VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE
(VJTI)

MATUNGA, MUMBAI 400 019

(Autonomous Institute affiliated to University of Mumbai)

Curriculum
(Scheme of Instruction & Evaluation and Course contents)

For First Year
of
Four-Year Undergraduate Programme Leading to
Bachelor of Technology (B Tech) Degree in Electronics Engineering

Implemented from the batch admitted in Academic Year 2023-24
(NEP 2020 based syllabus)

V J T I Veermata Jijabai Technological Institute
(Central Technological Institute, Maharashtra State, INDIA)
H. R. Mahajani Marg, Matunga, Mumbai-400019
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Credit Framework for UG Programme in Electronics Engineering (Level 4.5- UG Certificate)

Semester I

Sr.	Course Type	Course Code	Course Name	L	T	P	Hr	Cr	Examination Weightage in %		
									TA	MST	ESE
1	BSC	R5CH1011T	Chemistry	2	1	0	3	3	20	30	50
2	BSC	R5CH1011L	Chemistry – Laboratory	0	0	2	2	1	ISCE: 60		40
3	BSC	R5MA1003T	Mathematics-I	2	1	0	3	3	20	30	50
4	BSC	R5EL1026T	Bio Science for Electrical Engineers	2	0	0	2	2	20	30	50
5	ESC	R5SE1001T	Engineering Mechanics	2	0	0	2	2	ISCE: 60		40
6	ESC	R5SE1001L	Engineering Mechanics Laboratory	0	0	2	2	1	20	30	50
7	ESC	R5CO1001T	Programming for Problem Solving	2	0	0	2	2	ISCE: 60		40
8	ESC	R5CO1001L	Programming for Problem Solving Laboratory	0	0	2	2	1	20	30	50
9	PCC	R5EL1027T	Basic Electrical Engineering	2	0	0	2	2	ISCE: 60		40
10	VSEC	R5EL1028L	Electrical Workshop	0	0	3	3	1.5	ISCE: 100		
11	IKS	R5EL1029T	Introduction to Ancient Indian Technology	2	0	0	2	2	20	30	50
									Or Credit Transfer		
12	CC2	R5EL1030L	From Basket	0	0	3	3	1.5	ISCE: 100		
			Total	**14**	**2**	**12**	**28**	**22**			

abbreviations **L** Lecture, **T** Tutorial, **P** Practical, **TA** Teacher Assessment / Term work Assessment, **MST** Mid Semester Test, **ESE** End Semester Written Examination, **ISCE** In-semester Continuous Evaluation, **BSC** Basic Science Course, **ESC** Engineering Science Course, **VSEC** Vocational and Skill Enhancement Course, **AEC** Ability Enhancement Course, **CC** Co-curricular Course

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Semester II

Sr.	Course Type	Course Code	Course Name	L	T	P	Hr	Cr	Examination Weightage in %		
									TA	MST	ESE
1	BSC	R5PH1012T	Physics	2	1	0	3	3	20	30	50
2	BSC	R5PH1012L	Physics – Laboratory	0	0	2	2	1	ISCE: 60		40
3	BSC	R5MA1013T	Mathematics-II	2	1	0	3	3	20	30	50
4	ESC	R5ME1002T	Engineering Graphics	2	0	0	2	2	20	30	50
5	ESC	R5ME1002L	Engineering Graphics Laboratory	0	0	2	2	1	20	30	50
6	ESC	R5EL1021T	Numerical Techniques	3	0	0	3	3	20	30	40
7	ESC	R5EL1022T	Basic Electronics	3	0	0	3	3	20	30	50
8	ESC	R5EL1023L	Basic Electronics Lab	0	0	2	2	1	ISCE :60		40
9	VSEC	R5EL1024L	Design Thinking and Idea Lab	0	0	3	3	1.5	ISCE :60		50
10	AEC	R5HS1002L	Business and Technical Communication	1	0	2	3	2	ISCE :60		50
11	CC2	R5EL1025L	From Basket	0	0	3	3	1.5	ISCE :100		
			Total	**13**	**2**	**14**	**21**	**22**			

abbreviations **L** Lecture, **T** Tutorial, **P** Practical, **TA** Teacher Assessment / Term work Assessment, **MST** Mid Semester Test, **ESE** End Semester Written Examination, **ISCE** In-semester Continuous Evaluation, **BSC** Basic Science Course, **ESC** Engineering Science Course, PCC Program Core, **VSEC** Vocational and Skill Enhancement Course, IKS Indian Knowledge System, **CC** Co-curricular Course

SEMESTER-I

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5CH1011T	SEMESTER	I	CREDITS	3	SCHEME	2L:1T
COURSE	CHEMISTRY						

Course Outcomes:

The student should be able to

CO1 Correlate the different chemical reaction mechanisms with rate of reaction that are used in the industrial synthesis of organic molecules and drugs.

CO2 Rating the chemical fuels based on their chemical composition, and properties. Choosing the alternate energy sources.

CO3 Analyze the basic cause of corrosion, its reactions & corrective preventive measure to reduce the rate and adopt suitable method of treatment suitable for various industrial applications.

CO4 Analyse functional material based on their structure, and performance. Rationalize the concept Sustainability and adopt green chemistry approach

CO5 Select appropriate separation methods required in manufacturing industries by understanding the basic concept of chromatographic techniques. Choose the spectroscopic techniques for characterization of materials.

Course Contents:

Reactions, Mechanisms & Kinetics

Introduction to Chemical reactions, Material balance for organic reactions, Mass balance and stoichiometry, SN1, SN2 Reactions, Chemical Kinetics, Energy profile diagram, Synthesis of drug molecule.

Energy Source:

Types of Chemical fuels, Calorific value, Determination of calorific value, combustion calculations, Analysis of coal, proximate and ultimate analysis, Fuels for IC engines, Effect of Chemical composition of fuel on knocking, anti-knocking agents. Limitations of fossil fuels, Alternative fuels: Power alcohol, biomass, biogas, Biodiesel, Green hydrogen.

Science of Corrosion

Direct chemical corrosion, Electrochemical corrosion, and its reaction mechanisms. Types of electrochemical corrosion include differential aeration, galvanic, and concentration cell corrosion. Additionally, Electrochemical corrosion can manifest as pitting, Intergranular Corrosion, Soil Corrosion, and Waterline Corrosion. Factors Affecting Corrosion, Protection from Corrosion, and Applications with Few Practical Problems of Corrosion.

