JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE AND SYLLABUS

For UG – R20

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

(Applicable for batches admitted from 2020-2021)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA - 533 003, ANDHRA PRADESH, INDIA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE

I Year –I SEMESTER

S. No.	Category	Subjects	L	T	P	Credits
1	HS	Communicative English	3	0	0	3
2	BS	Mathematics –I(Calculus)	3	0	0	3
3	BS	Applied Chemistry	3	0	0	3
4	ES	Programming for Problem Solving Using C	3	0	0	3
5	BS	Engineering Drawing	2	0	2	3
6	LC	English Communication Skills Laboratory	0	0	3	1.5
7	LC	Applied Chemistry Lab	0	0	3	1.5
8	LC	Programming for Problem Solving Using C Lab	0	0	3	1.5
					Total Credits	**19.5**

I Year – II SEMESTER

S. No	Category	Subjects	L	T	P	Credits
1	BS	Mathematics –II (Linear Algebra and Numerical Methods)	3	0	0	3
2	BS	Applied Physics	3	0	0	3
3	ES	Object Oriented Programming through Java	2	0	2	3
4	ES	Network Analysis	3	0	0	3
5	ES	Basic Electrical Engineering	3	0	0	3
6	LC	Electronic workshop Lab	0	0	3	1.5
7	LC	Basic Electrical Engineering Lab	0	0	3	1.5
8	LC	Applied Physics Lab	0	0	3	1.5
9	MC	Environmental Science	3	0	0	0.0
					Total Credits	**19.5**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

II Year –I Semester

S. No	Category	Name of the Subject	L	T	P	Credits
1	PC	Electronic Devices and Circuits	3	1	0	3
2	PC	Switching Theory and Logic Design	3	1	0	3
3	PC	Signals and Systems	3	1	0	3
4	BS	Mathematics-III (Transforms and Vector Calculus)	3	1	0	3
5	BS	Random Variables and Stochastic Processes	3	1	0	3
6	LC	OOPS through Java Lab	0	0	2	1.5
7	LC	Electronic Devices and Circuits -Lab	0	0	2	1.5
8	LC	Switching Theory and Logic Design–Lab	0	0	2	1.5
9	SC	Python Programming	0	0	4	2
					Total Credits	**21.5**

II Year – II Semester

S. No	Category	Name of the subject	L	T	P	Credits
1	PC	Electronic Circuit Analysis	3	1	0	3
2	PC	Digital IC Design	3	1	0	3
3	PC	Analog Communications	3	0	0	3
4	ES	Linear control Systems	3	1	0	3
5	HS	Management and Organizational Behavior	3	0	0	3
6	LC	Electronic Circuit Analysis Lab	0	0	3	1.5
7	LC	Analog Communications Lab	0	0	3	1.5
8	LC	Digital IC Design Lab	0	0	3	1.5
9	SC	Soft Skills	0	0	4	2
10	MC	Constitution of India	3	0	0	0
					Total Credits	**21.5**
		Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				**4**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

III Year - I Semester

S. No	Category	Name of the subject	L	T	P	Credits
1	PC	Analog ICs and Applications	3	0	0	3
2	PC	Electromagnetic Waves and Transmission Lines	3	0	0	3
3	PC	Digital Communications	3	0	0	3
4	OE1	Open Elective Course/Job oriented elective-1	2	0	2	3
5	PE1	Professional Elective courses -1	3	0	0	3
6	LC	Analog ICs and Applications LAB	0	0	3	1.5
7	LC	Digital Communications Lab	0	0	3	1.5
8	SC	Data Structures using Java Lab	0	0	4	2
9	MC	Indian Traditional Knowledge	2	0	0	0
	Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester		0	0	0	1.5
					Total credits	**21.5**
	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)					**4**

PE1:	OE1:
1. Antenna and Wave Propagation 2. Electronic Measurements and Instrumentation 3. Computer Architecture & Organization	Candidate should select the subject from list of subjects offered by other departments

