Jawaharlal Nehru Technological University Anantapur

(Established by Govt. of A.P., Act. No. 30 of 2008)

Ananthapuramu–515 002 (A.P) India

B.Tech - Course Structures and Syllabi under R20 Regulations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTAPUR – 515 002 (A.P) INDIA

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Semester-0

Induction Program: 3 weeks

(Common for All Branches of Engineering)

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

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Electronics & Communication Engineering

Semester - 1 (Theory - 5, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P/D**	**Credits**
1.	20A54101	Linear Algebra and Calculus	BS	3-0-0	3
2.	20A56201T	Applied Physics	BS	3-0-0	3
3.	20A52101T	Communicative English	HS	3-0-0	3
4.	20A02101T	Fundamentals of Electrical Circuits	ES	3-0-0	3
5.	20A03101T	Engineering Drawing	ES	1-0-0/2	2
6.	20A03101P	Engineering Graphics Lab	ES	0-0-2	1
7.	20A56201P	Applied Physics Lab	BS	0-0-3	1.5
8.	20A52101P	Communicative English Lab	HS	0-0-3	1.5
9.	20A02101P	Fundamentals of Electrical Circuits Lab	ES	0-0-2	1.5
				Total	**19.5**

Semester – 2 (Theory – 5, Lab – 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	20A54201	Differential Equations and Vector Calculus	BS	3-0-0	3
2.	20A51101T	Chemistry	BS	3-0-0	3
3.	20A05201T	C-Programming & Data Structures	ES	3-0-0	3
4.	20A04101T	Electronic Devices & Circuits	ES	3-0-0	3
5.	20A03202	Engineering Workshop	LC	0-0-3	1.5
6.	20A05202	IT Workshop	LC	0-0-3	1.5
7.	20A05201P	C-Programming & Data Structures Lab	ES	0-0-3	1.5
8.	20A51101P	Chemistry Lab	BS	0-0-3	1.5
9.	20A04101P	Electronic Devices & Circuits Lab	ES	0-0-3	1.5
10	20A99201	Environmental Science	MC	3-0-0	0.0
				Total	**19.5**

R20 Regulations

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Electronics & Communication Engineering

II B.TECH.

Semester-III

S.No.	Course Code	Course Name	Category	Hours per week			Credits
				L	T	P	
1.	20A54302	Complex Variables and Transforms	BS	3	0	0	3
2.	20A04301T	Signals and Systems	PC	3	0	0	3
3.	20A02303T	Electrical Engineering	ES	3	0	0	3
4.	20A04302T	Analog Circuits	PC	3	0	0	3
5.	20A52301 20A52302 20A52303	**Humanities Elective– I** Managerial Economics & Financial Analysis Organizational Behaviour Business Environment	HS	3	0	0	3
6.	20A04301P	Simulation Lab	PC	0	0	3	1.5
7.	20A02303P	Electrical Engineering Lab	ES	0	0	3	1.5
8.	20A04302P	Analog Circuits Lab	PC	0	0	3	1.5
9.	20A05305	**Skill oriented course – I** Application Development with Python	SC	1	0	2	2
10.	20A52201	**Mandatory noncredit course – II** Universal Human Values	MC	3	0	0	0
11.	20A99301	**NSS/NCC/NSO Activities**	MC	0	0	2	0
						Total	**21.5**

Semester-IV

S.No.	Course Code	Course Name	Category	Hours per week			Credits
				L	T	P	
1.	20A54403	Probability Theory & Stochastic Processes	BS	3	0	0	3
2.	20A04303T	Digital Logic Design	PC	3	0	0	3
3.	20A04401	EM Waves and Transmission Lines	PC	3	0	0	3
4.	20A04402T	Communication Systems	PC	3	0	0	3
5.	20A04403T	Linear and Digital IC Applications	PC	3	0	0	3
6.	20A04303P	Digital Logic Design Lab	PC	0	0	3	1.5
7.	20A04402P	Communication Systems Lab	PC	0	0	3	1.5
8.	20A04403P	Linear and Digital IC Applications Lab	PC	0	0	3	1.5
9.	20A52401	**Skill Oriented Course –II** Soft Skills	SC	1	0	2	2
10.	20A99401	**Mandatory noncredit course – III** Design Thinking for Innovation	MC	2	1	0	0
						Total	**21.5**
Community Service Internship (Mandatory) for 6 weeks duration during summer vacation							

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– I Sem

L	T	P	C
3	0	0	3

(20A54101) LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

UNIT -1

Matrices

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix.

Learning Outcomes:

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

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

UNIT -2

Mean Value Theorems

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

Learning Outcomes:

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

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- Analyze the behaviour of functions by using mean value theorems (L3)

UNIT -3

Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

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

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT -4

Multiple Integrals

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

Learning Outcomes:

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

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

UNIT -5

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.

Learning Outcomes:

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

- Understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
5. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press
6. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
7. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education

8. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education
9. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.
10. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

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

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– I Sem

L	T	P	C
3	0	0	3

20A56201T APPLIED PHYSICS

(ECE, EEE, CSE, AI & DS,CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML) & IT)

Course Objectives

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
- To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

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.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates with applications.

Learning Outcomes:

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

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary polarized light and extraordinary polarized light (L2)

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 – 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 – Propagation of electromagnetic wave through optical fibers – Propagation Losses (qualitative) – Applications.

Learning Outcomes:

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

- Understand the basic concepts of LASER light Sources (L2)
- Apply the concepts to learn the types of lasers (L3)
- Identifies the Engineering applications of lasers (L2)
- Explain the working principle of optical fibers (L2)
- Classify optical fibers based on refractive index profile and mode of propagation (L2)
- Identify the applications of optical fibers in various fields (L2)

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 – Clausius-Mossotti equation.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro-Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Learning Outcomes:

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

- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)
- Apply the concept of magnetism to magnetic devices (L3)

Unit IV:

Quantum Mechanics, Free Electron Theory and Band theory of Solids

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.

Band theory of Solids- Bloch's Theorem (Qualitative) – Kronig-Penney model (Qualitative) – E vs K diagram – Classification of crystalline solids – Effective mass of electron – m^* vs K diagram – Concept of hole.

Learning Outcomes:

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

- Explain the concept of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Explain the importance of K-P model
- Classify the materials based on band theory (L2)
- Apply the concept of effective mass of electron (L3)

Unit – V:

Semiconductors and Superconductors

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – 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.

Learning Outcomes:

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

- Classify the energy bands of semiconductors (L2)
- Interpret the direct and indirect band gap semiconductors (L2)
- Identify the type of semiconductor using Hall effect (L2)
- Identify applications of semiconductors in electronic devices (L2)
- Explain how electrical resistivity of solids changes with temperature (L2)
- Classify superconductors based on Meissner's effect (L2)
- Explain Meissner's effect, BCS theory & Josephson effect in superconductors (L2)

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, Mc Graw Hill

Course Outcomes

- Study the different realms of physics and their applications in both scientific and technological systems through physical optics. (L2)
- Identify the wave properties of light and the interaction of energy with the matter (L3).
- Asses the electromagnetic wave propagation and its power in different media (L5).
- Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L3)
- 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. (L2)
- Elaborate the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors. (L5)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– I Sem

L	T	P	C
3	0	0	3

(20A52101T) COMMUNICATIVE ENGLISH

(Common to All Branches of Engineering)

Course Objectives

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help 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
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

UNIT -1

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. **Reading for 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, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

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

- Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- Ask and answer general questions on familiar topics and introduce oneself/others
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- Form sentences using proper grammatical structures and correct word forms

UNIT -2

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea 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:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

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

- Comprehend short talks on general topics
- Participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- Understand the use of cohesive devices for better reading comprehension
- Write well structured paragraphs on specific topics
- Identify basic errors of grammar/ usage and make necessary corrections in short texts

UNIT -3

Lesson: The Death Trap: Saki
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:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

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

- Comprehend short talks and summarize the content with clarity and precision
- Participate in informal discussions and report what is discussed
- Infer meanings of unfamiliar words using contextual clues
- Write summaries based on global comprehension of reading/listening texts
- Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

UNIT-4

Lesson: Innovation: Muhammad Yunus
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:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

Learning Outcomes

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

- Infer and predict about content of spoken discourse
- Understand verbal and non-verbal features of communication and hold formal/informal conversations
- Interpret graphic elements used in academic texts
- Produce a coherent paragraph interpreting a figure/graph/chart/table
- Use language appropriate for description and interpretation of graphical elements

UNIT -5

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

Learning Outcomes

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

- Take notes while listening to a talk/lecture and make use of them to answer questions
- Make formal oral presentations using effective strategies
- Comprehend, discuss and respond to academic texts orally and in writing
- Produce a well-organized essay with adequate support and detail
- Edit short texts by correcting 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

Course Outcomes

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

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE) – I Sem **L T P C**

3 0 0 3

(20A02101T) FUNDAMENTALS OF ELECTRICAL CIRCUITS

Course Objectives:

To make the student learn about

- Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various combinations of these parameters.
- The Single Phase AC circuits and concepts of real power, reactive power, complex power, phase angle and phase difference
- Series and parallel resonances, bandwidth, current locus diagrams
- Network theorems and their applications
- Network Topology and concepts like Tree, Cut-set , Tie-set, Loop, Co-Tree

Unit- 1

Introduction to Electrical & Magnetic Circuits

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. Examples

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

Learning Outcomes:

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

- To know about Kirchhoff's Laws in solving series, parallel, non-series-parallel configurations in DC networks
- To know about voltage source to current source and vice-versa transformation in their representation
- To understand Faraday's laws
- To distinguish analogy between electric and magnetic circuits
- To understand analysis of series and parallel magnetic circuits

Unit- 2

Network Topology

Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks & Independent Voltage and Current Sources – Duality & Dual Networks. Nodal Analysis, Mesh Analysis.

Learning Outcomes:

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

- To understand basic graph theory definitions which are required for solving electrical circuits

- To understand about loop current method
- To understand about nodal analysis methods
- To understand about principle of duality and dual networks
- To identify the solution methodology in solving electrical circuits based on the topology

Unit- 3

Single Phase A.C Circuits

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, j-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation-Resonance - Phasor diagrams - Concept of Power Factor- Concept of Reactance, Impedance, Susceptance and Admittance-Apparent Power, Active and Reactive Power, Examples.

Learning Outcomes:

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

- To understand fundamental definitions of 1-ϕ AC circuits
- To distinguish between scalar, vector and phasor quantities
- To understand voltage, current and power relationships in 1-ϕ AC circuits with basic elements R, L, and C.
- To understand the basic definitions of complex immittances and complex power
- To solve 1-ϕ AC circuits with series and parallel combinations of electrical circuit elements R, L and C.

Unit- 4

Network Theorems

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millmann's, Tellegen's, and Compensation Theorems for D.C and Sinusoidal Excitations.

Learning Outcomes:

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

- To know that electrical circuits are 'heart' of electrical engineering subjects and network theorems are main part of it.
- To distinguish between various theorems and inter-relationship between various theorems
- To know about applications of certain theorems to DC circuit analysis
- To know about applications of certain theorems to AC network analysis
- To know about applications of certain theorems to both DC and AC network analysis

Unit- 5

Three Phase A.C. Circuits

Introduction - Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems. Analysis of Three Phase Unbalanced Circuits - Loop Method - Star Delta Transformation Technique – for balanced and unbalanced circuits - Measurement of Active and reactive Power – Advantages of Three Phase System.