Functional Materials for Engineers

Plastic, Elastomeric, & Fiber forming polymers, structural requirement, molecular weight determination, effect of structure, bonding, molecular weight, degree of polymerisation on the performance of the polymers. Glass transition temperature, Structure property relationship.

Lubricants: Types of lubricants, Mechanism of lubrication, Physical and Chemical properties of lubricants, selection of lubricants.
Cementations Materials: Chemical composition of cement, Admixtures used in concrete, Chemical reactions involved, bitumen emulsions.

Identification, Separation & Purification
Types of Separation techniques: Column Chromatography, Thin layer chromatography, Paper chromatography. Spectroscopic principles and its applications, U.V. Spectroscopy, Fourier Transform Infra-Red Spectroscopy, Flame photometry. Determination of hardness of water by EDTA method and removal of hardness by ion exchange and zeolite method.

Sustainable Engineering Chemistry
Concept of sustainability and its significance, Waste minimization, Atom Economy, Reduction of Materials and Energy requirement, Green Chemistry approach, Industrial applications of green chemistry.

Textbooks

1. Engineering Chemistry by Jain and Jain, Danpatrai publications;16th edn. (2013)
2. Engineering Chemistry by Dr.S.S.Dara, Dr.S.S.Umare, S.Chand & CompanyLtd,12th ed.
3. A Text Book of Engineering Chemistry by Shashi Chawla, Dhanpatrai publications; 4th edn;(2010)

Reference Books

1. Polymer Science-Billmayer, F.John Willey&Sons, N.Y.; 3rd edn(1984)
2. Introduction to Material Science William Callister, John Willey & Sons, N.Y.; 9th edn;(2013)
3. Engineering .Chemistry- NPTEL web- book, by T.L. Tembe, Kamaluddin and M.S.Krishnan
4. Fundamentals of Molecular spectroscopy: Colin N.Banwell & Elaine M. McCash, Tata McGraw- Hill 4th edn.
5. Fundamentals of Electrochemistry, Second Edition, V. S. Bagotsky, Wiley Interscience (2006).

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5CH1011L	SEMESTER	I	CREDITS	1	SCHEME	0L:2P
COURSE	CHEMISTRY LABORATORY						

Course Outcomes:

The student should be able to

CO1 Determine the quality of water suitable for different sectors.
CO2 Determine physical and chemical characteristics of lubricating oils.
CO3 Synthesis of Biodiesel, Chalcones, and Calculating Atom Economy.
CO4 Analysis of coal by the proximate method.
CO5 Separate and analyse by Chromatographic techniques

Course Contents

Title of the Experiment: (Any 10 experiments)

1. Saponification value of oils
2. Acid value of an Oil
3. Viscosity &Viscosity Index by Redwood Viscometer
4. Flash Point by Abel's & Pensky-Marten's Apparatus
5. Conductometric titrations
6. Analysis Of fuel: Proximate analysis of coal sample
7. Determination of adulteration in transport fuels
8. Separation by TLC & Paper chromatography 9. Determination of alkali metals by Flame photometry 10. Synthesis of Biodiesel to find out Atom Economy.
11. Synthesis of drug molecule
12. Determination of hardness of water by EDTA method.

References:

1. Lab. Manual for Engineering Chemistry - Dr.S.K.Basin & Dr. S.K. Rani, Dhanapat Rai Publishing Company; (2009)
2. Practical Manual for Chemistry of Engineering Materials - D.D. Shah, Nandu Publication, Mumbai
3. Post Graduate Practical Chemistry - H.N. Patel, S.P. Turakhia, S.S. Kelkar, S.R. Puniyani, Himalaya Publishing House, 5th edn; (2008)
4. A Manual of Practical Engineering Chemistry Sudha Jain & Shradha Sinha, S.Chand Company Ltd 1st edn (2002)

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5MA1003T	SEMESTER	I	CREDITS	3	SCHEME	2L:1P
COURSE	MATHEMATICS – I						

Course Outcomes:

After the completion of course, the student should be able to

CO1 Characterize a linear system in terms of number of solutions, whether it is consistent or not.

CO2 Compute eigenvalues and eigenvectors of a square Matrix and determine if it is diagonalizable.

CO3 Demonstrate the concepts of vector spaces, subspaces, span, basis, dimension and their properties with examples and identify their subspaces.

CO4 Calculate functional value of some point in a neighborhood using Taylor's series expansion and find the limit of a function at a point or at infinity using L'Hospital's rule.

CO5 Determine if an infinite series is convergent or not using suitable test.

CO6 Be familiar with the theorems of differentiability such as mean value theorem and interpret it geometrically.

CO7 Evaluate partial derivatives and apply it to find minima and maxima of a multivariate function. Also Find directional derivatives and gradient and illustrate geometric meaning with the help of sketches.

CO8 Apply definite integration to evaluate surface areas and volumes of revolution and evaluate improper integrals.

CO9 Evaluate multiple integrals for regions in a plane and find volume, area bounded by the curves, mass, center of gravity of solid geometric figures.

Course Contents:

Module	Contents
1	**LINEAR ALGEBRA:** Rank of a matrix, System of linear equations- check for consistency, Eigenvalues & eigenvectors of a matrix, Diagonalization, Cayley-Hamilton theorem, Minimal polynomial, Finding Inverse and Powers of a matrix, Linear dependence and independence of vectors, Vector spaces, Basis, Dimension, Subspaces, Linear transformations, Rank of a Linear transformation, Orthogonal transformation, Inner product spaces.
2	**DIFFERENTIAL CALCULUS:** Mean value theorem, Rolle's theorem, Indeterminate form, L'Hospital's rule, Taylor's theorem and Truncation error, Partial Derivatives, Chain rule, Total Derivative, Differentiation of an implicit function, Directional Derivative, Gradient, maxima, minima and saddle points of a multivariable function, Lagrange's multipliers method, tangent plane and normal line, Convergence of sequence and series, Tests for convergence -ratio test, root test, p-series test, comparison test, alternating series test, absolute convergence test.
3	**INTEGRAL CALCULUS:** Evaluation of definite integration to find surface areas and volumes of revolution, Introduction to Improper Integrals and Gamma functions and its properties, Multiple

	integrals, change of order of integration in double integrals, Change of variables (Cartesian to polar), Triple integrals (Cartesian, cylindrical and spherical co-ordinates). Applications: areas and volumes, Center of mass and Gravity (constant and variable densities).
4	**NUMERICAL METHODS:** Numerical solutions of non-linear equations, Interpolation by Newton's and Lagrange polynomials, Integration by trapezoidal and Simpson's rule.