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

III Year –II Semester

S. No	Category	Name of the subject	L	T	P	Credits
1	PC	Microprocessor and Microcontrollers	3	1	0	3
2	PC	VLSI Design	3	0	0	3
3	PC	Digital Signal Processing	3	0	0	3
4	PE2	Professional Elective courses - 2	3	0	0	3
5	OE 2	Open Elective Course/Job oriented elective -2	2	0	2	3
6	LC	Microprocessor and Microcontrollers - Lab	0	0	3	1.5
7	LC	VLSI Design Lab	0	0	3	1.5
8	LC	Digital Signal Processing Lab	0	0	3	1.5
9	SC	ARM based/ Aurdino based Programming	1	0	2	2
10	MC	Research Methodology	2	0	0	0
					Total credits	**21.5**
	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)					**4**

Industrial/Research Internship (Mandatory) 2 Months during summer vacation

PE2:	OE2:
1.Microwave Engineering 2.Mobile & Cellular Communication 3.Embedded Systems 4.CMOS Analog IC Design	Candidate should select the subject from list of subjects offered by other departments

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IV Year –I Semester

S. No	Category	Name of the subject	L	T	P	Credits
1	PE	Professional Elective courses -3	3	0	0	3
2	PE	Professional Elective courses -4	3	0	0	3
3	PE	Professional Elective courses -5	3	0	0	3
4	OE	Open Elective Courses/ Job oriented elective -3	2	0	2	3
5	OE	Open Elective Courses/ Job oriented elective -4	2	0	2	3
6	HS	***Humanities and Social Science Elective**	3	0	0	3
7	SC	**Designer tools (HFSS,** Microwave Studio CST. Cadence Virtuoso. Synopsys, Mentor Graphics, Xilinx.)	1	0	2	2
Industrial/Research Internship 2 Months (Mandatory) afterthird year (to be evaluated during VII semester			0	0	0	3
					Total credits	**23**
		Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				**4**

PE 3: 1. Optical Communication 2. Digital Image Processing 3. Low Power VLSI Design	PE5: 1. Radar engineering 2.Pattern recognition & Machine Learning 3.Internet of Things
PE4: 1.Satellite Communications 2.Soft Computing Techniques 3.Digital IC Design using CMOS	

IV Year – II Semester

S. No.	Category	Code	Course Title	Hours per week			Credits
1	Major Project	PROJ	Project work, seminar and internship inindustry	-	-	-	12
INTERNSHIP (6 MONTHS)							
						Total credits	**12**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SUBJECTS FOR
HONORS

POOL-1

Instrumentation and Control Systems: (any four of the following subjects which are not chosen as professional electives are to be considered for Honors Degree)

S. No.	Subject	L-T-P	Credits
1	Data Acquisition systems	3-1-0	4
2	Adaptive Control Systems	3-1-0	4
3	Bio-Medical Instrumentation	3-1-0	4
4	Digital Control Systems	3-1-0	4
5	Process Control Instrumentation	3-1-0	4
6	Transducers & sensors	3-1-0	4
7	MEMS	3-1-0	4
8	Intelligent & Smart Instrumentation	3-1-0	4
In addition to any of the four subjects, MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each) are compulsory in the domain of Electronics and Communication Engineering			

POOL-2

Integrated circuits and Systems: (any four of the following subjects which are not chosen asprofessional electives are to be considered for Honors Degree)

S. No	Subject	L-T-P	Credits
1	VLSI Technology and Design	3-1-0	4
2	CMOS Analog IC Design	3-1-0	4
3	CMOS Digital IC design	3-1-0	4
4	Design for Testability	3-1-0	4
5	System on Chip	3-1-0	4
6	Programmable Logic Devices and ASIC	3-1-0	4
7	Scripting Language	3-1-0	4
8	Low Power VLSI Design	3-1-0	4
In addition to any of the four subjects, MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each) are compulsory in the domain of Electronics and Communication Engineering			

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

POOL-3

Communication Engineering: (any four of the following subjects which are not chosen as a professional electives are to be considered for Honors Degree)

S. No	Subject	L-T-P	Credits
1	Wireless Sensor Networks	3-1-0	4
2	Software defined radio	3-1-0	4
3	Data Communications & Computer Networks	3-1-0	4
4	Cognitive radio	3-1-0	4
5	5G Communications	3-1-0	4
6	Satellite communication	3-1-0	4
7	Optical Communication	3-1-0	4
8	Global navigational satellite systems	3-1-0	4
In addition to any of the four subjects, MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each) are compulsory in the domain of Electronics and Communication Engineering			

