BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
B.Tech. in ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE &SYLLABUS (R22 Regulations)
Applicable fromA.Y.2022-23Batch

I Year I Semester

S.No.	Course Code	Course Title	L	T	P	Credits
1	22MA101BS	Matrices and Calculus	3	1	0	4
2	22CH101BS	Engineering Chemistry	3	1	0	4
3	22CS103ES	C Programming and Data Structures	3	0	0	3
4	22EE105PC	Electrical Circuit Analysis–I	3	0	0	3
5	22ME103ES	Computer Aided Engineering Graphics	1	0	4	3
6	22EE106PC	Elements of Electrical and Electronics Engineering	0	0	2	1
7	22CH102BS	Engineering Chemistry Laboratory	0	0	2	1
8	22CS104ES	C Programming and Data Structures Laboratory	0	0	2	1
		Induction Program				
		Total Credits	**13**	**2**	**10**	**20**

I Year II Semester

S.No.	Course Code	Course Title	L	T	P	Credits
1	22MA202BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22PH201BS	Applied Physics	3	1	0	4
3	22ME201ES	Engineering Workshop	0	1	3	2.5
4	22EN201HS	English for Skill Enhancement	2	0	0	2
5	22EE207ES	Electrical Circuit Analysis- II	2	0	0	2
6	22CS208ES	Python Programming Laboratory	0	1	2	2
7	22PH202BS	Applied Physics Laboratory	0	0	3	1.5
8	22EN202HS	English Language and Communication Skills Laboratory	0	0	2	1
9	22EE208ES	Electrical Circuit Analysis Laboratory	0	0	2	1
10	22MC201ES	Environmental Science	3	0	0	0
		Total Credits	**13**	**2**	**14**	**20**

II YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	22MA305BS	Numerical Methods and Complex variables	3	1	0	4
2	22EE309PC	Electrical Machines-I	3	1	0	4
3	22EC311PC	Analog Electronic Circuits	3	0	0	3
4	22EE312PC	Power System-I	3	0	0	3
5	22EE311PC	Electro Magnetic Fields	3	0	0	3
6	22EE310PC	Electrical Machines Laboratory-I	0	0	2	1
7	22EC312PC	Analog Electronic Circuits Laboratory	0	0	2	1
8	22EE313PC	Electrical Simulation tools Laboratory	0	0	2	1
9	22MC302	Gender Sensitization Laboratory	0	0	2	0
		Total Credits	**15**	**2**	**08**	**20**

II YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	22ME414ES	Solid Mechanics &Hydraulic Machines	3	1	0	4
2	22EE414PC	Measurements and Instrumentation	3	0	0	3
3	22EE417PC	Electrical Machines–II	3	0	0	3
4	22EC407ES	Digital Logic Design	2	0	0	2
5	22EE416PC	Power System-II	3	0	0	3
6	22EC408ES	Digital Logic Design Laboratory	0	0	2	1
7	22EE415PC	Measurements and Instrumentation Laboratory	0	0	2	1
8	22EE418PC	Electrical Machines Laboratory-II	0	0	2	1
9	22EE446PR	Real-time Research Project/Field Based Project	0	0	4	2
10	22MC403	Constitution of India	3	0	0	0
		Total Credits	**17**	**1**	**10**	**20**

III YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	22EE519PC	Power Electronics	3	1	0	4
2	22EE524PC	Control Systems	3	1	0	4
3	22EC530PC	Microprocessors & Microcontrollers	3	0	0	3
4		Professional Elective-I	3	0	0	3
5	22SM501MS	Business Economics and Financial Analysis	3	0	0	3
6	22EC531PC	Microprocessors& Microcontrollers Laboratory	0	0	2	1
7	22EE520PC	Power Electronics Laboratory	0	0	2	1
8	22EN503HS	Advanced English Communication Skills Laboratory	0	0	2	1
9	22MC504	Intellectual Property Rights	3	0	0	0
10	22MC507	Cyber Security	3	0	0	0
		Total Credits	**18**	**2**	**6**	**20**