References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9 th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9 th Edition, John Wiley & sons, 2006.
3. Ramana B. V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 th Reprint, 2010.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw Hill, New Delhi 2008.
5. N.P.Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint 2008.
6. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 th Edition, 2010.
7. M.K.Jain, S.R.K. Iyengar, R.K.Jain, Numerical methods for scientific and engineering computation,Fourth Edition.

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5EL1026T	SEMESTER	I	CREDITS	2	SCHEME	2L:0P
COURSE	BIO SCIENCE FOR ELECTRICAL ENGINEERS						

Course Outcomes:

After the completion of the course, the student should be able to

CO1 Illustrate the origin of various biological signals and their characteristics.
CO2 Gain knowledge on characteristics of bio signals.
CO3 Measure various electrical parameters with accuracy, precision, resolution.
CO4 Provide an engineering approach to different measurement techniques for non-electrical bio-parameters.

Course Contents:

Module	Content
1	**INTRODUCTION:** i. Role of technology in medicine, ii. Physiological System of the body: The cardiovascular system, The respiratory system, The nervous system iii. Sources of Biomedical signals, iv. Role of engineers in healthcare facilities.
2	**BIO ELECTRIC SIGNALS AND ELECTRODES :** i Origin of Bio electric signal, Electrocardiography (ECG),(Electroencephalograph(EEG), Electromyography (EMG) ii Bio signals characteristics – Origin of io potential and its propagation. Frequency and amplitude ranges. iii Electrode configurations: Electrode-electrolyte interface, electrode–skin interface impedance, polarization effects of electrode – non-polarizable electrodes. Unipolar and bipolar configuration, classification of electrodes
3	**PHYSIOLOGICAL TRANSDUCERS:** i. Introduction to Transducer ii. Classification of Transducers iii. Performance Characteristics of Transducers iv. Displacement, Position and Motion Transducers v. Pressure Transducers vi. Transducers for Body Temperature Measurement vii. Photoelectric Transducers
4	**BIOSENSORS:** **i.** General configuration of biosensor ii. Types of biosensors iii. Basic principle and instrumentation of different types of biosensors: electrochemical, optical, piezoelectric, magnetic and calorimetric biosensors; iv. Advance materials and techniques for developing biosensors

Text Books:

- Biomedical Instrumentation and measurement",Leslie Cromwell, 2nd edition, Prentice hall of India, New Delhi, 2015
- "Medical Instrumentation Application and Design", John G. Webster, 4th edition, Wiley India Pvt Ltd, New Delhi, 2015.

References Books:

- "Handbook of Biomedical Instrumentation",Khandpur R.S, Tata McGraw Hill, New Delhi, 2003.
- "Introduction to Biomedical Engineering", John Enderle, Susan Blanchard, Joseph Bronzino, second edition, Academic Press,2005.
- "Introduction to Biomedical Equipment Technology", John Enderle, Susan Blanchard, Joseph Bronzino, Pearson Education, 2004.

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5SE1001T	SEMESTER	I	CREDITS	2	SCHEME	2L:2P
COURSE	ENGINEERING MECHANICS						

Course Outcomes:

The student should be able to

CO1 Analyse the force system and relate it to the Engineering Applications.

CO2 Calculate centroids and centre of gravity of plane areas and volumes.

CO3 Analyse the different motions of a particle and apply principles of work, energy, impulse & momentum.

Course Contents:

FUNDAMENTAL OF MECHANICS
Review of basic concepts – mass, space, time and force: Particles and rigid bodies: Scalars and vectors: Free, sliding, fixed and unit vectors: Addition, subtraction and multiplication of two vectors. Definition of a force: Classification of forces: Principles of transmissibility, etc.
FORCE SYSTEMS
Introduction to different force systems, Composition of forces, triangle, parallelogram and polygon law of forces, addition of two parallel forces, Resolution of forces, moment of a force, Varignon's Theorem, Couple of forces, force – couple systems, Resultant of a force system, Equilibrium conditions for a force system, Free body diagram, Different types of supports, etc.
DISTRIBUTED FORCES
Line, area and volume distributions of forces, Centre of gravity, Centre of mass, Centroid of plane figures, Cerntroid of composite figures, Moment of Inertia, Area and mass moments of inertia, Perpendicular and parallel axes theorems of moment of inertia, Radius of gyration, etc.
DRY FRICTION
Laws of dry friction, Co-efficient of friction, Angle and cone of friction, Angle of repose, Applications of friction to wedges and screw jacks, etc.
VIRTUAL WORK
Work done by forces and couples, Virtual displacement and virtual work, Principle of virtual work for equilibrium bodies in equilibrium, Active force diagram, Degree of freedom, etc.
KINEMATICS OF PARTICLES:
Differential equations of kinematics, plane, rectilinear and curvilinear motions, Cartesian co- ordinate system, Normal and tangent co-ordinate system, projectile motion, etc.
KINETICS OF PARTICLES:
Newton's second law of motion, Work and energy principle, Gravitational-potential energy, elasticpotential energy, kinetic energy, power, efficiency, Principle of impulse and momentum, Impact motion, Direct central impact, etc.

Recommended books

1. A textbook of Engineering Mechanics, Dr. Sadhu Singh (S. Chand publishing)
2. Tayal A.K., Mechanics for Engineering, Statics and Dynamics, Umesh Publication, N. Delhi, 2008.
3. Engineering Mechanics, K. L. Kumar, Veenu Kumar, McGrow Higher Education.

Additional Reading

1. Shames I.H, Engineering Mechanics, P.H.I. India 1980.
2. Kumar K. L., Engineering Mechanics, McGraw Hill publishing company New Delhi 2008.
3. Beer and Johnston, Mechanics for Engineers, McGraw Hill, 2009.
4. Timoshenko and Young, Mechanics for Engineers, McGraw Hill, 2010.
5. Mclean and Nelson, Mechanics for Engineers, Schaum Outline Series 2010.
6. Hibbeler R.C., Mechanics for Engineers, Pearson Education, 2012.

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5SE1001L	SEMESTER	I	CREDITS	1	SCHEME	0L:2P
COURSE	ENGINEERING MECHANICS LABORATORY						

Course Contents:

List of Practicals (Any 10)

Bell Crank Lever:

- Study the equilibrium conditions of a bell crank lever under different loads and angles. Calculate the Electrical advantage and efficiency of the bell crank lever.

Simple Beam:

- Determine the reactions at the supports of a simple beam loaded with various point loads and distributed loads.
- Verify the principles of equilibrium and deflection calculations for the beam.

Simple Jib Crane:

- Analyze the forces acting on a simple jib crane and calculate the reactions at its base.