POOL-4

Digital Signal processing (any four of the following subjects which are not chosen as professional electives are to be considered for Honors Degree)

S. No	Subject	L-T-P	Credits
1	Speech Signal Processing	3-1-0	4
2	Video Signal Processing	3-1-0	4
3	Adaptive Signal Processing	3-1-0	4
4	Bio- Medical Signal Processing	3-1-0	4
5	DSP Processors and Architectures	3-1-0	4
6	Wavelet Theory	3-1-0	4
7	Multirate Systems And Filter Banks	3-1-0	4
8	Mathematical methods for signal processing	3-1-0	4
In addition to any of the four subjects Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)			

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:: KAKINADA
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

GENERAL MINOR TRACKS

S. No.	Subject	L-T-P	Credits
1	Electronics Devices and Basic Circuits	3-1-0	4
2	Digital Electronics	3-1-0	4
3	Principles of Communication	3-1-0	4
4	Signal Analysis	3-1-0	4
In addition to any of the four subjects, MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each) are compulsory in the domain of Electronics and Communication Engineering			

List of the **OPEN ELECTIVES** offered by **ECE** Department to **other Branches**:

1. Basics of Signals and Systems
2. Electronic Measurements and Instrumentation
3. Principles of Signal Processing
4. Industrial Electronics
5. Consumer Electronics
6. Fundamentals of Microprocessors and Microcontrollers
7. Transducers and Sensors
8. IOT and Applications
9. Soft Computing Techniques
10. IC Applications
11. Principles of Communications
12. Basic Electronics
13. Data Communications
14. Digital Logic design
15. Remote Sensing and GIS
16. Bio Medical Instrumentation

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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

Course Objectives:
- To instruct the concept of Matrices in solving linear algebraic equations
- To elucidate the different numerical methods to solve nonlinear algebraic equations
- To disseminate the use of different numerical techniques for carrying out numerical integration.
- 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.

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)
- solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
- evaluate the approximate roots of polynomial and transcendental equations by different algorithms (L5)
- apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
- apply numerical integral techniques to different Engineering problems (L3)
- apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3)

UNIT – I: Solving systems of linear equations, Eigen values and Eigen vectors: (10hrs)
Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss Eliminationmethod – Eigen values and Eigen vectors and properties (article-2.14 in text book-1).

Unit – II: Cayley–Hamilton theorem and Quadratic forms: (10hrs)
Cayley-Hamilton theorem (without proof) – Applications – Finding the inverse and power of a matrix by Cayley-Hamilton theorem – Reduction to Diagonal form – Quadratic forms and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation. Singular values of a matrix, singular value decomposition (text book-3).

UNIT – III: Iterative methods: (8 hrs)
Introduction– Bisection method–Secant method – Method of false position– Iteration method – Newton-Raphson method (One variable and simultaneous Equations) – Jacobi and Gauss-Seidel methods for solving system of equations numerically.

UNIT – IV: Interpolation: (10 hrs)
Introduction– Errors in polynomial interpolation – Finite differences– Forward differences– Backward differences –Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula– Newton's divide difference formula.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIT – V: Numerical differentiation and integration, Solution of ordinary differential equations with initial conditions: **(10 hrs)**

Numerical differentiation using interpolating polynomial – Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rule– Solution of initial value problems by Taylor's series– Picard's method of successive approximations– Euler's method – Runge-Kutta method (second and fourth order).

Text Books:
1. **B. S. Grewal,** Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
3. **David Poole,** Linear Algebra- A modern introduction, 4th Edition, Cengage.

Reference Books:
1. **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering and Science,Tata Mc. Graw Hill Education.
2. **M. K. Jain, S.R.K. Iyengar and R.K. Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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

APPLIED PHYSICS

Unit-I: Wave Optics 12hrs

Interference: Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating(Qualitative).

Polarization: Introduction-Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

Unit Outcomes:

The students 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 andFiberoptics *8hrs*

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping mechanisms – Ruby 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 - Applications.

Unit Outcomes:

The students 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)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Unit III: Quantum Mechanics, Free Electron Theory andBand theory   *10hrs*

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

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory- Fermi**-**Dirac distribution- Density of states (3D) - Fermi energy.