Learning Outcomes:

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

- To know about advantages of 3-ϕ circuits over 1-ϕ circuits
- To distinguish between balanced and unbalanced circuits
- To know about phasor relationships of voltage, current, power in star and delta connected balanced and unbalanced loads
- To know about measurement of active, reactive powers in balanced circuits
- To understand about analysis of unbalanced circuits and power calculations

Text Books:

1. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill, 5th Edition, 2013.
2. Engineering circuit analysis William Hayt and Jack E. Kemmerly, Mc Graw 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 Valkenberg, 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, Mc Graw Hill, 5th Edition, 2010.
5. Electrical Circuit Theory and Technology John Bird, Routledge, Taylor & Francis, 5th Edition, 2014.

Course Outcomes:

After completing the course, the student should be able to do the following

- Given a network, find the equivalent impedance by using network reduction techniques and determine the current through any element and voltage across and power through any element.
- Given a circuit and the excitation, determine the real power, reactive power, power factor etc,.
- Apply the network theorems suitably
- Determine the Dual of the Network, develop the Cut Set and Tie-set Matrices for a given Circuit. Also understand various basic definitions and concepts.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE) – I Sem

L	T	P/D	C
1	0	0/2	2

(20A03101T) ENGINEERING DRAWING

(Common to All Branches of Engineering)

Course Objectives:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.

Unit: I

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

a)Conic sections including the rectangular hyperbola- general method only,
b) Cycloid, epicycloids and hypocycloid c) Involutes

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the significance of engineering drawing
- Know the conventions used in the engineering drawing
- Identify the curves obtained in different conic sections
- Draw different curves such as cycloid, involute and hyperbola

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.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of projection
- Know how to draw the projections of points, lines
- Differentiate between projected length and true length
- Find the true length of the lines

Unit: III

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

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids
- Differentiate between rotational method and auxillary view method.
- Draw the projection of solid inclined to one plain
- Draw the projection of solids inclined to both the plains

Unit: IV

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

Learning Outcomes:

At the end of this unit the student will be able to

- Understand different sectional views of regular solids
- Obtain the true shapes of the sections of prism
- Draw the sectional views of prism, cylinder, pyramid and cone

Unit: V

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

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of development of surfaces
- Draw the development of regular solids such as prism, cylinder, pyramid and cone
- Obtain the development of sectional parts of regular shapes

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, Copy Right, 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.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- Draw various curves applied in engineering. (l2)
- Show projections of solids and sections graphically. (l2)
- Draw the development of surfaces of solids. (l3)

Additional Sources

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– I Sem

L	T	P	C
0	0	2	1

(20A03101P) ENGINEERING GRAPHICS LAB

(Common to All Branches of Engineering)

Course Objectives:

- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- 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 + Auto Cad, New Age International Publishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

Reference Books:

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

Course Outcomes:

After completing the course, the student will be able to

- Use computers as a drafting tool. (L2)
- Draw isometric and orthographic drawings using CAD packages. (L3)

Additional Sources

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– I Sem

L	T	P	C
0	0	3	1.5

(20A56201P) APPLIED PHYSICS LAB

(ECE, EEE, CSE, AI & DS,CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML) & IT)

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 12 experiments (minimum 10) must be performed in a semester

List of Applied Physics Experiments

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. Measurement of magnetic susceptibility by Gouy's method
11. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
12. To determine the resistivity of semiconductor by Four probe method
13. To determine the energy gap of a semiconductor
14. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.
15. Measurement of resistance with varying temperature.

Course Outcomes:

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

- Operate optical instruments like microscope and spectrometer (L2)
- Determine thickness of a hair/paper with the concept of interference (L2)
- Estimate the wavelength of different colors using diffraction grating and resolving power (L2)
- Plot the intensity of the magnetic field of circular coil carrying current with distance (L3)
- Evaluate the acceptance angle of an optical fiber and numerical aperture (L3)
- Determine the resistivity of the given semiconductor using four probe method (L3)
- Identify the type of semiconductor i.e., n-type or p-type using hall effect (L3)
- Calculate the band gap of a given semiconductor (L3)

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– I Sem

L	T	P	C
0	0	3	1.5

(20A52101P) COMMUNICATIVE ENGLISH LAB

(Common to All Branches of Engineering)

Course Objectives

- students will be exposed to a variety of self instructional, learner friendly modes of language learning
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

List of Topics

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons
4. Role Play or Conversational Practice
5. JAM
6. Etiquettes of Telephonic Communication
7. Information Transfer
8. Note Making and Note Taking
9. E-mail Writing
10. Group Discussions-1
11. Resume Writing
12. Debates
13. Oral Presentations
14. Poster Presentation
15. Interviews Skills-1

Suggested Software

Orel, Walden Infotech, Young India Films

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

Course Outcomes

After completing the course, the student will be able to

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1.5**

(20A02101P) FUNDAMENTALS OF ELECTRICAL CIRCUITS LAB

Course Objectives:

- Remember, understand and apply various theorems and verify practically.
- Understand and analyze active, reactive power measurements in three phase balanced & un balanced circuits.

List of Experiments:

1. Verification of Thevenin's and Norton's Theorems
2. Verification of Superposition Theorem for average and rms values
3. Maximum Power Transfer Theorem for DC and AC circuits
4. Verification of Compensation Theorem for DC circuits
5. Verification of Reciprocity, Millmann's Theorems for DC circuits
6. Determination of Self, Mutual Inductances and Coefficient of Coupling
7. Measurement of Active Power for Star Connected Balanced Loads
8. Measurement of Reactive Power for Star Connected Balanced Loads
9. Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads
10. Measurement of Active Power for Delta Connected Balanced Loads
11. Measurement of Reactive Power for Delta Connected Balanced Loads

Course Outcomes:

At the end of the course, students should be able to

- Remember, understand and apply various theorems and verify practically.
- Understand and analyze active, reactive power measurements in three phase balanced & un balanced circuits.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– II Sem

L	T	P	C
3	0	0	3

(20A54201) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to Civil, EEE, Mechanical, ECE and Food Technology)

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT -1

Linear differential equations of higher order (Constant Coefficients)

Definitions, homogenous and non-homogenous, complimentaryfunction, generalsolution, particular integral,Wronskean, method of variation of parameters.Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.

Learning Outcomes:

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

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L3)
- Formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT 2:

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.

Learning Outcomes:

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

- Apply a range of techniques to find solutions of standard pdes (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT -3

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, One dimensional Heat equation.

Learning Outcomes:

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

- Calcify the PDE (L3)
- Learn the applications of PDEs (L2)

UNIT-4

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.

Learning Outcomes:

At the end of this unit, the student will be able to
- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT -5

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.

Learning Outcomes:

At the end of this unit, the student will be able to
- Find the work done in moving a particle along the path over a force field (L4)
- Evaluate the rates of fluid flow along and across curves (L4)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
6. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
7. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
8. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
9. R.L. GargNishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
10. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
11. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.
12. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

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

- Solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– II Sem

L	T	P	C
3	0	0	3

(20A51101T) CHEMISTRY

(CSE, AI & DS,CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), **ECE, EEE and IT)**

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, molecular machines and switches

Unit 1:

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 O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation ofbond order.

Learning Outcomes:

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

- Apply Schrodinger wave equation to hydrogen atom (L3)
- Illustrate the molecular orbital energy level diagram of different molecular species (L2)
- Explain the calculation of bond order of O_2 and Co molecules (L2)
- Discuss the basic concept of molecular orbital theory (L3)

Unit 2:

Modern Engineering materials:

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

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

iii). Supercapacitors: Introduction, Basic concept-Classification – Applications.

iv). Nanochemistry: Introduction, classification of nanometerials, properties and applications of Fullerenes, carbonnano tubes and Graphines nanoparticles.

Learning Outcomes:

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

- Explain splitting in octahedral and tetrahedral geometryof complexes (L2).
- Discuss the magnetic behaviour and colour of coordination compounds (L3).
- Explain the band theory of solids for conductors, semiconductors and insulators (L2)
- Demonstrate the application of Fullerenes, carbon nano tubes and Graphines nanoparticles (L2).

Unit 3:

Electrochemistry and Applications:

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).
Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.
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.

Learning Outcomes:

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

- Apply Nernst equation for calculating electrode and cell potentials (L3)
- Differentiate between ph metry, potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)
- Solve problems based on cell potential (L3)

Unit 4:

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, carbon fibres.
Elastomers–Buna-S, Buna-N–preparation, properties and applications.
Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.

Learning Outcomes:

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

- Explain the different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres (L2)
- Describe the mechanism of conduction in conducting polymers (L2)
- Discuss Buna-S and Buna-N elastomers and their applications (L2)

Unit 5:

Instrumental Methods and Applications (10 hrs)
Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, UV-Visible**,**IR Spectroscopies. Solid-Liquid Chromatography–TLC, retention time.

Learning outcomes:

After completion of Unit IV, students will be able to:

- Explain the different types of spectral series in electromagnetic spectrum (L2)
- Understand the principles of different analytical instruments (L2)
- Explain the different applications of analytical instruments (L2)

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, Mc Graw 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, Supra Molecular Chemistry, VCH Publications

Course Outcomes:

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

- Compare the materials of construction for battery and electrochemical sensors (l2)
- Explain the preparation, properties, and applications of thermoplastics &thermosetting, elastomers & conducting polymers. (l2)
- Explain the principles of spectrometry, slc in separation of solid and liquid mixtures (l2)
- Apply the principle of Band diagrams in application of conductors and semiconductors (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– II Sem

L	T	P	C
3	0	0	3

(20A05201T) C-PROGRAMMING & DATA STRUCTURES

(Common to All Branches of Engineering)

Course Objectives:

- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiarize with Stack, Queue and Linked lists data structures.
- To explain the concepts of non-linear data structures like graphs and trees.
- To learn different types of searching and sorting techniques.

UNIT-1

Introduction to C Language - 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, arrays.

Learning outcomes:

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

- Use C basic concepts to write simple C programs. (L3)
- Use iterative statements for writing the C programs (L3)
- Use arrays to process multiple homogeneous data. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Translate algorithms into programs. (L4)
- Implement conditional branching, iteration and recursion. (L2)

UNIT – 2

Functions, types of functions, Recursion and argument passing, pointers, storage allocation, pointers to functions, expressions involving pointers, Storage classes – auto, register, static, extern, Structures, Unions, Strings, string handling functions, and Command line arguments.

Learning outcomes:

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

- Writing structured programs using C Functions. (L5)
- Writing C programs using various storage classes to control variable access. (L5)
- Apply String handling functions and pointers. (L3)
- Use arrays, pointers and structures to formulate algorithms and write programs.(L3)

UNIT-3

Data Structures, Overview of data structures, stacks and queues, representation of a stack, stack related terms, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations.