Link Chain:

- Study the forces acting on a link chain when subjected to a load.
- Determine the tension in different segments of the chain and its equilibrium conditions.

Screw Jack (Friction):

- Investigate the working of a screw jack, considering frictional forces.
- Calculate the input force required to lift a given load using the screw jack.

Shear Leg Apparatus:

- Set up and analyze a shear leg apparatus to lift a load using multiple ropes and pulleys.
- Calculate the forces in the ropes and verify equilibrium conditions.

'g' by Falling Weight Method:

- Measure the acceleration due to gravity using the falling weight method.
- Analyze the motion of a freely falling weight and calculate 'g' from the recorded data.

Plane Motion of Bodies:

- Investigate the motion of bodies on inclined planes under the influence of gravity.
- Determine the acceleration, time of motion, and distance covered on the inclined plane.

Moment of Inertia (M.I.) of Flywheel:

- Determine the moment of inertia of a flywheel experimentally using rotational dynamics. Compare experimental results with theoretical calculations.

Compound Pendulum:

- Study the behaviour of a compound pendulum and analyze its oscillations.
- Calculate the period of oscillation and verify the principles of simple harmonic motion.

Torsional Pendulum:

- Set up a torsional pendulum and measure the torsional constant of the material.
- Calculate the moment of inertia of the pendulum and analyze its oscillations.

Principle of Conservation of Energy (Connected Bodies with Flywheel):

- Study the energy transfer and conservation principles in a system of connected bodies with a flywheel.
- Analyze the changes in potential and kinetic energy and validate the principle of conservation of energy.

Stiffness of Spring:

- Determine the stiffness (spring constant) of a spring experimentally.
- Analyze the relationship between force and displacement for the spring.

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5CO1011T	SEMESTER	I	CREDITS	2	SCHEME	2L:2P
COURSE	PROGRAMMING FOR PROBLEM SOLVING						

Course Outcomes:

The student should be able to

CO1 Interpret the concepts of the C++ programming language.

CO2 Use control structures such as loops and conditional statements to control the flow of their programs.

CO3 Develop simple C++ programs to solve computational problems using fundamental programming constructs.

CO4 Use file handling to store and retrieve data efficiently from files.

CO5 Develop problem-solving skills by applying C++ programming techniques to real-world scenarios and challenges.

Course Contents:

Module	Contents
1	**Introduction to Programming and C++** Elements of a computer systems, DOS Commands & Linux environment, Overview of programming languages, Introduction to C++ and its features, Setting up a C++ development environment, Language Processors, Object Oriented Programming Paradigm and benefits, Applications of Object Oriented programming.
2	**Beginning with C++** Tokens, Expressions, Control Structures, Array, Functions, Structures, Unions and pointers, String Manipulation
3	**C++ Programming Features** Classes, Objects, Constructors, Destructors, Inheritance and Polymorphism, Virtual Base Classes, Abstract Classes.
4	**Working with Files** Classes for File Stream Operations and I/O stream operation, Opening and Closing a File, Detecting end-of-file, more about Open(): File Modes, Sequential Input and Output operations. **Case Studies of C++**
5	**Programming:** Number Conversions, Telecom Billing System, Logistic management of solid waste, Design of a scientific calculator

Text Books

1. How to Solve It: A New Aspect of Mathematical Method, by G. Polya, Princeton University Press, 2015
2. The C++ Programming Language, Fourth Edition by Bjarne Stroustrup, Addison-Wesley Educational Publishers Inc
3. Programming and Problem Solving with C++ by Chip Weems, Nell Dale and Tim Richards, Jones and Bartlett Publishers, Inc, 2022
4. Scientific Approach to Problem Solving: With C++ Programming by Sal Washah, Cognella, Inc, 2013.

Reference Books:

1. Effective C++, 3rd edition, by Scott Meyers, Addison-Wesley Educational Publishers Inc
2. Solving Mathematical Problems: A Personal Perspective, Illustrated Edition, by Terence Tao, Oxford University Press, 2006.
3. Object-Oriented Programming with C++, 8th edition, by E Balagurusamy, Publisher McGraw Hill

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5CO1011L	SEMESTER	I	CREDITS	1	SCHEME	0L:2P
COURSE	PROGRAMMING FOR PROBLEM SOLVING LABORATORY						

Course Outcomes:

The student should be able to

CO1 Understand Linux Environment, basic Linux commands and computer elements.
CO2 Demonstrate proficiency in writing basic C++ programs, including understanding data types, variables, control structures, and functions.
CO3 Implement classes and objects, understand inheritance and polymorphism, and apply OOP principles in their code.
CO4 Apply C++ knowledge to design and implement complete software solutions for specific problem domains.
CO5 Develop their ability to manipulate strings, including concatenation, substring extraction, and other string operations.
CO6 Read from and write to files in C++, enabling them to process data from external sources.

Course Contents:

List of Practicals

1. Study of Linux Commands, language processor and Computer Elements.
2. Study of Input and Output operations in C++ - Write a program in C++ for entering the detailed information of student and print all details of student.
3. Study of for loop in C++ - Write a program in C and C++ to print Fibonacci series of any number inputted by person.
   Additional Program for practice - Write a program in C++ to find binary values of integer using for loop.
4. Study of if-else loop in C++ - Write a program in C++ to check whether entered character is a vowel or not using if-else statement.
5. Study of if – else if - else loop in C++ - Write a C++ program to accept marks of subjects for a student. Calculate the total and percentage of marks, also decide grade of student depending on the percentage using if-else-if-else statements.
   Study of while loop and do-while in C++ - Write a C++ program to display numbers from 1 to 10 with the help of a while loop and do-while loop.
6. Study of switch case in C++ - Write a program in C++ to make a menu driven calculator. Additional Program for practice: Write a menu driven program in C++ to find sum of positive numbers, sum of negative numbers & avg of all numbers in an array.
7. Study of arrays and structures in C++
   a) Write a program in C++ to display the information of 10 employees using array of structure variable.
   b) Write a program in C++ to illustrate use of array within structure.
   c) Write a program in C++ to illustrate use of nested structure .
8. Study of Classes and Objects in C++ - Write a program in C++ to add two integers using classes.
   Additional Program for practice: Read and Print Student Information using class Student.
9. (a) Study of Function Overloading in C++.
   (b) Study of Operator Overloading in C++ (Overloading unary and binary operators).
10. Study of Constructors and Destructors in C++ -
    Write a program in C++ with class Rectangle with the data fields width, length, area and colour. The length, width and area are of double type and colour is of string type. The methods are get_length(),

get_width(), get_colour() and find_area(). Create two objects of Rectangle and compare their area and colour. If the area and colour both are the same for the objects then display "Matching Rectangles", otherwise display "Non-matching Rectangle". Use Constructors.

