nanomaterials by precipitation
13. Estimation of Ferrous Iron by Dichrometry

Course Title	Electrical Circuits Analysis - I Lab					B. Tech. II Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2002208	Engineering Science Course (ESC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to determine active, reactive, apparent power for single phase AC circuits, calculation of self and mutual inductances and coefficient of coupling. Verification of Kirchhoff's laws and network theorems for DC excitation.

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

CO 1	Understand the Kirchhoff's laws theoretically and practically for any given circuit
CO 2	Obtain the value of 'K' for a single phase transformer.
CO 3	Determine the active, reactive and apparent power for single phase ac circuits.
CO 4	Apply theorems for a given DC circuits and verify theoretically & practically

List of Experiments

1. Verification of KCL and KVL
2. Determination of Self, Mutual Inductances and Coefficient of Coupling
3. Verification of Thevenin's Theorems
4. Verification of Norton's Theorems
5. Verification of Superposition Theorem
6. Verification of Maximum Power Transfer Theorem
7. Verification of Reciprocity Theorems
8. Measurement of Active, Reactive and Apparent Power for Single Phase AC Circuits
9. Measurement of 3-Phase Active Power by One Wattmeter Method
10. Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads

Course Title	Electronic Devices & Circuits Lab					B. Tech. II Semester (EEE)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2004209	Engineering Science Course (ESC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to verify theoretically and practically all the experiments, analyse the characteristics of Diodes, BJT, MOSFET, UJT, design the amplifier circuits from the given specifications and model the electronic circuits using tools such as PSPICE/Multisim.

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

CO 1	Understand the basic characteristics and applications of basic electronic devices
CO 2	Observe the characteristics of electronic devices by plotting graphs.
CO 3	Analyze the Characteristics of UJT, BJT, MOSFET
CO 4	Design MOSFET / BJT based amplifiers for the given specifications
CO 5	Simulate all circuits in PSPICE /Multisim

List of Experiments

Note: All the experiments shall be implemented using both Hardware and Software.

1. Verification of Volt- Ampere characteristics of a PN junction diode and find static, dynamic and reverse resistances of the diode from the graphs obtained.
2. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
3. Verify various clipping and clamper circuits using PN junction diode and draw the suitable graphs.
4. Design a Zener diode-based voltage regulator against variations of supply and load. Verify the same from the experiment.
5. Study and draw the output and transfer characteristics of MOSFET (Enhance mode) in Common Source Configuration experimentally. Find Threshold voltage (V_T), g_m, & K from the graphs.
6. Study and draw the output and transfer characteristics of MOSFET (Depletion mode) or JFET in Common Source Configuration experimentally. Find I_{DSS}, g_m, & V_P from the graphs.
7. Verification of the input and output characteristics of BJT in Common Emitter configuration experimentally and find required h – parameters from the graphs.
8. Study and draw the input and output characteristics of BJT in Common Base configuration experimentally, and determine required h – parameters from the graphs.
9. Study and draw the Volt Ampere characteristics of UJT and determine η, I_P, I_v, V_P, &Vv from the experiment.
10. Design and analysis of voltage- divider bias/self-bias circuit using BJT.
11. Design and analysis of voltage- divider bias/self-bias circuit using JFET.
12. Design and analysis of self-bias circuits using MOSFET.
13. Design a suitable circuit for switch using CMOSFET/JFET/BJT.
14. Design a small signal amplifier using MOSFET (common source) for the given specifications. Draw the frequency response and find the bandwidth.
15. Design a small signal amplifier using BJT(common emitter) for the given specifications. Draw the frequency response and find the bandwidth.

Tools / Equipment Required: Software Tools Like Multisim/ Pspice or Equivalent, DC Power supplies, Multimeters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

<table>
<tr><td>Course Title</td><td colspan="5">Environmental Science</td><td colspan="3">B. Tech. II Semester (EEE)</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">20MC210</td><td rowspan="2">Mandatory Course (MC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>2</td><td>0</td><td>--</td><td>0.0</td><td>30</td><td>--</td><td>30</td></tr>
<tr><td colspan="6">Mid Exam Duration : 2Hrs</td><td colspan="3"></td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to get awareness of the environment, understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life and to save earth from the inventions by the engineers.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to,</td></tr>
<tr><td>CO 1</td><td colspan="8">Explain multidisciplinary nature of environmental studies and various Renewable and Nonrenewable resources</td></tr>
<tr><td>CO 2</td><td colspan="8">Understand Energy flow, biogeochemical cycles and ecological pyramids</td></tr>
<tr><td>CO 3</td><td colspan="8">Illustrate various causes of pollution and related preventive measures.</td></tr>
<tr><td>CO 4</td><td colspan="8">Summarize Solid waste management, Social issues related to environment and their protection acts</td></tr>
<tr><td>CO 5</td><td colspan="8">Evaluate Causes of population explosion, value education and welfare programmes</td></tr>
</table>

UNIT I

Multidisciplinary Nature Of Environmental Studies**: –**Scope and Importance – Need for Public Awareness.

Natural Resources**:** Renewable and non-renewable resources – Natural resources and associated problems

Forest resources: deforestation, case studies – Mining, dams and other effects on forest and tribal people

Water resources : Use and over utilization of surface and ground water conflicts over water. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Renewable &Non-Renewable.

UNIT II

Ecosystems**:** Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Food chains, food web- Ecological succession and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Desert ecosystem
c. Aquatic ecosystems (lakes, rivers and oceans)

Biodiversity and its Conservation **:** Introduction, 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 levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

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

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

UNIT – IV

Social Issues And The Environment**:** From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents.

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**:** Population growth, variation among nations. Population explosion – Family Welfare Programmes. – 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, etc.

Text Books

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

References

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