Learning outcomes:

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

- Describe the operations of Stack. (L2)
- Explain the different notations of arithmetic expression. (L5)
- Develop various operations on Queues. (L6)

UNIT – 4

Linked Lists – Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

Learning outcomes:

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

- Analyze various operations on singly linked list. (L4)
- Interpret operations of doubly linked lists. (L2)
- Apply various operations on Circular linked lists. (L6)

UNIT-5

Trees - Tree terminology, representation, Binary trees, representation, binary tree traversals. binary tree operations, **Graphs** - graph terminology, graph representation, elementary graph operations, Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees. **Searching and Sorting** – sequential search, binary search, exchange (bubble) sort, selection sort, insertion sort.

Learning outcomes:

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

- Develop the representation of Tress. (L3)
- Identify the various Binary tree traversals. (L3)
- Illustrate different Graph traversals like BFS and DFS. (L2)
- Design the different sorting techniques (L6)
- Apply programming to solve searching and sorting problems. (L3)

Text Books:

1. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
4. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
5. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E. Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K. Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T. Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

Course Outcomes:

1. Analyse the basicconcepts of C Programming language. (L4)
2. Design applications in C, using functions, arrays, pointers and structures. (L6)
3. Apply the concepts of Stacks and Queues in solving the problems. (L3)
4. Explore various operations on Linked lists. (L5)
5. Demonstrate various tree traversals and graph traversal techniques. (L2)
6. Design searching and sorting methods (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– II Sem

L	T	P	C
3	0	0	3

(20A04101T) ELECTRONIC DEVICES & CIRCUITS
(Common to EEE and ECE)

Course Objectives:

- To understand the basic principles of all semiconductor devices.
- To be able to solve problems related to diode circuits, and amplifier circuits.
- To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.
- To be able to compare the performance of BJTs and MOSFETs
- To design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

Unit – 1

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,reversebias, 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.

Learning outcomes:

- Remember and understand the basic characteristics of semiconductor diode (L1)
- Understand iterative and graphical analysis of simple diode circuits (L1)

Unit – 2

Zener Diodes– Zenerdiode 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, Schottkybarrier 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, andsaturation modes, V-ICharacteristics- of different configurations - graphical representation of transistor characteristics, dependence of collector current on collector voltage, the Early Effect.

Learning outcomes:

- Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
- Understand the V-I characteristics of BJT and its different configurations (L1)
- Analyze various applications of diode and special purpose diodes (L3)
- Design rectifier and voltage regulator circuits (L4)

Unit- 3

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.

Learning outcomes:

- Solve problems on various biasing circuits using BJT (L2)
- Analyze BJT based biasing circuits (L3)
- Design an amplifier using BJT based on the given specifications (L4)

Unit – 4

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.

Learning outcomes:

- Understand principle of operation of various types of MOSFET devices (L1)
- Understand the V-I characteristics of MOSFET devices and their configurations (L1)

Unit – 5

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.

Learning outcomes:

- Solve problems on small signal equivalent of MOSFET devices (L2)
- Analyze various biasing circuits based on different types of MOSFETs (L3)
- Design an amplifier using BJT based on the given specifications (L4)

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.
1. Jimmie J Cathey, "Electronic Devices and Circuits," Schaum's outlines series, 3rd edition, McGraw-Hill (India), 2010.

Course Outcomes:

After the completion of the course students will able to

CO1: Understand principle of operation, characteristics and applications of Semiconductor diodes, Bipolar Junction Transistor and MOSFETs.

CO2: Applying the basic principles solving the problems related to Semiconductor diodes, BJTs, and MOSFETs.

CO3: Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze biasing circuits of BJTs, and MOSFETs.

CO4: Design of diode circuits and amplifiers using BJTs, and MOSFETs.

CO5: Compare the performance of various semiconductor devices.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– II Sem

L	T	P	C
0	0	3	1.5

(20A03202) ENGINEERING WORKSHOP

(Common to All Branches of Engineering)

Course Objective:

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

List of Topics

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

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

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

Electrical Wiring:

Familiarities 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

Course Outcomes:

After completion of this lab the student will be able to

- Apply wood working skills in real world applications. (l3)
- Build different objects with metal sheets in real world applications. (l3)
- Apply fitting operations in various applications. (l3)
- Apply different types of basic electric circuit connections. (l3)

- Use soldering and brazing techniques. (l2)

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– II Sem

L	T	P	C
0	0	3	1.5

(20A05202) IT WORKSHOP

(Common to All Branches of Engineering)

Course Objectives:

- To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations and LAteX
- To learn about Networking of computers and use Internet facility for Browsing and Searching

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 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 trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods

Task 3:

Install Operating system: Student should install Linux on the computer. Student 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. Crimpling 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 e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If 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 e-mail account.

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 sheet 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 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. Trouble shooting, Maintaining & Repairing PCs, Bigelows, TMH
6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

Course Outcomes:

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

Note: Use open source tools for implementation of the above exercises.

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B.Tech (ECE)– II Sem

L	T	P	C
0	0	3	1.5

(20A05201P) C-PROGRAMMING & DATA STRUCTURES LAB

(Common to All Branches of Engineering)

Course Objectives:

- To get familiar with the basic concepts of C programming.
- To design programs using arrays, strings, pointers and structures.
- To illustrate the use of Stacks and Queues
- To apply different operations on linked lists.
- To demonstrate Binary search tree traversal techniques.
- To design searching and sorting techniques.

Week l

Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.
iii) To solve Towers of Hanoi problem.

Week 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
i) Addition of Two Matrices ii) Multiplication of Two Matrices

Week 3

a) Write a C program that uses functions to perform the following operations:
i) To insert a sub-string in to a given main string from a given position.
ii) To delete n characters from a given position in a given string.

Week 4

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn‘t contain T.

b) Write a C program to count the lines, words and characters in a given text.

Week 5

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
i) call-by-value ii) call-by-reference

Week 6

Write a C program that uses functions to perform the following operations:

i) Reading a complex number
ii) Writing a complex number
iii) Addition of two complex numbers
iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Week 7

Write C programs that implement stack (its operations) using

i) Arrays
ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using

i) Arrays
ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression
ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linkedlist.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 13

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.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

i) Linear search
ii) Binary search

Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

i) Bubble sort
ii) Selection sort
iii) Insertion sort

Text Books:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon 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.

Reference Books:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

Course Outcomes

- Demonstrate basic concepts of C programming language. (L2)
- Develop C programs using functions, arrays, structures and pointers. (L6)
- Illustrate the concepts Stacks and Queues. (L2)
- Design operations on Linked lists. (L6)
- Apply various Binary tree traversal techniques. (L3)
- Develop searching and sorting methods. (L6)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE) – I Sem

L	T	P	C
0	0	3	1.5

(20A51101P) CHEMISTRY LAB

(CSE, AI & DS,CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), **ECE, EEE and IT)**

Course Objectives:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method
2. Models of potential energy surfaces
3. Conductometrictitration of (i) strong acid vs. strong base, (ii) 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 a Bakelite and measurement of its mechanical properties (strength.).
8. Verify Lambert-Beer's law
9. Thin layer chromatography
10. Identification of simple organic compounds by IR.
11. Preparation of nanomaterial's by precipitation
12. Estimation of Ferrous Iron by Dichrometry.

Course Outcomes:

At the end of the course, the students will be able to

- Determine the cell constant and conductance of solutions (L3)
- Prepare advanced polymer Bakelite materials (L2)
- Measure the strength of an acid present in secondary batteries (L3)
- Analysethe IR of some organic compounds (L3)

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B.Tech (ECE)– II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20A04101P) ELECTRONIC DEVICES & CIRCUITS LAB
(Common to EEE and ECE)

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyse the characteristics of Diodes, BJT, MOSFET, UJT.
- To design the amplifier circuits from the given specifications.
- To Model the electronic circuits using tools such as PSPICE/Multisim.

LIST OF EXPERIMENTS: (**Execute any 12 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 circuit 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 Toollike Multisim/ Pspice or Equivalent,
DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Course Outcomes:

- Understand the basic characteristics and applications of basic electronic devices. (L1)Observe the characteristics of electronic devices by plotting graphs. (L2)
- Analyze the Characteristics of UJT, BJT, MOSFET (L3).
  Design MOSFET / BJT based amplifiers for the given specifications. (L4)
  Simulate all circuits in PSPICE /Multisim. (L5).

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B.Tech (ECE)– II Sem

L	T	P	C
3	0	0	0

(20A99201) ENVIRONMENTAL SCIENCE

(Common to All Branches of Engineering)

Course Objectives:

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

UNIT – I

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

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

Learning outcomes:

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

- To know the importance of public awareness
- To know about the various resources

UNIT – II

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

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Learning outcomes:

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

- To know about various echo systems and their characteristics
- To know about the biodiversity and its conservation

UNIT – III

Environmental Pollution: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

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.

Learning outcomes:

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

- To know about the various sources of pollution.
- To know about the various sources of solid waste and preventive measures.
- To know about the different types of disasters and their managerial measures**.**

UNIT – IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Learning outcomes:

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

- To know about the social issues related to environment and their protection acts.
- To know about the various sources of conservation of natural resources.
- To know about the wild life protection and forest conservation acts.

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 – Case studies.

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

Learning outcomes:

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

- To know about the population explosion and family welfare programmes.
- To identify the natural assets and related case studies.

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.

Course Outcomes:

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

- Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
- Understand flow and bio-geo- chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Casus of population explosion, value education and welfare programmes.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	Complex variables and Transforms		L	T	P	C
20A54302	(Common to ECE & EEE)		3	0	0	3
Pre-requisite	Functions, Differentiations and Integration	Semester	III			

Course Objectives:

This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The student develops the idea of using continuous/discrete transforms.

Course Outcomes (CO): Student will be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply cauchy's integral formula and cauchy's integral theorem to evaluate improper integrals along contours.
- Understand the usage of laplace transforms, fourier transforms and z transforms.
- Evaluate the fourier series expansion of periodic functions.
- Understand the use of fourier transforms and apply z transforms to solve difference equations.

UNIT - I	**Complex Variable – Differentiation**:	8 Hrs

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method-Conformal mappings-standard and special transformations (sin z, e^z, cos z, z^2) Mobius transformations (bilinear) and their properties.

UNIT - II	**Complex Variable – Integration**:	9 Hrs

Line integral-Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Liouville's theorem (without proof) and Maximum-Modulus theorem (without proof);power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi circle with f(z) not having poles on real axis).

UNIT - III	**Laplace Transforms**	9 Hrs

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

UNIT - IV	**Fourier series**	8 Hrs

Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions- typical wave forms - Parseval's formula- Complex form of Fourier series.

UNIT - V	**Fourier transforms & Z Transforms:**	9 Hrs

Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem .

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

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ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Textbooks:
1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers. 2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India
Reference Books:
1. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers. 2. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.
Online Learning Resources:
1. nptel.ac.in/courses/111107056 2. onlinelibrary.wiley.com 3. https://onlinecourses.nptel.ac.in/noc18ma12.

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ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	SIGNALS AND SYSTEMS		L	T	P	C
20A04301T			3	0	0	3
Pre-requisite	Mathematics - I	Semester	III			

Course Objectives:

- To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
- To present Fourier tools through the analogy between vectors and signals.
- To teach concept of sampling and reconstruction of signals.
- To analyze characteristics of linear systems in time and frequency domains.
- To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

Course Outcomes (CO):

CO1: Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques.
CO2: Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems.
CO3: Analyze the frequency spectra of various continuous-time and discrete-time signals using different transform methods.
CO4: Classify the systems based on their properties and determine the response of them.