Additional Program for Practice - Write a program in C++ to implement Stack. Design the class for stack and the operations to be performed on stack. Use Constructors and destructors.

11. Study of Inheritance, virtual class and virtual function in C++ - Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data() to initialize base class data members and another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redefine this function in the derived classes to suit their requirements.
12. Study of friend class and friend function in C++.
13. Study of String Manipulation in C++ - Write a program in C++ to perform string operations by using predefined string functions.
14. Study of File Handling in C++ - Write a program in C++ to open, read and close a file using file stream operations.

Text Books:

1. The C++ Programming Language, Fourth Edition by Bjarne Stroustrup, Addison-Wesley Educational Publishers Inc
2. Object-Oriented Programming with C++, 8th edition, by E Balagurusamy, Publisher McGraw Hill

Reference Books:

1. Effective C++, 3rd edition, by Scott Meyers, Addison-Wesley Educational Publishers Inc
2. Object-Oriented Analysis and Design with Applications by Grady Booch, 3rd edition, Robert

A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, and Kelli A. Houston, Addison Wesley publisher

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5EL1027T	SEMESTER	I	CREDITS	2	SCHEME	2L:0P
COURSE	Basic Electrical Engineering						

Course Outcomes:

CO1 To understand fundamentals of DC circuits and apply knowledge for analyzing network theorem in DC circuit.

CO 2 To Learn the fundamental and analyse single phase AC circuit.
CO 3 To Learn the fundamental and analyse Three phase AC circuit.
CO 4 To analyse star and delta connection concepts of phasors in AC single and three phase circuit.
CO 5 To describe the construction, operation and characteristics of single phase transformer.

Course Contents:

Module	Contents
1	**DC Circuits (Only Independent Sources):** Kirchhoff 's laws, Ideal and practical voltage and current source, Mesh and Nodal analysis, Super node and Super mesh analysis, Source transformation, Star-delta transformation, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem
2	**AC Circuits:** Generation of alternating voltage and currents, RMS and Average value of different waveforms, form factor, crest factor, AC applied to resistance, inductance and capacitance
3	**Fundamentals of AC Circuits- I:**R-L, R-C and R-L-C series circuits, phasor diagrams, calculations of power and power factor, series resonance, Q factor and bandwidth in AC series resonance circuits. **Fundamentals of AC Circuits- II:** R-L-C parallel circuits, phasor diagrams, calculations of power and power factor, parallel resonance, Q factor and bandwidth in AC parallel resonance circuits
4	**Three Phase Circuits:** Three phase voltage and current generation, star and delta connections (balanced load only), relationship between phase and line currents and voltages, Phasor diagrams, Basic principle of wattmeter, measurement of power by one and two wattmeter methods

Text Books:-

1. B.L.Theraja, "Text Book of Electrical Technology", by S.Chand& Co Ltd, India
2. Mittle. V.N., "Basic Electrical and Electronics Engineering", Tata McGraw Hill, New Delhi, 1st edition.
3. V.K.Mehta , "Principles of Electrical Engineering", by S.Chand& Co. Ltd, India.

Reference Books:-

1.A.VincentDeltoro , "Principles of Electrical Engineering" PHI
2. S.Parker Smith, "Principles of Electrical Engineering" by Oxford University
3.William Hayt and Kimmerly "Electric circuit Analysis" , Tata Mcgra Hills

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5EL1028L	SEMESTER	I	CREDITS	1.5	SCHEME	0L:0T:3P
COURSE	ELECTRICAL WORKSHOP						

Course Outcomes:

CO1 Demonstrate safety measures against electric shocks.

CO2 Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols.

CO3 Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings.

CO4 Identify various Resistors, capacitors, inductors and transformers.

CO5 Use components as per the requirements of the circuits. Work in a team with good interpersonal skills.

Course Contents:

Module	Contents
1	a) Demonstrate the precautionary steps adopted in case of Electrical shocks. b) Identify different types of cables, wires, switches, fuses, fuse carriers, MCB, ELCB and MCCB with ratings
2	Wiring of simple light circuit for controlling light/ fan point (PVC conduit wiring)
3	Wiring of light/fan circuit using Two way switches. (Staircase wiring)
4	Importance of Neutral and structure Grounding and exposure to various earthing schemes
5	Assembling and dissembling of D. C. Machine, single phase motor
6	Assembling and dissembling of single phase transformer
7	Test resistor, capacitor, inductor, P-N junction Diode using CRO & Multimeter.

Text Books:

- Electrical engineering materials and electronic components, TTTI Chandigarh, Raina K. B., Bhattacharya S. K., Juneja T.

References:

- List of Software/Learning Websites: http://www.electronics-tutorials.com, http://www.efymag.com/, http://en.wikipedia.org/wiki/Electronic_component

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5EL1029T	SEMESTER	I	CREDITS	2	SCHEME	2L:0P
COURSE	INTRODUCTION TO ANCIENT INDIAN TECHNOLOGY						

Course Outcomes:

The students would know about the various aspects of Ancient Indian Technology in various sectors:

CO1 Introduction to ancient Indian Technology in general and Electrical Engg
CO2 Ancient Indian Technology related to Agricultural practices
CO3 Ancient Indian Technology related to textile and Metallurgy
CO4 Ancient Indian Technology related to Civil and Urban Planning, Water and irrigation systems

Course Contents:

MODULE 1	1.0	**INTRODUCTION TO ANCIENT INDIAN CIVILIZATION:** Ancient Indian Civilization's gift to the world, Brief Review of Ancient Indian Scriptures , Why do we need to look at Ancient Indian Science and Technology, Glimpses of Ancient Indian Science and Technology, Basic Principles of carrying out science and technology, Arrays of Physics, chemistry, and indoor games, Marvels of Ancient Indian Technology (AIT)
	1.1	**ELECTRICITY** and applications of Electricity in Ancient Indian technology
MODULE 2	2.0	**INTRODUCTION TO INDIAN AGRICULTURE:** Problems arising due to modern agriculture practices, Pesticides and soil degradation, Agriculture – A primary productive activity, An Agriculture Tools – A Plough, Soil and seeds, Sowing Methods, Indigenous cattle and manuring
MODULE 3	3.0	**ANCIENT INDIAN TEXTILE TECHNOLOGY:** Handlooms and Charkha, Different types of Handlooms
	3.1	**METALLURGY:** World of materials, Metals – Gold silver lead, History of Copper, Iron during Vedic Period, Iron smelting process in ancient India, Iron and Steel crafts in ancient India, Extraction and smelting of Zinc in ancient India, Metal casting in ancient India, Glass Technology in Ancient India
MODULE 4	4.0	**CIVIL AND URBAN PLANNING:** Ancient Rural Indian Housing, Thatched Roof House, Rural Walls and Roof materials, Indus Valley and Harappan Civilization, First and Second Indian Civilization, Town topologies and Brick and Tile making process,
	4.1	**WATER AND IRRIGATION:** Availability of Water and Freshwater, Ancient Indian Wells, Temple water tanks and dams, Tank irrigation system and rainwater harvesting, Waterbodies – Lakes and canals, Sluices and Embankments