Band theory of Solids: Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - v vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

Unit Outcomes:
The students 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-Pmodel
- ➢ **Classify** the materials based on band theory(L2)
- ➢ **Apply** the concept of effective mass of electron(L3)

Unit-IV: Dielectric andMagneticMaterials   *8hrs*

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

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

Unit Outcomes:

The students 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 indielectrics(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 data storage devices(L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Unit – V: SemiconductorsandSuperconductors   *10hrs*

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

Unit Outcomes:
The students 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)
➢ **Classify** superconductors based on Meissner's effect(L2)
➢ **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors(L2)

Text books:
1. M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy" A Text book ofEngineering Physics"- S.Chand Publications, 11th Edition2019.

2. Engineering Physics" by D.K.Bhattacharya and Poonam Tandon, Oxford press(2015).

3. Applied Physics by P.K.Palanisamy SciTechpublications.

Reference Books:
1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley&Sons
2. Engineering Physics by M.R.Srinivasan, New Age international publishers(2009).
3. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education,2018
4. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, UniversityPress
5. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc GrawHill
6. B.K. Pandey and S. Chaturvedi, Engineering Physics, CengageLearning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

I Year - II Semester		L	T	P	C
		2	0	2	3
OBJECT ORIENTED PROGRAMMING THROUGH JAVA					

Course Objectives:

This subject will help to improve

- the analytical skills of object orientedprogramming
- Overall development of problem solving and criticalanalysis.
- Formal introduction to Java programminglanguage

Course Outcomes:

On successful completion of this course, the student should be able to:

- Show competence in the use of the Java programming language in the development of small to medium- sized application programs that demonstrate professionally acceptable coding and performancestandard
- Illustrate the basic principles of the object-orientedprogramming
- Demonstrate an introductory understanding ofgraphical user interfaces, multithreaded programming, and event-drivenprogramming.

Unit I

Introduction to Java : Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

Objects and Classes : Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

Unit II

Inheritance and Polymorphism : Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTILpackage.

Unit III

Event and GUI programming : Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Creating a swing applet, swing controls and components.

Unit IV

I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. Event driven model, handling events

Unit V

Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Text Books:
1) Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition,Pearson.
2) Programming in Java, SachinMalhotra&SaurabhChaudhary, Oxford University Press.

Reference Books:
1) Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman,SPD.
2) Core Java Volume-I Fundamentals, Eight Edition, Horstmann& Cornell, Pearson Education.
3) The Complete Reference, Java 2 (Fourth Edition), Herbert Schild,TMH. Java Programming, D. S. Malik, CengageLearning.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

I Year - II Semester		L	T	P	C
		3	0	0	3
	NETWORK ANALYSIS				

UNIT – I

Introduction to Electrical Circuits : Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources also. (Text Books: 1,2,3, Reference Books: 3)

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

Network Topology: Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule. (Text Books: 2,3, Reference Books: 3)

UNIT – II

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method. (Text Books: 1,2,3, Reference Books: 1,3)

UNIT – III

Steady State Analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-L- C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving. (Text Books: 1,2, Reference Books: 3)

Coupled Circuits : Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.

UNIT – IV

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth ofparallel resonance, general case-resistance present in both branches, anti resonance at all frequencies. (Text Books:2,3, Reference Books: 3)

Network Theorems: Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition,Max Power Transfer, Tellegens- problem solving using dependent sources also. (Text Books: 1,2,3, ReferenceBooks:2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIT – V

Two-port Networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. (Text Books: 1,2, Reference Books: 1,3)

TEXT BOOKS:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rdEdition,2000.
2. Network Analysis by K.Satya Prasad and S Sivanagaraju,CengageLearning
3. Electric Circuit Analysis by Hayt andKimmarle,TMH

REFERENCES:

1. Network lines and Fields by John. D. Ryder 2ndedition, Asiapublishinghouse.
2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
3. Network Analysis and Filter Design by Chadha,UmeshPublications.

COURSE OBJECTIVES:

- To understand the basic concepts on RLC circuits.
- To know the behavior of the steady states and transients states inRLCcircuits.
- To know the basic Laplace transforms techniques inperiods'waveforms.
- To understand the two portnetworkparameters.
- To understand the properties of LC networksandfilters.