UNIT - I	**Signals and Systems**

Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error.

UNIT - II	**Fourier Series and Fourier Transform**

Fourier series: Trigonometric & Exponential, Properties of Fourier series, concept of discrete spectrum, Illustrative Problems.
Continuous Time Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

UNIT - III	**Laplace Transform**

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions.

UNIT - IV	**Signal Transmission through LTI systems**

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

UNIT - V	**DTFT & Z-Transform**

Discrete Time Fourier Transform: Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems.
Z–Transform: Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions. Illustrative Problems.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Textbooks:
1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Edition, PHI, 2009. 2. Simon Haykin and Van Veen, "Signals & Systems", 2nd Edition, Wiley, 2005.
Reference Books:
1. BP Lathi, "Principles of Linear Systems and Signals", 2nd Edition, Oxford University Press, 015. 2. Matthew Sadiku and Warsame H. Ali, "Signals and Systems A primer with MATLAB", CRC Press, 2016. 3. Hwei Hsu, "Schaum's Outline of Signals and Systems", 4thEdition, TMH, 2019.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	ELECTRICAL ENGINEERING		L	T	P	C
20A02303T			3	0	0	3
Pre-requisite	Fundamentals of Electrical Circuits	Semester	III			

Course Objectives:

- Distinguish between classical method and Laplace transform approach in analyzing transient phenomenon in DC excitations
- Understand and design the different types of filters.
- To know about various characteristics of DC Generators and motors.
- To know about principle of operation of a DC machine working as a generator and motor.
- To understand computation and predetermination of regulation of a 1-ϕ transformer.
- To know about principle of operation of three phase induction motor.

Course Outcomes (COs):

CO1: Able to acquire knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations.
CO2: Able to solve the problems on R L C circuits for different excitations using different approaches.
CO3: Analyze the complex circuits of R L C circuits.
CO4: Able to solve the problems the e.m.f. generated on DC Generator
CO5: Able to acquire knowledge about how to determine the efficiency and regulation of single phase transformer and synchronous machine.

UNIT - I	**Transient Analysis**

Introduction, Source free R-L, R-C circuits, R-L, R-C circuits with DC, step, pulse forcing functions, Source free R-L-C circuits – under damped, over damped and critical damped cases, Response of R-L-C circuits with DC and Sinusoidal forcing functions, Relationship between bandwidth and Quality factor in R-L-C circuits – Response of R-L-C circuits using Integral-differential equation and Laplace Transform approaches for dc and sinusoidal excitations – Problem Solving.

UNIT - II	**Frequency Response**

Introduction,Series and Parallel Resonant circuits, Resonant frequency, Relationship between bandwidth and Quality factor, Variation of resonant frequency with circuit elements, Passive Filters – Low pass, High pass, band pass, band elimination filter, Network Synthesis – Foster and Cover forms of LC circuits – Problem Solving.

UNIT - III	**Two-port Networks**

Introduction, Types of two port networks, Various parameters of two port networks, Impedance, Admittance, Transmission, Hybrid parameters and their relations – Finding the two port parameters for various circuits, Concept of transformed network, Two port parameters using transformed variables – Problem solving.

UNIT - IV	**DC Machines**

DC Generators: Principle of operation of DC machines – EMF equation – types of generators – Magnetization and Load characteristics of DC generators
DC Motors: Principle of operation of DC Motor, Types of Motors, Back EMF Equation, Characteristics of DC motor, Torque Equation, Three Point starter, Efficiency Calculation, Swinburne's Test and speed control.

UNIT - V	**AC Machines**

Transformers: Construction and principle of operation of single-phase transformer –EMF equation O.C. & S.C. tests – efficiency and regulation.
Induction Motors: Principle and operation of three phase induction motors – Constructional details – Torque equation- slip torque characteristics.
Alternators: Principle and operation of alternators – O.C. & S.C. tests – regulation by synchronous impedance method.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Textbooks:

1. William Hayt, Jack E. Kemmerly and Jamie Phillips, "Engineering Circuit Analysis", Mc Graw Hill, 9th edition, 2019.
2. Charles Alexander & Mathew Sadiku, "Fundamentals of Electric Circuits", 6th edition, McGraw Hill Publications, 2016.
3. I. J. Nagrath&D.P.Kothari, "Electric Machines", 7th Edition, Tata Mc Graw Hill, 2005.

Reference Books:

1. M.E. Van Valkenberg, "Network Analysis", 3rd Edition, Prentice Hall (India), 1980.
2. B. R. Gupta, "Fundamentals of Electric Machines", Vandana Singhal, 3rd Edition, New age International Publishers, 2005.
3. T.K. Nagsarkar and M.S. Sukhija, " Basic Electrical Engineering", 3rd Edition, Oxford University Press2017.
4. S. Kamakashiah, "Electromachanics – III", overseas publishers Pvt. Ltd.
5. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering", S.Chand Publications, 2005.

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ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	ANALOG CIRCUITS		L	T	P	C
20A04302T			3	0	0	3
Pre-requisite	Electronic Devices and Circuits, Electrical circuits	Semester	III			

Course Objectives:

- To review analysis & design of single stage amplifiers using BJT & MOSFETs at low and high frequencies.
- To understand the characteristics of Differential amplifiers, feedback and power amplifiers.
- To examine the response of tuned amplifiers and multivibrators
- To categorize different oscillator circuits based on the application
- To design the electronic circuits for the given specifications and for a given application.

Course Outcomes (CO):

CO1: Understand the characteristics of differential amplifiers, feedback and power amplifiers. (L2)
CO2: Examine the frequency response of multistage and differential amplifier circuits using BJT & MOSFETs at low and high frequencies. (L3)
CO3: Investigate different feedback and power amplifier circuits based on the application. (L4)
CO4: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillator circuits. (L4)
CO5: Evaluate the performance of different tuned amplifiers and multivibrators (L5)
CO6: Design analog circuits for the given specifications and application. (L6)

UNIT - I	Multistage and Differential Amplifiers	10Hrs

Introduction – Recap of Small Signal Amplifiers, Multistage Amplifiers, Cascode amplifier, Darlington pair, the MOS Differential Pair, Small-Signal Operation of the MOS Differential Pair, The BJT Differential Pair, and other Nonideal Characteristics of the Differential Amplifier.

UNIT - II	Frequency Response	15Hrs

Low-Frequency Response of the CS and CE Amplifiers, Internal Capacitive Effects and the High-Frequency Model of the MOSFET and the BJT, High-Frequency Response of the CS and CE Amplifiers, High-Frequency Response of the CG and Cascode Amplifiers, High-Frequency Response of the Source and Emitter Followers, High-Frequency Response of Differential Amplifiers and Multistage amplifiers.

UNIT - III	Feedback Amplifiers & Oscillators	12Hrs

Feedback Amplifiers: Introduction, The General Feedback Structure, Some Properties of Negative Feedback, The Four Basic Feedback Topologies, The Feedback Voltage Amplifier (Series—Shunt), The Feedback Transconductance Amplifier (Series—Series), The Feedback Trans-resistance Amplifier (Shunt—Shunt), The Feedback Current Amplifier (Shunt—Series), Summary.
Oscillators: General Considerations, Phase Shift Oscillator, Wien-Bridge Oscillator, LC Oscillators, Relaxation Oscillator, Crystal Oscillators, Illustrative Problems.

UNIT - IV	Power Amplifiers	10Hrs

Introduction, Classification of Output Stages, Class A Output Stage, Class B Output Stage, Class AB Output Stage, Biasing the Class AB Circuit, CMOS Class AB Output Stages, Power BJTs, Variations on the Class AB Configuration, MOS Power Transistors.

UNIT - V	Tuned Amplifiers and Multivibrators	11Hrs

Tuned Amplifiers: Basic Principle, Use of Transformers, Single Tuned Amplifiers, Amplifiers with multiple Tuned Circuits, Stagger Tuned Amplifiers.
Multivibrators: Analysis and Design of Bistable, Monostable, and Astable Multivibrators.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Textbooks:
1. Adel. S. Sedra and Kenneth C. Smith, "Micro Electronic Circuits," 6th Edition, Oxford University Press, 2011. 2. J. Millman, C Chalkias, "Integrated Electronics", 4thEdition, McGraw Hill Education (India) Private Ltd., 2015. 3. Millman and Taub, "Pulse,Digital and Switching Waveforms", 3rd Edition, Tata McGraw-Hill Education, 2011.
Reference Books:
1. Behzad Razavi, "Fundamentals of Micro Electronics", Wiley, 2010. 2. Donald A Neamen, "Electronic Circuits – Analysis and Design," 3rdEdition, McGraw Hill (India), 2019. 3. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory", 9th Edition, Pearson/Prentice Hall, 2006. 4. K.Lal Kishore, "Electronic Circuit Analysis", 2ndEdition, B S Publications, 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (Common to All branches of Engineering)		L	T	P	C
20A52301			3	0	0	3
Pre-requisite	NIL	Semester	III			

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements

Course Outcomes (CO):

- Define the concepts related to Managerial Economics, financial accounting and management.
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Develop the accounting statements and evaluate the financial performance of business entity.

UNIT - I	**Managerial Economics**

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

UNIT - II	**Production and Cost Analysis**

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least-cost combination– Short run and Long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT - III	**Business Organizations and Markets**

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

UNIT - IV	**Capital Budgeting**

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

UNIT - V	**Financial Accounting and Analysis**

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(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). ***Financial Analysis*** **-** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.
Textbooks: 1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013. 2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019
Reference Books:
1. Ahuja Hl Managerial economics Schand,3/e,2013 2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013. 3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi. 4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.
Online Learning Resources:
https://www.slideshare.net/123ps/managerial-economics-ppt https://www.slideshare.net/rossanz/production-and-cost-45827016 https://www.slideshare.net/darkyla/business-organizations-19917607 https://www.slideshare.net/balarajbl/market-and-classification-of-market https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396 https://www.slideshare.net/ashu1983/financial-accounting

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	ORGANISATIONAL BEHAVIOUR		L	T	P	C
20A52302	(Common to All branches of Engineering)		3	0	0	3
Pre-requisite	**NIL**	**Semester**	**III**			

Course Objectives:

- To enable student's comprehension of organizational behavior
- To offer knowledge to students on self-motivation, leadership and management
- To facilitate them to become powerful leaders
- To Impart knowledge about group dynamics
- To make them understand the importance of change and development

Course Outcomes (CO):

- Define the Organizational Behaviour, its nature and scope.
- Understand the nature and concept of Organizational behaviour
- Apply theories of motivation to analyse the performance problems
- Analyse the different theories of leadership
- Evaluate group dynamics
- Develop as powerful leader

UNIT - I	**Introduction to Organizational Behavior**

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective -Understanding Individual Behaviour –Attitude -Perception - Learning – Personality.

UNIT - II	**Motivation and Leading**

Theories of Motivation- Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Cleland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory – Locke's goal setting theory– Alderfer's ERG theory .

UNIT - III	**Organizational Culture**

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader- Women and Corporate leadership.