Ref: NPTEL: Introduction to Ancient Indian Technology

SEMESTER -II

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5PH1012T	SEMESTER	II	CREDITS	3	SCHEME	2L:1T
COURSE	PHYSICS-II						

Course Outcomes:

After the completion of the course, students would be able to

CO1 Examine the band theory of solids and semiconductors.

CO2 Identify and summarize properties and applications of dielectric materials.

CO3 Classify and analyze magnetic materials.

CO4 Explain basic Concepts of quantum mechanics.

CO5 Define the concepts of Special Theory of Relativity and application.

Course Contents:

Semiconductor: Energy band in solids and classification of solids, the concept of Fermi level and Fermi distribution function, Intrinsic and extrinsic semiconductors, Transport properties of semiconductors: Conductivity in semiconductors and its dependence of carrier concentration and mobility.
Dielectric properties: Capacitance, Permittivity & dielectric constant; Polarizability-polar and nonpolar, dielectric susceptibility, Gauss law in dielectrics, Polarizations: - electronics, ionic, orientation interface, internal fields in solids, Dielectrics in alternating fields, ferroelectricity, piezoelectricity
Magnetism: The Langevin theory of Diamagnetism and Paramagnetism: deriving the magnetic susceptibility and Curie's law. An introduction to the Weiss theory of Paramagnetism and ferromagnetism
Quantum Mechanics: limitation of classical physics, Planks Law, Matter waves and its characteristics, Wave Velocity, Group velocity, Heisenberg Uncertainty principle, wave function
Relativity: Special Theory of relativity: Galilean Transformations, Michelson Morley experiment, Einstein Principle of relativity, Lorentz Transformation equations, Lorentz Velocity transformation, Consequences of Special theory of relativity: - Simultaneity, time dilation, Lorentz-Fitzgerald contraction, Relativistic doppler Shift, twins' paradox, Relativistic mass variation, mass energy equivalence. **General Theory of relativity:** Gravitational deflection of light, black hole, Mercury odd orbit, GPS system, gravitational waves.

Reference Books:

1. Modern Physics, 3rd edition, R Serway, C Moses and C Moyer, Thomson Learning inc,
2. Material Science and Engineering: An Introduction, 6th Edn., Callister W.C. Jr., John Wiley & Sons
3. Applied Physics I for Science and Engineering, Dattatray Wavhal, ISBN 978-93-5267- 180-9, 2016
4. Applied Physics II for Science and Engineering, Dattatray Wavhal, ISBN 978-93-5268- 289-8, 2017
5. A textbook of Engineering Physics, M N Avadhanulu and P. G. Kshirsagar

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5PH1012L	SEMESTER	II	CREDITS	1	SCHEME	0L:2P
COURSE	PHYSICS-II LABORATORY						

Course Outcomes:

The student should be able to

CO1 Calculate resistivity, band gap, Hall Voltage and Carrier concentration of semiconductor.

CO2 Calculate Band Gap of p-n junction diode.

CO3 Determination of magnetic properties using hysteresis/curie temperature/ susceptibility.

CO4 Determine Plank constant using Photoelectric effect.

CO5 Measurements of frequency, wavelength, rms voltage using CRO, e/m by Thomson method, Stefan's law

Course Contents:

(Any 10)

1. Measurement of Resistivity of solids
2. Band gap of Semiconductor by four probe methods
3. Hall Effect in Semiconductors
4. Band gap of p-n junction diode
5. Susceptibility of solids by Gouy's method
6. Hysteresis of a ferromagnetic material
7. Curie temperature by two probe method
8. Plank's constant determination
9. Ultrasonic Interferometer
10. CRO based measurements.
11. e/m by Thomson method 12. Stefans law

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5MA1013T	SEMESTER	II	CREDITS	3	SCHEME	2L:1T
COURSE	MATHEMATICS-II						

Course outcomes:

The student should be able to,

CO1 Find the complete solution of a differential equation with constant coefficients in terms of the complementary function and the particular integral.

CO2 Formulate Differential equations from the given physical problems and solve first-order Differential equations using different techniques.

CO3 Characterise complex functions in terms of analyticity find harmonic conjugates and study geometric properties of conformal mappings.

CO4 Study complex power series, classify singularities of a function, evaluate line integrals and apply the residue theorem to evaluate real integrals.

CO5 Develop better understanding of scalar and vector fields and apply gradient to solve problems involving normal vectors to level surfaces.

CO6 Apply the integral theorems such as Stokes theorem, Green's theorem and Gauss divergence theorem to evaluate line, surface and volume integrals and give physical interpretation of curl and divergence of a vector field. Course Contents

Contents:

Ordinary Differential Equations

Solving First order equations – Exact, linear and Bernoulli's equations, higher order linear differential equations with constant coefficients, Complementary functions and Particular integrals by operator method, method of variation of parameters, Method of Undetermined coefficients, Euler-Cauchy equation; initial and boundary value problems.Partial Differential Equation

Vector calculus

Vector functions- Limits, continuity and differentiation, scalar and vector fields, gradient, divergence and curl, Line integrals, Surface integrals, Volume integrals, Stoke's theorem, Gauss' Divergence theorem, Green's theorem.Complex Variables: Integration.

Complex Variables – Differentiation:

Complex Functions- Limits, Continuity and differentiability, Analytic functions, Cauchy Riemann equations, Harmonic conjugates, Conformal mappings, Linear fractional transformations and their properties.

Complex Variables – Integration:

Cauchy's Integral theorem and formula, Taylor's series- radius of convergence, Laurent's series, Singularities and Poles, Residue theorem, Evaluation of real integrals using contour integration and concept of residues.