COURSE OUTCOME:

- gain the knowledge on basic networkelements.
- will analyze the RLC circuits behaviorindetailed.
- analyze the performance of periodicwaveforms.
- gain the knowledge in characteristics of two port network parameters (Z,Y,ABCD,h&g).
- analyze the filter design concepts in realworldapplications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

I Year - II Semester		L	T	P	C
		3	0	0	3
	BASIC ELECTRICAL ENGINEERING				

Preamble:
This course covers various topics related to principle of operation and performance of various electrical machines.

Course Educational Objectives:
- To understand the principle of operation, constructional details andoperational characteristics ofDCgenerators.
- To understand the principle of operation, characteristics of DC motor. Methodsof starting and speed control methods ofDCmotors.
- To learn the constructional details, principle of operation and performanceof transformers.
- To study the principle of operation, construction and details ofsynchronousmachines.
- To learn the principle of operation, constructional details, performance, torque – slip characteristics and starting methods of 3-phaseinductionmotors.

Unit I
DC Machines
Principle of operation of DC generator – emf equation – types of DC machines – torque equation of DC motor – applications – three point starter - losses and efficiency - swinburne's test - speed control methods – OCC of DC generator- Brake test on DC Shunt motor- numerical problems

Unit II
Transformers
Principle of operation of single phase transformer constructional features – EMF equation – Losses and efficiency of transformer- regulation of transformer – OC & SC tests predetermination of efficiency and regulations – Sumpner's test-NumericalProblems.

Unit III
Synchronous Generators
Principle of operation and construction of alternators – types of alternators Regulation of alternator by synchronous impedance method-EMF equation of three phase alternator

Synchronous Motors
Construction of three phase synchronous motor - operating principle –equivalent circuit of synchronous motor.

Unit IV
Induction Machine: Principle of operation and construction of three-phase induction motors – slip ring and squirrel cage motors – slip-torque characteristics – efficiency calculation – starting methods-Brake test on 3-Phase Induction Motor.

Unit V
Special Machines: Principle of operation and construction - single phase induction motor - shaded pole motors – capacitor motors and AC servomotor.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Course Outcomes:
- Able to explain the operation of DC generator and analyze the characteristics of DC generator.
- Able to explain the principle of operation of DC motor and analyze theircharacteristics. Acquire the skills to analyze the starting and speed control methods ofDCmotors.
- Ability to analyze the performance and speed – torque characteristics of a3-phase induction motor and understand starting methods of 3-phaseinductionmotor.
- Able to explain the operation ofSynchronousMachines
- Capability to understand the operation of variousspecialmachines.

TEXT BOOKS:
1. Principles of Electrical Machines by V.K. Mehta &Rohit Mehta,S.Chandpublications
2. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria&Sons

REFERENCE BOOKS:
1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition
3. Basic Electrical Engineering by Nagsarkar,Sukhija, Oxford Publications, 2ndedition

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

I Year - II Semester		L	T	P	C
		0	0	3	1.5
	ELECTRONIC WORKSHOP LAB				

I.   Identificationofcomponents
II.   Laboratoryequipment
III.   Solderingpractice
IV.   PCBLayout
V.   TestingofComponents
VI.   CRO

I.   *Identificationofcomponents:*

- Resistors:- Types of Resistors, Value of Resistance using colorcode,DRBS.
- Capacitors:- Types of capacitors, value of capacitance using colorcode,DCBS.
- Inductors:- Types ofInductors,DLB
- Rheostats:- Types of Rheostats, Types ofpotentiometers,Relays.
- Switches:- TypesofSwitches.
- Cables: TypesofCables.
- Types ofInstrumentsused.

Identification of active elements.

   (Two Terminal, Three Terminal Devices)
- (SC diode, Zenerdiode,D.AC)
- Three Terminal Devices: BJT, UJT, SCR, FET,MOSFET,TRIAC.
- Digital and Analog ICs. (TO and Flat packages) ICregulatorstypes.
- Testing of above components usingMultimeter.

II.   *LaboratoryEquipment:*
   A) Meters:-
- Types of Voltmeters, Types of Ammeters both AnalogandDigital.
- Types of Multi meters (Analog&Digital)
- AVO Meters.
- FETinputVoltmeter.