III YEAR II SEMESTER

S.No	Course Code	Course Title	L	T	P	Credits
1		Open Elective-I	3	0	0	3
2		Professional Elective-II	3	0	0	3
3	22EC609PC	Signals and Systems	3	0	0	3
4	22EE622PC	Power System Protection	3	0	0	3
5	22EE621PC	Power System Operation and Control	3	0	0	3
6	22EE622PC	Power System Laboratory	0	0	2	1
7	22EE623PC	Control Systems Laboratory	0	0	2	1
8	22EC634PC	Digital Signal Processing Lab	0	0	2	1
9	22EE647PR	Industry Oriented Mini Project/Internship	0	0	4	2
10	*22MC606	Environmental Science	3	0	0	0
11	22MC605	Fundamentals of AI	3	0	0	0
		Total Credits	**18**	**0**	**10**	**20**

Environmental Science in III Yr II Sem Should be Registered by Lateral Entry Students Only.

IV YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	22EE726PC	Power Electronic Applications to Renewable Energy Systems	3	1	0	4
2		Open Elective-II	3	0	0	3
3		Professional Elective-III	3	0	0	3
4		Professional Elective-IV	3	0	0	3
5	22SM705MS	Fundamentals of Management for Engineers	2	0	0	2
6	22EE727PC	Simulation of Renewable Energy Systems Laboratory	0	0	4	2
7	22EE748PR	Project Stage-I	0	0	6	3
		Total Credits	**14**	**1**	**10**	**20**

IV YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1		Open Elective-III	3	0	0	3
2		Professional Elective-V	3	0	0	3
3		Professional Elective-VI	3	0	0	3
4	22EE849PR	Project Stage–II including Seminar	0	0	22	11
		Total Credits	**9**	**0**	**22**	**20**

Professional Electives

Professional Elective -I

22EE528PE	IoT Applications in Electrical Engineering
22EE529PE	Utilization of Electric Energy
22EE530PE	Computer Aided Electrical Machine Design

Professional Elective-II

22EE631PE	Cyber-Physical Systems
22EE632PE	Power Semiconductor Drives
22EE633PE	Wind and Solar Energy systems

Professional Elective-III

22EE734PE	High Voltage Engineering
22EE735PE	Electric and Hybrid Vehicles
22EE736PE	Digital Signal Processing

Professional Elective-IV

22EE737PE	HVDC Transmission
22EE738PE	Power System Reliability
22EE739PE	Embedded Systems Applications

Professional Elective-V

22EE840PE	Power Quality &FACTS
22EE841PE	Solar Power Batteries
22EE842PE	AI Techniques in Electrical Engineering

Professional Elective-VI

22EE843PE	Smart Grid Technologies
22EE844PE	Electrical Distribution Systems
22EE845PE	Machine Learning Applications to Electrical Engineering

LIST OF SUBJECTS

Sl. No	Name of the subject
1	Basic Electrical Engineering
2	Basic Electrical Engineering Laboratory
3	Basic Electrical and Electronics Engineering
4	Basic Electrical and Electronics Engineering Laboratory
5	Electrical Circuit Analysis–I
6	Elements of Electrical and Electronics Engineering
7	Electrical Circuit Analysis- II
8	Electrical Circuit Analysis Laboratory
9	Electrical Machines-I
10	Electrical Machines Laboratory-I
11	Electro Magnetic Fields
12	Power System-I
13	Electrical Simulation tools Laboratory
14	Measurements and Instrumentation
15	Measurements and Instrumentation Laboratory
16	Power System-II
17	Electrical Machines–II
18	Electrical Machines Laboratory-II
19	Power Electronics
20	Power Electronics Laboratory
21	Power System Operation and Control
22	Power System Protection
23	Power System Laboratory
24	Control Systems
25	Control Systems Laboratory
26	Power Electronic Applications to Renewable Energy Systems
27	Simulation of Renewable Energy Systems Laboratory
46	Real-time Research Project/Field-Based Project
47	Industry Oriented Mini Project/Internship
48	Project Stage–I
49	Project Stage–II including seminar

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
B.Tech. List of open Electives offered by Electrical and Electronics Engineering
Applicable fromA.Y.2022-23Batch

Open Elective-I:

22EE650OE	Renewable Energy Sources
22EEE651O	Fundamental of Electric Vehicles

Open Elective-II:

22EE752OE	Utilization of Electric Energy
22EE753OE	Energy Storage Systems

Open Elective-III:

22EE854OE	Charging Infrastructure for Electric Vehicles
22EE855OE	Reliability Engineering

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22MA101BS: MATRICES AND CALCULUS

B.Tech. I Year I Sem.