UNIT - IV	**Group Dynamics**

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behavior - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution

UNIT - V	**Organizational Change and Development**

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

Textbooks:

1. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 12 Th edition 2011
2. P Subba Ran, Organisational Behaviour, Himalya Publishing House 2017

Reference Books:

- McShane, Organizational Behaviour, TMH 2009
- Nelson, Organisational Behaviour, Thomson, 2009.
- Robbins, P. Stephen, Timothy A. Judge, Organisational Behaviour, Pearson 2009.
- Aswathappa, Organisational Behaviour, Himalaya, 2009

Online Learning Resources:

https://www.slideshare.net/Knight1040/organizational-culture-9608857s://www.slideshare.net/AbhayRajpoot3/motivation-165556714
https://www.slideshare.net/harshrastogi1/group-dynamics-159412405
https://www.slideshare.net/vanyasingla1/organizational-change-development-26565951

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	Business Environment (Common to All branches of Engineering)		L	T	P	C
20A52303			3	0	0	3
Pre-requisite	NIL	Semester	III			

Course Objectives:

- To make the student to understand about the business environment
- To enable them in knowing the importance of fiscal and monitory policy
- To facilitate them in understanding the export policy of the country
- To Impart knowledge about the functioning and role of WTO
- To Encourage the student in knowing the structure of stock markets

Course Outcomes (CO):

- Define Business Environment and its Importance.
- Understand various types of business environment.
- Apply the knowledge of Money markets in future investment
- Analyse India's Trade Policy
- Evaluate fiscal and monitory policy
- Develop a personal synthesis and approach for identifying business opportunities

UNIT - I	**Overview of Business Environment**

Introduction – meaning Nature, Scope, significance, functions and advantages. Types-Internal &External, Micro and Macro. Competitive structure of industries -Environmental analysis- advantages & limitations of environmental analysis& Characteristics of business.

UNIT - II	**Fiscal & Monetary Policy**

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget- Monetary Policy - Demand and Supply of Money –RBI -Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

UNIT - III	**India's Trade Policy**

Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank -Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

UNIT - IV	**World Trade Organization**

Introduction – Nature, significance, functions and advantages. Organization and Structure - Role and functions of WTO in promoting world trade - GATT -Agreements in the Uruguay Round –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

UNIT - V	**Money Markets and Capital Markets**

Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI – Stock Exchanges - Investor protection and role of SEBI, Introduction to international finance.

Textbooks:

1. Francis Cherunilam (2009), International Business: Text and Cases, Prentice Hall of India.
2. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition.HPH2016

Reference Books:

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ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

1.K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4.E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

Online Learning Resources:

https://www.slideshare.net/ShompaDhali/business-environment-53111245
https://www.slideshare.net/rbalsells/fiscal-policy-ppt
https://www.slideshare.net/aguness/monetary-policy-presentationppt
https://www.slideshare.net/DaudRizwan/monetary-policy-of-india-69561982
https://www.slideshare.net/ShikhaGupta31/indias-trade-policyppt
https://www.slideshare.net/viking2690/wto-ppt-60260883
https://www.slideshare.net/prateeknepal3/ppt-mo

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(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	SIMULATION LAB		L	T	P	C
20A04301P			0	0	3	1.5
Pre-requisite	Linear Algebra	Semester	III			

Course Objectives:

- To realize the concepts studied in theory
- To simulate various Signals and Systems through MATLAB
- To apply the concepts of signals to determine their energy, power, psd etc.
- To analyze the output of a system when it is excited by different types of deterministic and random signals.
- To generate random signals for the given specifications

Course Outcomes (CO):

CO1: Learn how to use the MATLAB software and know syntax of MATLAB programming.
CO2: Understand how to simulate different types of signals and system response.
CO3: Find the Fourier Transform of a given signal and plot amplitude and phase characteristics.
CO4: Analyze the response of different systems when they are excited by different signals and plot power spectral density of signals.
CO5: Generate/Simulate different random signals for the given specifications

List of Experiments:

1. Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function.
2. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings- Plot the discrete spectrum of the signal.
4. Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
5. Write a program to convolve two discrete time sequences. Plot all the sequences.
6. Write a program to find autocorrelation and cross correlation of given sequences.
7. Write a program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System.
8. Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
9. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
10. Write a program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
11. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
12. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.
13. To plot pole-zero diagram in S-plane of given signal/sequence and verify its stability.

Note: All the experiments are to be simulated using MATLAB or equivalent software.

References:

Stephen J. Chapman, "MATLAB Programming for Engineers", Cengage, November 2012.

Online Learning Resources/Virtual Labs:

https://www.vlab.co.in/

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(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	ELECTRICAL ENGINEERING LAB		L	T	P	C
20A02303P			0	0	3	1.5
Pre-requisite	Fundamentals of Electrical Circuits	Semester	III			

Course Objectives:

- Understand and experimentally verify various resonance circuits
- Apply and experimentally analyze two port network parameters
- To do experiments on DC Machines
- To do experiments on AC Machines

Course Outcomes (CO):

- To determine the various parameters experimentally
- To understand various characteristics of DC generators and DC motors
- To predetermine the efficiency and regulation of a 1-ϕ transformer

Experiments

1. Response of RL, RC, and R-L-C circuits for step and pulse inputs
2. Series Resonance and its Frequency Response
3. Parallel Resonance and its Frequency Response
4. Determination of Z & Y parameters for the given two port network.
5. Determination of Transmission and Hybrid Parameters of a given two port network
6. OCC of a separately excited DC generator
7. Load characteristics of DC shunt generator
8. Load characteristics of DC shunt motor
9. Swinburne's test
10. Speed control of DC shunt motor
11. OC & SC tests on a 1-ϕ transformer
12. Load test on Squirrel cage Induction motor
13. Predetermination of regulation of alternator by Synchronous impedance method

Note: Student has to perform at least 10 experiments

Online learning resources/Virtual Labs:
https://www.vlab.co.in/

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	ANALOG CIRCUITS LAB		L	T	P	C
20A04302P			0	0	3	1.5
Pre-requisite	Electronic Devices and Circuits lab	Semester	III			

Course Objectives:

- To review analysis & design of single stage amplifiers using BJT & MOSFETs at low and high frequencies.
- To understand the characteristics of Differential amplifiers, feedback and power amplifiers.
- To examine the response of tuned amplifiers and multivibrators
- To categorize different oscillator circuits based on the application
- To design the electronic circuits for the given specifications and for a given application.

Course Outcomes (CO):

CO1: Know about the usage of equipment/components/software tools used to conduct the experiments in analog circuits.
CO2: Conduct the experiment based on the knowledge acquired in the theory about various analog circuits using BJT/MOSFETs to find the important parameters of the circuit (viz. Voltage gain, Current gain, bandwidth, input and output impedances etc) experimentally.
CO3: Analyze the given analog circuit to find required important metrics of it theoretically.
CO4:Draw the relevant graphs between important metrics of the system from the observed measurements.
CO5: Compare the experimental results with that of theoretical ones and infer the conclusions.
CO6: Design the circuit for the given specifications.

List of Experiments:

1. Design and Analysis of Darlington pair.
2. Frequency response of CE – CC multistage Amplifier
3. Design and Analysis of Cascode Amplifier.
4. Frequency Response of Differential Amplifier
5. Design and Analysis of Series – Series feedback amplifier and find the frequency response of it.
6. Design and Analysis of Shunt – Shunt feedback amplifier and find the frequency response of it.
7. Design and Analysis of Class A power amplifier
8. Design and Analysis of Class AB amplifier
9. Design and Analysis of RC phase shift oscillator
10. Design and Analysis of LC Oscillator
11. Frequency Response of Single Tuned amplifier
12. Design and Analysis of Bistable Multivibrator
13. Design and Analysis of Monostable Multivibrator
14. Design and Analysis of Astable Multivibrator

Note: At least 12 experiments shall be performed. Both BJT and MOSFET based circuits shall be implemented.
Faculty members who are handling the laboratory shall see that students are given design specifications for a given circuit appropriately and monitor the design and analysis aspects of the circuit.

Online learning resources/Virtual labs:
https://www.vlab.co.in/

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	Application Development with Python		L	T	P	C
20A05305			1	0	2	2
Pre-requisite	NIL	Semester	III			

Course Objectives:

- To learn the basic concepts of software engineering and life cycle models
- To explore the importance of Databases in application Development
- Acquire programming skills in core Python
- To understand the importance of Object-oriented Programming

Course Outcomes (CO):

Students should be able to

- Identify the issues in software requirements specification and enable to write SRS documents for software development problems
- Explore the use of Object oriented concepts to solve Real-life problems
- Design database for any real-world problem
- Solve mathematical problems using Python programming language

Module 1. Basic concepts in software engineering and software project management

Basic concepts: abstraction versus decomposition, the evolution of software engineering techniques, Software development life cycle
Software project management: project planning and project scheduling

Task:
1. Identifying the Requirements from Problem Statements

Module 2. Basic Concepts of Databases
Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Data Definition Language(DDL) Statements: (Create table, Alter table, Drop table), Data Manipulation Language(DML) Statements
Task:
1. Implement Data Definition Language(DDL) Statements: (Create table, Alter table, Drop table)
2. Implement Data Manipulation Language(DML) Statements

Module 3. Python Programming:
Introduction to Python: Features of Python, Data types, Operators, Input and output, Control Statements, Looping statements
Python Data Structures: Lists, Dictionaries, Tuples.

Strings: Creating strings and basic operations on strings, string testing methods.

Functions: Defining a function- Calling a function- Types of functions-Function Arguments-Anonymous functions- Global and local variables

OOPS Concepts; Classes and objects- Attributes- Inheritance- Overloading- Overriding- Data hiding

Modules and Packages: Standard modules-Importing own module as well as external modules Understanding Packages Powerful Lamda function in python Programming using functions, modules and external packages

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Working with Data in Python: Printing on screen- Reading data from keyboard- Opening and closing file- Reading and writing files- Functions-Loading Data with Pandas-Numpy

Tasks:

1. OPERATORS

a. Read a list of numbers and write a program to check whether a particular element is present or not using membership operators.
b. Read your name and age and write a program to display the year in which you will turn 100 years old.
c. Read radius and height of a cone and write a program to find the volume of a cone.
d. Write a program to compute distance between two points taking input from the user (Hint: use Pythagorean theorem)

2. CONTROL STRUCTURES

a. Read your email id and write a program to display the no of vowels, consonants, digits and white spaces in it using if…elif…else statement.
b. Write a program to create and display a dictionary by storing the antonyms of words. Find the antonym of a particular word given by the user from the dictionary using while loop.
c. Write a Program to find the sum of a Series 1/1! + 2/2! + 3/3! + 4/4! +…….+ n/n!. (Input :n = 5, Output : 2.70833)
d. In number theory, an abundant number or excessive number is a number for which the sum of its proper divisors is greater than the number itself. Write a program to find out, if the given number is abundant. (Input: 12, Sum of divisors of 12 = 1 + 2 + 3 + 4 + 6 = 16, sum of divisors 16 > original number 12)

3: LIST

a. Read a list of numbers and print the numbers divisible by x but not by y (Assume x = 4 and y = 5).
b. Read a list of numbers and print the sum of odd integers and even integers from the list.(Ex: [23, 10, 15, 14, 63], odd numbers sum = 101, even numbers sum = 24)
c. Read a list of numbers and print numbers present in odd index position. (Ex: [10, 25, 30, 47, 56, 84, 96], The numbers in odd index position: 25 47 84).
d. Read a list of numbers and remove the duplicate numbers from it. (Ex: Enter a list with duplicate elements: 10 20 40 10 50 30 20 10 80, The unique list is: [10, 20, 30, 40, 50, 80])

4: TUPLE

a. Given a list of tuples. Write a program to find tuples which have all elements divisible by K from a list of tuples. test_list = [(6, 24, 12), (60, 12, 6), (12, 18, 21)], K = 6, Output : [(6, 24, 12), (60, 12, 6)]
b. Given a list of tuples. Write a program to filter all uppercase characters tuples from given list of tuples. (Input: test_list = [(“GFG”, “IS”, “BEST”), (“GFg”, “AVERAGE”), (“GfG”,), (“Gfg”, “CS”)], Output : [(„GFG“, „IS“, „BEST“)]).
c. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3)

5: SET

a. Write a program to generate and print a dictionary that contains a number (between 1 and n) in the form (x, x*x).
b. Write a program to perform union, intersection and difference using Set A and Set B.
c. Write a program to count number of vowels using sets in given string (Input : “Hello World”, Output: No. of vowels : 3)
d. Write a program to form concatenated string by taking uncommon characters from two strings using set concept (Input : S1 = "aacdb", S2 = "gafd", Output : "cbgf").