   B) Laboratory Function Generators andAudioOscillators.
   C) PowerSupplies.
   D) RFgenerators.
   E) Different TypesofTransformers. (Power, AF, RF,etc.)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

III. *Solderingpractice*
Tools kit including soldering iron
Tools Kit:
- Insulatednoseplayer
- Insulatedcuttingplayer
- Screw driverkit
- Electricaltester
- Soldering iron,Lead,Flex

IV. *PCB layoutandDesign.*
Materials required, centimeter graph sheets, marker.

V. *Testing of Components.*
Active and Passive Components

VI. *CRO*
Acquaintance with CRO
Measurements on CRO

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

I Year - II Semester		L	T	P	C
		0	0	3	1.5
	BASIC ELECTRICAL ENGINEERING LAB				

Learning Objectives:
- To plot the magnetizing characteristics ofDC shunt generator and understand the mechanism ofself-excitation.
- To control the speed ofDCmotors.
- To determine and predetermine the performance ofDCmachines.
- To predetermine the efficiency and regulation of transformers and assesstheirperformance.
- To analyse performance of three phaseinductionmotor.
- To understand the significance of regulation of an alternators using synchronousimpedance method.

Any ten of the following experiments are to be conducted

1. Magnetization characteristics of D.C. Shunt generator.
2. Speed control of D.C.shuntmotor.
3. Brake test on DCshuntmotor.
4. Swinburne's test onDCmachine
5. Load test on DCshuntgenerator
6. Load test on DCseriesgenerator.
7. Separation of losses iun DCShuntmotor
8. OC & SC tests onsingle-phasetransformer
9. Sumpner's test on singlephasetransformer
10. Brake test on 3-phase Inductionmotor.
11. Regulation of alternator by synchronousimpedancemethod.

Learning Outcomes:
The student should be able to:
- Determine and predetermine the performance of DC machinesandtransformers.
- Control the DC shunt machines.
- Compute the performance of1-phasetransformer.
- Perform tests on 3-phase induction motor and alternator to determinetheirperformance characteristics.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Any 10 of the following listed experiments)

I Year - II Semester		L	T	P	C
		0	0	3	1.5
	APPLIED PHYSICS LABORATORY				

List of Applied Physics Experiments

1. Determination of thickness of thin object by wedgemethod.
2. Determination of radius of curvature of a given plano convex lens by Newton'srings.
3. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
4. Determination of dispersive power of theprism.
5. Determination of dielectric constant using charging and dischargingmethod.
6. Study the variation of B versus H by magnetizing the magnetic material (B-Hcurve).
7. Determination of numerical aperture and acceptance angle of an opticalfiber.
8. Determination of wavelength of Laser light using diffractiongrating.
9. Estimation of Planck's constant using photoelectriceffect.
10. Determination of the resistivity of semiconductor by four probemethod.
11. To determine the energy gap of a semiconductor using p‑n junctiondiode.
12. Magnetic field along the axis of a current carrying circular coil by Stewart & Gee's Method
13. Determination of Hall voltage and Hall coefficient of a given semiconductor usingHall Effect.
14. Measurement of resistance of a semiconductor with varyingtemperature.
15. Resistivity of a Superconductor using four probe method & Meissnereffect.

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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

<div align="center">

ENVIRONMENTAL SCIENCE

</div>

Course Objective:

Engineering drawing being the principal method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

Unit I
Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.
Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.
Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, involutes, tangents &normals for the curves.
Scales: Plain scales, diagonal scales and vernier scales

Unit II
Objective: To introduce the students to use orthographic projections, projections of points & simple lines. To make the students draw the projections of the lines inclined to both the planes.
Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

Unit III
Objective: The objective is to make the students draw the projections of the plane inclined toboth the planes.
Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

Unit IV
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to both the planes.

Unit V
Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
Computer Aided Design, Drawing practice using Auto CAD, Creating 2D&3D drawings of objects using Auto CAD

Note: In the End Examination there will be no question from CAD.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

TEXT BOOKS:
1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:
1. Engineering Drawing by K.L.Narayana& P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

Course Outcome: The student will learn how to visualize 2D & 3D objects.