L	T	P	C
3	1	0	4

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn
- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

Course outcomes: After learning the contents of this paper the student must be able to
- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigenvalues and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes

UNIT-I: Matrices   **10 L**
Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors   **10 L**
Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Calculus   **10 L**
Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series.
Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications)   **10 L**
Definitions of Limit and continuity.
Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration)   **8 L**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5[th]Editon, 2016.

REFERENCE BOOKS:
1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9[th]Edition,Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22CH101BS: ENGINEERING CHEMISTRY

B.Tech. I Year I Sem.
                                                            L   T   P   C
                                                            3   1   0   4

Course Objectives:
1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

Course Outcomes:
1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineering materials.
4. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT - I: Water and its treatment: [8]
Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation - Determination of F^- ion by ion- selective electrode method.
Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – II Battery Chemistry& Corrosion [8]
Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.
Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials: [8]
Definition – Classification of polymers with examples – Types of polymerization –
addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene
Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation,
Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP).
Rubbers: Natural rubber and its vulcanization.
Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.
Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in

trans-polyacetylene and applications of conducting polymers.
Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: [8]
Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT - V: Engineering Materials: [8]
Cement: Portland cement, its composition, setting and hardening.
Smart materials and their engineering applications
Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides
Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

TEXT BOOKS:
1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:
1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22CS103ES: C PROGRAMMING AND DATA STRUCTURES

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes:
1. Understand the various steps in Program development.
2. Explore the basic concepts in C Programming Language.
3. Develop modular and readable C Programs
4. Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.
5. Apply data structures such as stacks, queues in problem solving
6. To understand and analyze various searching and sorting algorithms.

UNIT - I
Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development
Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output
Structure of a C Program – Operators, Bit-wise operators, Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Statements.

UNIT - II
Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.
Designing Structured Programs- Functions, basics, user defined functions, inter function communication, standard functions.
Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

UNIT - III
Pointers – Introduction, Pointers for inter function communication, pointers to pointers, compatibility,
Pointer Applications – Passing an array to a function, Memory allocation functions, array of pointers
Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

UNIT - IV
Derived types – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.
Input and Output – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

UNIT – V
Sorting- selection sort, bubble sort, insertion sort,
Searching-linear and binary search methods.
Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

TEXT BOOKS:
1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCE BOOKS:
1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE105PC: ELECTRICAL CIRCUIT ANALYSIS –I

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites: Mathematics

Course Objectives:
- To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.
- To learn steady state and transient analysis of single phase and 3-phase circuits.
- To understand Theorems and concepts of coupled circuits.

Course Outcomes: After learning the contents of this paper the student must be able to
- Understand network analysis, techniques using mesh and node analysis.
- Evaluate steady state and transient behavior of circuits for DC and AC excitations.
- Analyze electric circuits using network theorems and concepts of coupled circuits.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.	3	3	3	3	3	3	1	1	2	2	1	3
To learn steady state and transient analysis of single and three phase circuits.	3	2	3	2	3	3	2	2	2	3	2	3
To understand Theorems and concepts of coupled circuits.	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand network analysis, techniques using mesh and node analysis.	3	3	3	3	3	3	3	1	2	1	1	2
Evaluate steady state and transient behaviour of circuits for DC and AC excitations.	3	3	3	3	3	3	3	3	3	3	2	3
Analyse electric circuits using network theorems and concepts of coupled circuits.	3	2	2	2	3	3	3	2	1	3	3	2

UNIT-I:
Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements — R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and super mesh analysis.

UNIT-II:
Single-Phase Circuits: RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Bandwidth and Q-factor.