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

6: DICTIONARY

a. Write a program to do the following operations:
i. Create a empty dictionary with dict() method
ii. Add elements one at a time
iii. Update existing key‟s value
iv. Access an element using a key and also get() method
v. Deleting a key value using del() method
b. Write a program to create a dictionary and apply the following methods:
i. pop() method
ii. popitem() method
iii. clear() method
c. Given a dictionary, write a program to find the sum of all items in the dictionary.
d. Write a program to merge two dictionaries using update() method.

7: STRINGS

a. Given a string, write a program to check if the string is symmetrical and palindrome or not. A string is said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one half of the string is the reverse of the other half or if a string appears same when read forward or backward.
b. Write a program to read a string and count the number of vowel letters and print all letters except 'e' and 's'.
c. Write a program to read a line of text and remove the initial word from given text. (Hint: Use split() method, Input : India is my country. Output : is my country)
d. Write a program to read a string and count how many times each letter appears. (Histogram).

8: USER DEFINED FUNCTIONS

a. A generator is a function that produces a sequence of results instead of a single value. Write a generator function for Fibonacci numbers up to n.
b. Write a function merge_dict(dict1, dict2) to merge two Python dictionaries.
c. Write a fact() function to compute the factorial of a given positive number.
d. Given a list of n elements, write a linear_search() function to search a given element x in a list.

9: BUILT-IN FUNCTIONS

a. Write a program to demonstrate the working of built-in statistical functions mean(), mode(), median() by importing statistics library.
b. Write a program to demonstrate the working of built-in trignometric functions sin(), cos(), tan(), hypot(), degrees(), radians() by importing math module.
c. Write a program to demonstrate the working of built-in Logarithmic and Power functions exp(), log(), log2(), log10(), pow() by importing math module.
d. Write a program to demonstrate the working of built-in numeric functions ceil(), floor(), fabs(), factorial(), gcd() by importing math module.

10. CLASS AND OBJECTS

a. Write a program to create a BankAccount class. Your class should support the following methods for
i) Deposit
ii) Withdraw
iii) GetBalanace
iv) PinChange
b. Create a SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance).

c. Write a program to create an employee class and store the employee name, id, age, and salary using the constructor. Display the employee details by invoking employee_info() method and also using dictionary (__dict__).
d. Access modifiers in Python are used to modify the default scope of variables. Write a program to demonstrate the 3 types of access modifiers: public, private and protected.

11. FILE HANDLING

a. . Write a program to read a filename from the user, open the file (say firstFile.txt) and then perform the following operations:
   i. Count the sentences in the file.
   ii. Count the words in the file.
   iii. Count the characters in the file.

b. . Create a new file (Hello.txt) and copy the text to other file called target.txt. The target.txt file should store only lower case alphabets and display the number of lines copied.
c. Write a Python program to store N student‟s records containing name, roll number and branch. Print the given branch student‟s details only.

References:

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018.
2. RamezElmasri, Shamkant, B. Navathe, “Database Systems”, Pearson Education, 6th Edition, 2013.
3.Reema Thareja, “Python Programming - Using Problem Solving Approach”, Oxford Press, 1st Edition, 2017.
4. Larry Lutz, “Python for Beginners: Step-By-Step Guide to Learning Python Programming”, CreateSpace Independent Publishing Platform, First edition, 2018

Online Learning Resources/Virtual Labs:

1. http://vlabs.iitkgp.ernet.in/se/
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php
3. https://python-iitk.vlabs.ac.in

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	UNIVERSAL HUMAN VALUES		L	T	P	C
20A52201	(Common to all branches of Engineering)		3	0	0	0
Pre-requisite	NIL	Semester	III			

Course Objectives:

The objective of the course is fourfold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

Course Outcomes (CO):

By the end of the course,

- Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

UNIT - I	Course Introduction - Need, Basic Guidelines, Content and Process for Value Education	8 Hrs

Purpose and motivation for the course, recapitulation from Universal Human Values-I
Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
Continuous Happiness and Prosperity- A look at basic Human Aspirations
Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
Method to fulfil the above human aspirations: understanding and living in harmony at various levels.
Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

UNIT - II	Understanding Harmony in the Human Being - Harmony in Myself!	12 Hrs

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
Understanding the characteristics and activities of 'I' and harmony in 'I'
Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
Programs to ensure Sanyam and Health.
Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT - III	Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship	8 Hrs

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
Understanding the meaning of Trust; Difference between intention and competence
Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT – IV	Understanding Harmony in the Nature and Existence - Whole existence as Coexistence	10 Hrs

Understanding the harmony in the Nature
Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
Holistic perception of harmony at all levels of existence.
Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT – V	Implications of the above Holistic Understanding of Harmony on Professional Ethics	8 Hrs

Natural acceptance of human values
Definitiveness of Ethical Human Conduct
Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
Case studies of typical holistic technologies, management models and production systems
Strategy for transition from the present state to Universal Human Order:
a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations
Sum up.
Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Textbooks:

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

Reference Books:

Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. FSchumacher. "Small is Beautiful"
Slow is Beautiful –Cecile Andrews
J C Kumarappa "Economy of Permanence"

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Pandit Sunderlal "Bharat Mein Angreji Raj" Dharampal, "Rediscovering India" Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule" India Wins Freedom - Maulana Abdul Kalam Azad Vivekananda - Romain Rolland(English) Gandhi - Romain Rolland (English)
MODE OF CONDUCT Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions. While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration. Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practicals are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignments and/or activities are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	PROBABILITY THEORY AND STOCHASTIC PROCESSES		L	T	P	C
20A54403			3	0	0	3
Pre-requisite	Signals Systems & Networks	Semester	IV			

Course Objectives:

- To gain the knowledge of the basic probability concepts and acquire skills in handling situations involving more than one random variable and functions of random variables.
- To understand the principles of random signals and random processes.
- To be acquainted with systems involving random signals.
- To gain knowledge of standard distributions that can describe real life phenomena

Course Outcomes (CO):

CO1: Understanding the concepts of Probability, Random Variables, Random Processes and their characteristics learn how to deal with multiple random variables, conditional probability, joint distribution and statistical independence. (L1)
CO2: Formulate and solve the engineering problems involving random variables and random processes. (L2)
CO3: Analyze various probability density functions of random variables. (L3)
CO4: Derive the response of linear system for Gaussian noise and random signals as inputs. (L3)

UNIT - I	**Probability & Random Variable**

Probability through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events, Problem Solving.

Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties, Problem Solving.

UNIT - II	**Operations on Random variable**

Operations on Single Random Variable: Introduction, Expectation of a random variable, moments-moments about the origin, Central moments, Variance and Skew, Chebyshev's inequality, moment generating function, characteristic function, transformations of random variable.
Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected), Unequal Distribution, Equal Distributions.

UNIT - III	**Operations on Multiple Random variables**

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties of Gaussian random variables, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT - IV	**Random Processes**

Random Processes-Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence, First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, N-Order and Strict-Sense Stationarity. Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Random Processes-Spectral Characteristics: The Power Density Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT - V	**Random Signal Response of Linear Systems**	Lecture Hrs

Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band Limited and Narrowband Processes, Properties.

Noise Definitions: White Noise, colored noise and their statistical characteristics, Ideal low pass filtered white noise, RC filtered white noise.

Textbooks:

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, TMH, 2002.
2. Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, PHI, 2002

Reference Books:

1. Simon Haykin, "Communication Systems", 3rd Edition, Wiley, 2010.
2. Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing," 3rd Edition, Pearson Education, 2002.
3. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis," 3rd Edition, Oxford, 1999.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	DIGITAL LOGIC DESIGN		L	T	P	C
20A04303T	(Common to ECE and EEE)		3	0	0	3
Pre-requisite	NIL	Semester	III			

Course Objectives:

- To familiarize with the concepts of different number systems and Boolean algebra.
- To introduce the design techniques of combinational, sequential logic circuits.
- To model combinational and sequential circuits using HDLs.

Course Outcomes (CO):

CO1: Understand the properties of Boolean algebra, other logic operations, and minimization of Boolean functions using Karnaugh map.
CO2: Make use of the concepts to solve the problems related to the logic circuits.
CO3: Analyze the combinational and sequential logic circuits.
CO4: Develop digital circuits using HDL, and Compare various Programmable logic devices
CO5: Design various logic circuits using Boolean algebra, combinational and sequential logic circuits.

UNIT - I	**Number Systems, Boolean algebra and Logic Gates**

Number systems - binary numbers, octal, hexadecimal, other binary codes; complements, signed binary numbers, digital logic operations and gates, basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, complements of Boolean functions, two-level NAND and NOR Implementation of Boolean functions.

UNIT - II	**Minimization of Boolean functions and Combinational Logic Circuits**

The Karnaugh map method (up to five variables), product of sums simplifications, don't care conditions, Tabular method, Introduction, Combinational circuits, design procedure, adders, subtractors, 4-bit binary adder/ subtractor circuit, BCD adder, carry look- a-head adder, binary multiplier, magnitude comparator, decoders and encoders, multiplexers, demultiplexers,

UNIT - III	**Sequential Logic Circuits**

Basic architectural distinction between combinational and sequential circuits, Design procedure, latches, flip-flops, truth tables and excitation tables, timing and triggering consideration, conversion of flip- flops, design of counters, ripple counters, synchronous counters, ring counter, Johnson counter, registers, shift registers, universal shift register

UNIT - IV	**Finite State Machines and Programmable Logic Devices**

Types of FSM, capabilities and limitations of FSM, state assignment, realization of FSM using flip-flops, Mealy to Moore conversion and vice-versa, reduction of state tables using partition technique, Design of sequence detector.