References :

1.G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & sons, 2006.
3. Ramana B. V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw Hill, New Delhi 2008.
5. N.P.Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint 2008.
6. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
7. Susan Jane Colley, Vector Calculus, 4th Edition, 2012.
8. John H. Matthews and Russell W. Howell, Complex Analysis for Mathematics and Engineering, Third Edition .

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5ME1002T	SEMESTER	II	CREDITS	2	SCHEME	2L:0P
COURSE	ENGINEERING GRAPHICS						

Course Outcomes:

The student should be able to –

CO1 Represent projections of lines and solids.

CO2 Draw projections of solids cut by section planes.

CO3 Convert the pictorial view into orthographic projections.

CO4 Convert the orthographic projections into isometric view.

Course Contents:

Introduction to Drawing & Geometrical Contraction

Introduction: Introduction and importance of engineering drawing, Drawing Instruments and their use, Drawing layout, types of lines, lettering and Dimensioning

Engineering Curves: Cycloid, Epicycloid, and Hypocycloid; Involutes.

Projection of Points and Lines

Introduction: Method of projections, Orthographic projection, Reference planes, Quadrants, Reference line etc. Projection of Points.

Projections of lines: Line inclined to both the reference planes (excluding the traces), True/Apparent lengths & inclinations.

Projection Solids, Sections of Solids

Projections of Solids: Solids (Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron and cone only with their axis inclined to HP or VP only (Excluding Spheres, Composite and Hollow solids) Use change of position or Auxiliary Plane method.

Section of Solids: Section of Prism, Pyramid, Cylinder, Tetrahedron, Hexahedron & cone cut by plane. Use change of Position or Auxiliary plane method.

Orthographic Projections

Multi View Orthographic projections of simple machine parts by first angle method, Sectional views of simple machine parts (full & Half Section only)

Isomeric Projection

Isomeric scale, isometric view/Drawing of simple blocks with plain and cylindrical surfaces. (excluding spherical surface)

Note: Only FIRST ANGLE Method of projections must be used throughout the course.

Text books

1. N. D. Bhatt, Engineering Drawing, Charotar publishing house, 53rd Edition, 2014
2. N. H. Dubey, Engineering Drawing Nandu Publishers & printers, 15th Edition, 2015

PROGRAMME NAME	**BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING**						
COURSE CODE	**R5ME1002L**	**SEMESTER**	II	**CREDITS**	1	**SCHEME**	0L:2P
COURSE	**ENGINEERING GRAPHICS LABORATORY**						

Course Outcomes:

The student should be able to –
CO1 Draft various Geometrical Elements used in Engineering Practice using CAD software.
CO2 Draft projections of various objects and their representation and dimensioning using CAD software.
CO3 Represent objects through isometric projections. Interpret drawings of engineering parts and objects.
CO4 Acquire drawing skills pertaining to various topics like projection of points, lines and solids.

Course Contents:

Introduction to Computer Aided sketching
Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tools bars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of co-ordinate points, lines, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, offset, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions material conventions and lettering

Minimum 10 Exercises based on above mentioned topics with minimum two problems in each Exercise.

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5EL1021T	SEMESTER	II	CREDITS	3	SCHEME	2L:0T
COURSE	Numerical Techniques						

Course Outcomes:

After the completion of the course, students would be able to

CO1 Perform an error analysis for given numerical method.

CO2 Apply the numerical method to find the root of algebraic and transcendental equation.

CO3 Solve the of algebraic equation using direct method and iterative method.

CO4 Solve the problems using the concept of numerical differentiation and integration .

CO5 Solve numerical on interpolation and curve fitting.

Course Contents:

NUMERICAL COMPUTATIONS AND ERROR ANALYSIS Introduction, Why numerical methods? , Numbers and their accuracy, Floating point arithmetic, Errors in numbers, Computational methods for error estimation, General error formulae, Approximation of a function, Series approximation, Error propagation in computation.
SYSTEM OF SIMULTANEOUS ALGEBRAIC EQUATIONS Direct Methods of solution:- Cramer's rule, Matrix inversion method, Gauss elimination method, Gauss-Jordan method, Crout's (LU-method). **Iterative methods of solution**:- Jacobi's method, Gauss-seidel method, Relaxation method.
ALGEBRAIC AND TRANSCENDENTAL EQUATIONS Basic properties of polynomial equations, Relation between roots and coefficients. **Iterative Numerical Methods:-** Bisection method, Iteration methods, Newton-Rapson method.
INTERPOLATION AND CURVE FITTING : Interpolation:- Newton's forward interpolation formula, Gauss's forward and backward interpolation formula, Lagrange's interpolation formula, Inverse interpolation Lagrange's method and Iterative method, Bassel's interpolation formula. **Curve Fitting:-** Least square curve fitting , Straight line fitting , Parabolic curve fitting, Fitting of other curves, General least square method
NUMERICAL DIFFERENTIATION AND INTEGRATION : Numerical Differentiation:- Derivatives using Newton's backward difference formula, Differentiation based on Lagrange's interpolation formula. **Numerical Integration:-** Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.

Reference Books:

1. Niyogi, Pradip, "Numerical Analysis and Algorithms", Tata McGraw –Hill
2. Balagurusamy,E., "Numerical Methods", Tata McGraw –Hill
3. Sastry, S.S., "Introduction Methods of Numerical Analysis", PHI
4. Chapra, S.C. and Canale, R.P., "Numerical Methods for Engineers", Tata McGraw –Hill

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5EL1022T	SEMESTER	II	CREDITS	3	SCHEME	2L:0T
COURSE	Basic Electronics						

Course Outcomes:

After the completion of the course, students would be able to

CO1 Understand the semiconductor physics of the intrinsic, p and n materials.

CO2 Understand the function and operation of diodes.

CO3 Understand the function and operation transistors.

CO4 Understand the fundamental concepts of digital electronics.