UNIT-III:
Network theorems: Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (AC & DC).

UNIT-IV:
Poly-phase Circuits: Analysis of balanced and unbalanced 3-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

UNIT-V:
Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficientof coupling, Analysis of circuits with mutual inductance.
Topological Description of Networks: Graph, tree, chord, cut-set, incident matrix, circuit matrix and cut-set matrix,

TEXTBOOKS:
1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:
1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5th Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGraw Hill, 6th Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22ME103ES: COMPUTER AIDED ENGINEERING GRAPHICS

B.Tech. I Year I Sem.

L	T	P	C
1	0	4	3

Pre-requisites: Nil

Course Objectives:
- To develop the ability of visualization of different objects through technical drawings
- To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

Course Outcomes: At the end of the course, the student will be able to:
- Apply computer aided drafting tools to create 2D and 3D objects
- sketch conics and different types of solids
- Appreciate the need of Sectional views of solids and Development of surfaces of solids
- Read and interpret engineering drawings
- Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

UNIT – I:
Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

UNIT- II:
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

UNIT – III:
Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

UNIT – IV:
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

UNIT – V:
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.

REFERENCE BOOKS:
1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE106PC: ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites: Elements of Electrical Engineering

Course Objectives:
- To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
- To study the transient response of various R, L and C circuits using different excitations.
- To determine the performance of different types of DC machines and Transformers.

Course Outcomes: After learning the contents of this paper the student must be able to
- Verify the basic Electrical circuits through different experiments.
- Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
- Analyze the transient responses of R, L and C circuits for different input conditions.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach	3	2	1		2	0	0	1	2	0	1	2
To study the transient response of various R, L and C circuits using different excitations	3	2	1	1	3	0	0	0	2	0	1	1
To determine the performance of different types of DC machines and Transformers	3	2	0		3	0	0	0	1	2	1	1

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Verify the basic Electrical circuits through different experiments	3	2	1	0	1	0	0	0	2	0	2	2
Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods	3	2	1	0	3	1	0	1	1	2	1	2
Analyse the transient responses of R, L and C circuits for different input conditions	3	2	1	1	3	2	0	0	1	0	2	2

List of experiments/demonstrations:
PART-A (compulsory)
1. Verification Ohm's Law
2. Verification of KVL and KCL
3. Verification of Thevenin's and Norton's theorem

4. Verification of Superposition theorem
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Open Circuit and Short Circuit Tests on 1-phase Transformer

PART-B (any two experiments from the given list)
1. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
2. Verification of Reciprocity and Milliman's Theorem.
3. Verification of Maximum Power Transfer Theorem.
4. Determination of form factor for non-sinusoidal waveform
5. Transient Response of Series RL and RC circuits for DC excitation

TEXTBOOKS:
1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:
1. P.Ramana, M.Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S.Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M.S.Sukhija, T.K.Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22CH102BS: ENGINEERING CHEMISTRY LABORATORY

B.Tech. I Year I Sem.   **L   T   P   C**
                                                              0   0   2   1

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:
- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
- Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.

Course Outcomes: The experiments will make the student gain skills on:
- Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
- Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
- Students are able to prepare polymers like bakelite and nylon-6.
- Estimations saponification value, surface tension and viscosity of lubricant oils.

List of Experiments:
I. Volumetric Analysis: Estimation of Hardness of water by EDTAComplexometry method.
II. Conductometry: Estimation of the concentration of an acid by Conductometry.
III. Potentiometry: Estimation of the amount of Fe^{+2} by Potentiomentry.
IV. pH Metry: Determination of an acid concentration using pH meter.
V. Preparations:
   1. Preparation of Bakelite.
   2. Preparation Nylon – 6.
VI. Lubricants:
   1. Estimation of acid value of given lubricant oil.
   2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
VII. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
VIII. Virtual lab experiments
   1. Construction of Fuel cell and its working.
   2. Smart materials for Biomedical applications
   3. Batteries for electrical vehicles.
   4. Functioning of solar cell and its applications.