UNIT - V	**Hardware Description Language**

Types of PLD's: PROM, PAL, PLA, basic structure of CPLD and FPGA, advantages of FPGAs, Design of sequential circuits using ROMs, PLAs, CPLDs and FPGAs, Introduction to Verilog - structural Specification of logic circuits, behavioural specification of logic circuits, hierarchical Verilog Code, Verilog for combinational circuits - conditional operator, if-else statement, case statement, for loop; using storage elements with CAD tools-using Verilog constructs for storage elements, flip-flop with clear capability, using Verilog constructs for registers and counters.

Textbooks:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI. (Unit I to IV)
2. Stephen Brown and ZvonkoVranesic, "Fundamentals of Digital Logic with Verilog Design", 3rd Edition, McGraw-Hill (Unit V)

Reference Books:

1. Charles H. Roth, Jr, "Fundamentals of Logic Design", 4th Edition, Jaico Publishers.
2. ZviKohavi and Niraj K.Jha, "Switching and Finite Automata Theory, 3rd Edition, Cambridge University Press, 2010.
3. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis", 2nd Edition, Prentice Hall PTR.
4. D.P. Leach, A.P. Malvino, "Digital Principles and Applications", TMH, 7th Edition.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	ELECTROMAGNETIC WAVES AND TRANSMISSION LINES		L	T	P	C
20A04401			3	0	0	3
Pre-requisite	Mathematics II and Mathematics III	Semester	IV			

Course Objectives:

- To introduce fundamentals of static and time varying electromagnetic fields.
- To teach problem solving in Electromagnetic fields using vector calculus.
- To demonstrate wave concept with the help of Maxwell's equations.
- To introduce concepts of polarization and fundamental theory of electromagnetic waves in transmission lines and their practical applications.
- To analyze reflection and refraction of electromagnetic waves propagated in normal and oblique incidences.

Course Outcomes (CO):

CO1: Explain basic laws of electromagnetic fields and know the wave concept. (L2)
CO2: Solve problems related to electromagnetic fields. (L3)
CO3: Analyze electric and magnetic fields at the interface of different media. (L3)
CO4: Derive Maxwell's equations for static and time varying fields. (L3)
CO5: Analogy between electric and magnetic fields. (L5)
C06: Describes the transmission lines with equivalent circuit and explain their characteristic with various lengths. (L2)

UNIT - I	**Static Electric Fields**

Recap of Vector Analysis: Coordinate systems and transformation-Cartesian, Cylindrical and Spherical coordinates
Recap of Vector Calculus: Differential length area and volume, line surface and volume integrals, Del operator, gradient, divergent and curl operations.
Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Divergence Theorem, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT - II	**Static Magnetic Fields & Time varying Fields**

Magnetic Fields: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Magnetic dipole, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.
Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's equations for time varying fields, Maxwell's Equations in Different Final Forms and Word Statements, Illustrative Problems

UNIT - III	**Boundary Conditions and Uniform Plane Wave**

Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Wave Equations for Conducting and Perfect Dielectric Media. **Uniform Plane Waves** – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Illustrative Problems.

UNIT - IV	**Reflection and Refraction of Plane Waves**

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(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

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

UNIT - V	**Transmission Lines**

Transmission Lines: Introduction, Transmission line parameters, Transmission line equivalent circuit, Transmission line equations and their solutions in their phasor form, input impedance, standing wave ratio, Transmission of finite length- half wave, quarter wave transmission line, Smith chart, graphical analysis of transmission lines using Smith chart, stub matching- single and double stub matching, Illustrative Problems.

Textbooks:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics", 4th edition. Oxford Univ. Press, 2008.
2. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics", 7thedition.,TMH, 2006.

Reference Books:

1. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2000.
2. John D. Krauss, "Electromagnetics", 4th Edition, McGraw- Hill publication, 1999.
3. Electromagnetics, Schaum's outline series, 2nd Edition, Tata McGraw-Hill publications, 2006.

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(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	COMMUNICATION SYSTEMS		L	T	P	C
20A04402T			3	0	0	3
Pre-requisite	Signals & Systems	Semester	IV			

Course Objectives:

- To introduce various modulation and demodulation techniques of analog and digital communication systems.
- To analyze different parameters of analog and digital communication techniques.
- To Know Noise Figure in AM & FM receiver systems.
- To understand Function of various stages of AM, FM transmitters and Know Characteristics of AM &FMreceivers.
- To analyze the performance of various digital modulation techniques in the presence of AWGN.
- To evaluate the performance of each modulation scheme to know the merits and demerits interms of bandwidth and power efficiency

Course Outcomes (CO):

CO1: Recognize/List the basic terminology used in analog and digital communication techniques for transmission of information/data.
CO2: Explain/Discuss the basic operation of different analog and digital communication systems at baseband and passband level.
CO3: Compute various parameters of baseband and passband transmission schemes by applying basic engineering knowledge.
CO4: Analyze/Investigate the performance of different modulation & demodulation techniques to solve complex problems in the presence of noise.
CO5: Evaluate/Assess the performance of all analog and digital modulation techniques to know the merits and demerits of each one of them in terms of bandwidth and power efficiency.

UNIT - I	Continuous Wave Modulation	15 Hrs

Introduction: The communication Process, Communication Channels, Baseband and Passband Signals, Analog vs Digital Communications, Need for the modulation.
Amplitude Modulation(AM): AM and its modifications – DSB, SSB,VSB. Frequency Translation, Frequency Division Multiplexing (FDM).
Angle Modulation:Frequency Modulation(FM), Phase Modulation, PLL, Nonlinear Effects in FM, Superheterodyne Receivers.

UNIT - II	Noise and Pulse Modulation	12 Hrs

Introduction to Noise: Types of Noise, Receiver Model,Noise in AM, DSB, SSB, and FM Receivers, Pre-Emphasis and De-emphasis in FM.
Introduction to Pulse Modulation: The Sampling Process, PAM, TDM, Bandwidth-Noise Trade off, Quantization process, PCM, Noise considerations in PCM systems, Delta Modulation, DPCM, Coding speech at low bit rates.

UNIT - III	Baseband Pulse Transmission	10 Hrs

Introduction, Matched Filter, Properties of Matched Filter, Error rate due to noise, Inter Symbol Interference (ISI), Nyquist Criterion for distortion less baseband binary transmission, Correlative level coding, Baseband M-ary PAM transmission, QAM, MAP and ML decoding, Equalization, Eye pattern.

UNKT - IV	Digital Passband Transmission	8 Hrs

Introduction, Passband Transmission Model, Gram-Schmidt Orthogonalization Procedure, Geometric Interpretation of Signals, Response of bank of correlators in noise, Correlation receiver, Probability of Error, Detection of Signals with unknown phase.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

UNIT - V	Digital Modulation Schemes & Information Theory	12 Hrs
Coherent Digital Modulation Schemes – ASK, BPSK, BFSK, QPSK, Non-coherent BFSK, DPSK. M-ary Modulation Techniques, Power Spectra, Bandwidth Efficiency, Timing and Frequency synchronization. Information theory: Entropy, Mutual Information and Channel capacity theorem.		
Textbooks:		
1. Simon Haykin, "Communication Systems", JohnWiley& Sons, 4th Edition, 2004. 2. B. P. Lathi, Zhi Ding " Modern Digital and Analog Communication Systems", Oxford press, 2011.		
References:		
1.Sam Shanmugam, "Digital and Analog Communication Systems",JohnWiley& Sons, 1999. 2. Bernard Sklar, F. J. harris"Digial Communications: Fundamentals andApplications", Pearson Publications, 2020. 3. Taub and Schilling, " Principles of Communication Systems", Tata McGraw Hill, 2007.		

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(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	LINEAR AND DIGITAL IC APPLICATIONS		L	T	P	C
20A04403T			3	0	0	3
Pre-requisite	Analog circuits, Digital Logic Design	Semester	IV			

Course Objectives:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of PLL.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- Exposure to digital IC's

Course Outcomes (CO):

CO1: List out the characteristics of Linear and Digital ICs.
CO2: Discuss the various applications of linear & Digital ICs.
CO3: Solve the application based problems related to linear and digital ICs.
CO4: Analyze various applications based circuits of linear and digital ICs.
CO5: Design the circuits using either linear ICs or Digital ICs from the given specifications.

UNIT – I ICs and OP- AMPS

INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER: Introduction, Classification of IC's, IC chip size and circuit complexity, basic information of Op-Amp IC741 Op-Amp and its features, the ideal Operational amplifier, Op-Amp internal circuit, Op-Amp characteristics - DC and AC.

UNIT – II **Applications of OP- AMP**

LINEAR APPLICATIONS OF OP-AMP: Inverting and non-inverting amplifiers, adder, subtractor, Instrumentation amplifier, AC amplifier, V to I and I to V converters, Integrator and differentiator.

NON-LINEAR APPLICATIONS OF OP-AMP: Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger, Multivibrators, Triangular and Square waveform generators, Oscillators

UNIT - III **Active Filters and other ICs**

ACTIVE FILTERS: Introduction, Butterworth filters – 1st order, 2nd order low pass and high pass filters, band pass, band reject and all pass filters.

TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, description of functional diagram, monostable and astable operations and applications, Schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566), low pass filter, monolithic PLL and applications of PLL.

UNIT – IV **Voltage Regulators and Converters**

VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators, Switching Regulator.

D to A AND A to D CONVERTERS: Introduction, basic DAC techniques - weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A to D converters - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

UNIT - V Digital ICs

CMOS LOGIC: CMOS logic levels, MOS transistors, Basic CMOS Inverter, NAND and NOR gates, CMOS AND-OR-INVERT and OR-AND-INVERT gates, implementation of any function using CMOS logic.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

COMBINATIONAL CIRCUITS USING TTL 74XX ICS: Study of logic gates using 74XX ICs, Four-bit parallel adder (IC 7483), Comparator (IC 7485), Decoder (IC74138, IC 74154), BCD-to-7-segment decoder (IC 7447), Encoder (IC 74147), Multiplexer (IC 74151), Demultiplexer (IC74154). **SEQUNTIAL CIRCUITS USING TTL 74XX ICS:** Flip Flops (IC 7474, IC 7473), Shift Registers, Universal Shift Register (IC 74194), 4- bit asynchronous binary counter (IC 7493).
Textbooks:
1. D. Roy Choudhury, Shail B. Jain, "Linear Integrated Circuit", 4th edition (2012), New Age International Pvt.Ltd., New Delhi, India 2. Ramakant A. Gayakwad, "OP-AMP and Linear Integrated Circuits", 4th edition (2012), Prentice Hall / Pearson Education, New Delhi. Floyd, Jain, "Digital Fundamentals", 8th edition (2009), Pearson Education, New Delhi.
References:
1. Sergio Franco (1997), Design with operational amplifiers and analog integrated circuits, McGraw Hill, New Delhi. 2. Gray, Meyer (1995), Analysis and Design of Analog Integrated Circuits,Wiley International, New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code		DIGITAL LOGIC DESIGN LAB (Common to ECE and EEE)	L	T	P	C
20A04303P			0	0	3	1.5
Pre-requisite	NIL		Semester	IV		

Course Objectives:

- To understand various pin configurations of the Digital ICs used in the laboratory
- To conduct the experiments and verify the truth tables of various logic circuits.
- To analyze the logic circuits
- To design sequential and combinational logic circuits and verify their properties.
- To design of any sequential/combinational circuit using Hardware Description Language.