Course Contents:

Semi-Conductors and Diodes: Conductors, Semiconductors, Intrinsic Semiconductors, Extrinsic Semi-Conductors. Diode Theory: Basic Ideas, The ideal Diode, Forward and Reverse Bias, Diode Equation, Volt-Ampere Characteristic. Special diodes: symbol of zener diode, operation, V-I characteristics, symbol of photo diode, working principle, LED symbol and principle.
Rectifiers: Half-wave Rectifier, Full-wave and Bridge Rectifier, derivation of Ripple factor, efficiency of Half-wave, full-wave and Bridge rectifiers. Merits and demerits of Half-wave, full-wave and Bridge rectifiers, Comparisons of rectifiers, Controlled Rectifier Introduction
Bipolar Junction Transistors: Symbols of pnp and npn transistors and their working principles, Transistor currents, input and output characteristics of Common base configuration, Common Emitter configuration Transistor Switch, Amplifiers: working principles of Common base amplifier, Common Emitter amplifier, Common collector amplifier and their applications
Digital Electronics: Number systems, Binary arithmetic, Logic gates: OR, NOT, AND, NOR, NAND, XOR, XNOR gate; Truth tables Multiplexers, Demux, Encoder, Decoder ,Combinational circuits: SOP, POS form; K-map ,Introduction of Flip-flops

Text Books:-

1. Electronic Devices and Circuit Theory",Robert L. Boylestad, Pearson Education, 11th Edition, 23 July 2013.
2. "Electronic Devices and Circuits", David A.Bell, Oxford, 5th edition, 2009.

Reference Books:

1. "Digital Fundamentals", Thomas L. Floyd, Pearson Education,11th Edition, 30 August 2017.
2. "Digital Electronics Principles, Devices and Applications", Anil K Maini, Willey, 1st edition ,27 July 2007.

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5EL1023TL	SEMESTER	II	CREDITS	1	SCHEME	0L:2P
COURSE	**Basic Electronics Lab**						

Course Outcomes:

After the completion of the course, students would be able to

CO1 Analyze and design various electrical circuits.

CO2 Implement various electronic circuits using discrete components and to understand their applications..

CO3 Understand working of various amplifiers.

CO4 Implement Boolean expressions using logic gates and understand their application in logic design.

Course Contents:

1. Study of CRO & Measurement of Voltage Amplitude & Frequency
2. V-I Characteristics of Silicon & Germanium PN Junction diodes
3. V-I Characteristics of Zener Diode
4. Characteristics of BJT in Common Emitter Configuration
5. Characteristics of JFET in Common Source Configuration
6. Half Wave and Full Wave Rectifier Without Filter
7. Half Wave and Full Wave Rectifier with Filter
8. Common Emitter BJT Amplifier
9. To verify truth table of logical gate.
10. To implement universal gate using basic logic gates.

Text Books:-

1. Electronic Devices and Circuit Theory",Robert L. Boylestad, Pearson Education, 11th Edition, 23 July 2013.
2. "Electronic Devices and Circuits", David A.Bell, Oxford, 5th edition, 2009.

Reference Books:

1. "Digital Fundamentals", Thomas L. Floyd, Pearson Education,11th Edition, 30 August 2017.
2. "Digital Electronics Principles, Devices and Applications", Anil K Maini, Willey, 1st edition ,27 July 2007.

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5EL1024L	SEMESTER	II	CREDITS	1.5	SCHEME	0L:3P
COURSE	DESIGN THINKING and Idea Lab						

Course Outcomes:

After the completion of course, the student should be able to

1. Students will be able to identify an Opportunity from a Problem.
2. Students will be able to frame a product or service idea.
3. Students will be able to design and develop a Prototype.
4. Students will be able to pitch their idea

Course Contents:

Module	Content
1	Introduction to Design Thinking: LRI Assessment, Introduction to Design Thinking, Understanding the Mindsets-Empathy, Optimism, Embrace Ambiguity, Make it, Learn from Failure, Iterate, Create Confidence, Creativity Convergent & Divergent Thinking
2	Design Thinking Methodology: The 5 Stages of the Design Thinking Process-Empathies, Define (the problem), Ideate, Prototype, and Test
3	Ideation tools & exercises. Sample Design Challenge, Introduction to the Design Challenge Themes, Storytelling and Tools for Innovation
4	Empathize-Understand customers, Empathy Maps, Empathies-Step into customers shoes Customer Journey Maps, Define- Analysis & Drawing Inferences from Research
5	The Design Challenge: Define the Design Challenge, Prototyping & Iteration-Feasibility Study, Testing Documentation and the Pitching. Process of patenting.

Text Books:-

- Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School -Idris Mootee.

References Books:

- Zero to One: Note on Start-Ups, or How to Build the Future.
- The Lean Startup: How Constant Innovation Creates Radically Successful Businesses.

PROGRAMME NAME	BACHELOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING						
COURSE CODE	R5HS1002L	SEMESTER	I	CREDITS	2	SCHEME	1L:2P
COURSE	BUSINESS & TECHNICAL COMMUNICATION						

Course Outcomes

After completion of course, students would be able to:

1. Apply the principles and practices of business communication for communicating in a professional environment.
2. Design a technical document with correctness of language, appropriate vocabulary and style.
3. Display competence in oral and visual communication.
4. Demonstrate capabilities for self-assessment and development.

Course Contents

FOUNDATIONS OF BUSINESS ENGLISH

- Introduction to Business English and its importance in the professional world.
- Business Vocabulary and commonly used expressions. Business Idioms at the workplace.

BUSINESS AND TECHNICAL WRITING

- Understanding Business writing language, style and tone.
- Crafting clear and concise business documents: Instruction Manuals/Brochures. Developing Email Etiquette.

BUSINESS GRAMMAR AND LANGUAGE USAGE

- Review of essential English grammar rules.
- Identifying commonly made errors in Indian English.

GROUP DISCUSSION

- Basics of a Group Discussion.
- Understanding the different types of Group Discussions. Practical tips and suggestions for a GD.

PRESENTATION SKILLS

- Structuring a compelling business presentation.
- Engaging an audience and using visual aids effectively.

INTRODUCTION TO PUBLIC SPEAKING FOR ENGINEERS
Techniques to manage and reduce public speaking anxiety.

- Crafting a clear and concise speech outline.
- Tailoring the message for different audiences.

CRITICAL THINKING SKILLS

- Introduction to the processes of logical reasoning to interpret arguments.
- Evaluating information from a lens of fact checking, evidentiary support, confirmation bias and language analysis.

Text Books

1. H. S. Mukherjee, *Business Communication: Connecting at Work*, Oxford University Press; Pap/Cdr edition (26 November 2012), ISBN: 9780198073475
2. A. Rizvi, *Effective Technical Communication*, McGraw Hill Education; 1 edition (27 June 2005), ISBN: 0070599521
3. M. Raman, P. Singh, *Business Communication*, Oxford; Second edition (6 August 2012), ISBN: 9780198077053

Recommended Reading:

1. E. H. Mcgrath, *Basic Managerial Skills for All*, Prentice Hall India Learning Private Ltd.; 9 edition (2011), ISBN: 9788120343146
2. R. Subramanian, *Professional Ethics*, Oxford University Press; Second edition (17 April 2017), ISBN: 0199475075