Course Outcomes (CO):

CO1: Understand the pin configuration of various digital ICs used in the lab
CO2: Conduct the experiment and verify the properties of various logic circuits.
CO3: Analyze the sequential and combinational circuits.
CO4: Design of any sequential/combinational circuit using Hardware/ HDL.

List of Experiments:

1. Verification of truth tables of the following Logic gates
   Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR
2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
3. Verification of functional table of 3 to 8-line Decoder /De-multiplexer
4. 4variable logic function verification using 8 to1 multiplexer.
5. Design full adder circuit and verify its functional table.
6. Verification of functional tables of (i) JK Edge triggered Flip–Flop (ii) JK Master Slav Flip–Flop (iii) D Flip-Flop
7. Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output
8. Design a four bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output
9. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
10. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms.
11. Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.
12. (a) Draw the circuit diagram of a single bit comparator and test the output
    (b) Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.

ADD on Experiments:

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

References:

M. Morris Mano, "Digital Design", 3rd Edition, PHI

Online learning resources/virtual labs:
https://www.vlab.co.in/

Course Code	COMMUNICATION SYSTEMS LAB	L	T	P	C

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

20A04402P			0	0	3	1.5
Pre-requisite	**NIL**	**Semester**	**IV**			

Course Objectives:

- To understandthe basics of analog and digital modulation techniques.
- To Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course.
- To design and implement different modulation and demodulation techniques and their applications.
- To develop cognitive and behavioral skills for performance analysis of various modulation techniques.

Course Outcomes (CO):

CO1: Know about the usage of equipment/components/software tools used to conduct the experiments in analog and digital modulation techniques.
CO2: Conduct the experiment based on the knowledge acquired in the theory about modulation and demodulation schemes to find the important metrics of the communication system experimentally.
CO3: Analyze the performance of a given modulation scheme to find the important metrics of the system theoretically.
CO4: Draw the relevant graphs between important metrics of the system from the observed measurements.
CO5: Compare the experimental results with that of theoretical ones and infer the conclusions.

List of Experiments:

Design the circuits and verify the following experiments taking minimum of six from each section shown below.

Section-A

1. AM Modulation and Demodulation
2. DSB-SC Modulation and Demodulation
3. Frquency Division Multiplexing
4. FM Modulation and Demodulation
5. Radio receiver measurements
6. PAM Modulation and Demodulation
7. PWM Modulation and Demodulation
8. PPM Modulation and Demodulation

Section-B

1. Sampling Theorem.
2. Time Division Multiplexing
3. Delta Modulation and Demodulation
4. PCM Modulation and Demodulation
5. BASK Modulation and Demodulation
6. BFSK Modulation and Demodulation
7. QPSK Modulation and Demodulation
8. DPSK Modulation and Demodulation

Note: Faculty members (who are handling the laboratory) are requested to instruct the students not to use readymade kits for conducting the experiments. They are advised to make the students work in the laboratory by constructing the circuits and analysing them during the lab sessions.

Online learning resources/virtual labs:
https://www.vlab.co.in/

Course Code		L	T	P	C

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

20A04403P	**LINEAR AND DIGITAL IC APPLICATIONS LAB**		**0**	**0**	**3**	**1.5**
Pre-requisite	Analog Circuits Lab, Digital Logic Design Lab	**Semester**	**IV**			

Course Objectives:

The objective of the course is to learn design, testing and characterizing of circuit behaviour with digital and analog ICs.

Course Outcomes (CO):

CO1: Understand the pin configuration of each linear/ digital IC and its functional diagram.
CO2: Conduct the experiment and obtain the expected results.
CO3: Analyze the given circuit/designed circuit and verify the practical observations with the analyzed results.
CO4: Design the circuits for the given specifications using linear and digital ICs.
CO5: Acquaintance with lab equipment about the operation and its use.

List of Experiments:

PART – I: Linear IC Experiments

1. OP AMP Applications – Adder, Subtractor, Comparators.
2. Integrator and Differentiator Circuits using IC 741.
3. Active Filter Applications – LPF, HPF (first order)
4. IC 741 Waveform Generators – Sine, Square wave and Triangular waves.
5. IC 555 Timer – Monostable and Astable Multivibrator Circuits.
6. Schmitt Trigger Circuits – using IC 741
7. IC 565 – PLL Applications.
8. Voltage Regulator using IC 723, Three Terminal Voltage Regulators – 7805, 7809, 7912.

PART – II: Digital IC Applications

1. 3-8 decoder using 74138
2. 4-bit comparator using 7485.
3. 8*1 Multiplexer using 74151 and 2*4 Demultiplexer using 74155.
4. D, JK Flip Flops using 7474, 7483.
5. Decade counter using 7490.
6. UP/DOWN counter using 74163
7. Universal shift registers using 74194/195.
8. RAM (16*4) using 74189 (Read and Write operations).

Note: At least 12 experiments shall be performed.

References:

1. D. Roy Choudhury, Shail B. Jain, “Linear Integrated Circuit”, 4th edition (2012), New Age International Pvt.Ltd., New Delhi, India
2. Ramakant A. Gayakwad, “OP-AMP and Linear Integrated Circuits”, 4th edition (2012), Prentice Hall / Pearson Education, New Delhi.
3. Floyd, Jain, “Digital Fundamentals”, 8th edition (2009), Pearson Education, New Delhi.

Online Learning Resources/Virtual Labs:

https://www.vlab.co.in/

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	Soft Skills		L	T	P	C
20A52401			1	0	2	2
Pre-requisite	NIL	Semester	IV			

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To develop leadership skills and organizational skills through group activities
- To function effectively with heterogeneous teams

Course Outcomes (CO):

By the end of the program students should be able to

- Memorize various elements of effective communicative skills
- Interpret people at the emotional level through emotional intelligence
- apply critical thinking skills in problem solving
- analyse the needs of an organization for team building
- Judge the situation and take necessary decisions as a leader
- Develop social and work-life skills as well as personal and emotional well-being

UNIT – I	Soft Skills & Communication Skills	10 Hrs

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intrapersonal & Inter-personal skills - Verbal and Non-verbal Communication

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self- expression – articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

UNIT – II	Critical Thinking	10 Hrs

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT – III	Problem Solving & Decision Making	10 Hrs

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution –
Methods of decision making – Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

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(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

UNIT – IV	**Emotional Intelligence & Stress Management**	**10 Hrs**

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:
Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.
Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT – V	**Leadership Skills**	**10 Hrs**

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk-Taking - Team Building - Time Management

Activities:
Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

NOTE-:
1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.

Textbooks:

1. Personality Development and Soft Skills (English, Paperback, Mitra Barun K.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha KapoorPublisher : I K International Publishing House; 0 edition (February 28, 2018)

Reference Books:

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018.
2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India

Online Learning Resources:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

Course Code	Design Thinking for Innovation (Common to All branches of Engineering)		L	T	P	C
20A99401			2	1	0	0
Pre-requisite	NIL	Semester	IV			

Course Objectives:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes (CO):

- Define the concepts related to design thinking.
- Explain the fundamentals of Design Thinking and innovation
- Apply the design thinking techniques for solving problems in various sectors.
- Analyse to work in a multidisciplinary environment
- Evaluate the value of creativity
- Formulate specific problem statements of real time issues

UNIT - I	Introduction to Design Thinking	10 Hrs

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

UNIT - II	Design Thinking Process	10 Hrs

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

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

UNIT - III	Innovation	8 Hrs

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

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

UNIT - IV	Product Design	8 Hrs

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

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

UNIT - V	Design Thinking in Business Processes	10 Hrs

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

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

Textbooks:

1. Change by design, Tim Brown, Harper Bollins (2009)
2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

Reference Books:

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

1. Design Thinking in the Classroom by David Lee, Ulysses press 2. Design the Future, by Shrrutin N Shetty, Norton Press 3. Universal principles of design- William lidwell, kritinaholden, Jill butter. 4. The era of open innovation – chesbrough.H
Online Learning Resources:
https://nptel.ac.in/courses/110/106/110106124/ https://nptel.ac.in/courses/109/104/109104109/ https://swayam.gov.in/nd1_noc19_mg60/preview

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Electronics & Communication Engineering

COMMUNITY SERVICE PROJECT

……Experiential learning through community engagement

Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of the society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

- Every student should put in a 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc
- A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty incharge.

- Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programmes of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
    - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
    - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
        - Agriculture
        - Health
        - Marketing and Cooperation
        - Animal Husbandry
        - Horticulture
        - Fisheries
        - Sericulture
        - Revenue and Survey
        - Natural Disaster Management
        - Irrigation
        - Law & Order
        - Excise and Prohibition
        - Mines and Geology
        - Energy
        - Internet
        - Free Electricity
        - Drinking Water

EXPECTED OUTCOMES
BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

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Electronics & Communication Engineering

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals
- New energy, enthusiasm and perspectives applied to community work
- Enhanced community-university relations.

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SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

For Engineering Students

1. **Water facilities and drinking water availability**
2. **Health and hygiene**
3. **Stress levels and coping mechanisms**
4. **Health intervention programmes**
5. **Horticulture**
6. **Herbal plants**
7. **Botanical survey**
8. **Zoological survey**
9. **Marine products**
10. **Aqua culture**
11. **Inland fisheries**
12. **Animals and species**
13. **Nutrition**
14. **Traditional health care methods**
15. **Food habits**
16. **Air pollution**
17. **Water pollution**
18. **Plantation**
19. **Soil protection**
20. **Renewable energy**
21. **Plant diseases**
22. **Yoga awareness and practice**
23. **Health care awareness programmes and their impact**
24. **Use of chemicals on fruits and vegetables**
25. **Organic farming**
26. **Crop rotation**
27. **Floury culture**
28. **Access to safe drinking water**
29. **Geographical survey**
30. **Geological survey**
31. **Sericulture**
32. **Study of species**

33. **Food adulteration**
34. **Incidence of Diabetes and other chronic diseases**
35. **Human genetics**
36. **Blood groups and blood levels**
37. **Internet Usage in Villages**
38. **Android Phone usage by different people**
39. **Utilisation of free electricity to farmers and related issues**
40. **Gender ration in schooling lvel- observation.**

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programmes are;

Programmes for School Children

1. Reading Skill Programme (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Programme on Socially relevant themes.

Programmes for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Womens' Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programmes on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programmes for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco

4. Awareness on Competitive Examinations
5. Personality Development

Common Programmes

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programmes in consonance with the Govt. Departments like –
    i. Agriculture
    ii. Health
    iii. Marketing and Cooperation
    iv. Animal Husbandry
    v. Horticulture
    vi. Fisheries
    vii. Sericulture
    viii. Revenue and Survey
    ix. Natural Disaster Management
    x. Irrigation
    xi. Law & Order
    xii. Excise and Prohibition
    xiii. Mines and Geology
    xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also with the Governmental Departments. If the programme is rolled out, the District Administration could be roped in for the successful deployment of the programme.
- An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.

- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secreteriats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks work to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University.

  Throughout the Community Service Project, a daily log-book need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.