REFERENCE BOOKS:
   1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
   2. Vogel's text book of practical organic chemistry 5th edition
   3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
   4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22CS104ES: C PROGRAMMING AND DATA STRUCTURES LABORATORY

B.Tech. I Year I Sem.   **L   T   P   C**
                                                                 0   0   2   1

Course Objectives: Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes:
1. Develop modular and readable C Programs
2. Solve problems using strings, functions
3. Handle data in files
4. Implement stacks, queues using arrays, linked lists.
5. To understand and analyze various searching and sorting algorithms.

List of Experiments:
1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5. Write a C program to find the roots of a quadratic equation.
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program to solve Towers of Hanoi problem.
9. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
10. Write a C program to find both the largest and smallest number in a list of integers.
11. Write a C program that uses functions to perform the following:
    i)   Addition of Two Matrices
    ii) Multiplication of Two Matrices
12. Write a C program that uses functions to perform the following operations:
    i)   To insert a sub-string in to a given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
13. Write a C program to determine if the given string is a palindrome or not
14. Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
15. Write a C program to count the lines, words and characters in a given text.
16. Write a C program to generate Pascal's triangle.
17. Write a C program to construct a pyramid of numbers.
18. Write a C program that uses functions to perform the following operations:
    i)   Reading a complex number
    ii) Writing a complex number
    iii) Addition of two complex numbers
    iv) Multiplication of two complex numbers
         (Note: represent complex number using a structure.)
19.19.
    i.   Write a C program which copies one file to another.
    ii. Write a C program to reverse the first n characters in a file.
    (Note: The file name and n are specified on the command line.)

19.
  i.   Write a C program to display the contents of a file.
  ii. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

20. Write a C program that uses functions to perform the following operations on singly linked list.:
i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

21. Write C programs that implement stack (its operations) using
i) Arrays   ii) Pointers

22. Write C programs that implement Queue (its operations) using
i) Arrays   ii) Pointers

23. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order   i) Bubble sort   ii) Selection sort   iii)Insertion sort

24. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
i) Linear search   ii) Binary search

TEXT BOOKS:
  1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
  2. Let us C, YeswanthKanitkar
  3. C Programming, Balaguruswamy.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22MA202BS: ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

B.Tech. I Year II Sem.   **L   T   P   C**
                                                                     3   1   0   4

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn
- Methods of solving the differential equations of first and higher order.
- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course outcomes: After learning the contents of this paper the student must be able to
- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems.
- Use the Laplace transforms techniques for solving ODE's.
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: First Order ODE   **8 L**
Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order   **10 L**
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $x\,V(x)$, method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

UNIT-III: Laplace transforms   **10 L**
Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation   **10 L**
Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration   **10 L**
Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22PH201BS: APPLIED PHYSICS

B.Tech. I Year II Sem.

L	T	P	C
3	1	0	4

Pre-requisites: 10 + 2 Physics

Course Objectives: The objectives of this course for the student are to:
1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibres.

Course Outcomes: At the end of the course the student will be able to:
1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

UNIT - I: QUANTUM PHYSICS AND SOLIDS
Quantum Mechanics: Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect - Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.
Solids: Symmetry in solids, free electron theory (Drude& Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem -Kronig-Penney model – E-K diagram- effective mass of electron-origin of energy bands- classification of solids.

UNIT - II: SEMICONDUCTORS AND DEVICES
Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

UNIT - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS
Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials – applications – liquid crystal displays (LCD) and crystal oscillators.
Magnetic Materials: Hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics.
Energy Materials: Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

UNIT - IV: NANOTECHNOLOGY
Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods – top-down fabrication: ball milling - physical vapor deposition (PVD) - chemical

vapor deposition (CVD) - characterization techniques - XRD, SEM &TEM - applications of nanomaterials.

UNIT - V: LASER AND FIBER OPTICS

Lasers: Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods- ruby laser, He-Ne laser , CO_2 laser, Argon ion Laser, Nd:YAG laser-semiconductor laser-applications of laser.

Fiber Optics: Introduction to optical fiber- advantages of optical Fibers - total internal reflection-construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers-losses in optical fiber - optical fiber for communication system - applications.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4th Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons, 11th Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1st Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group Energy Materials Taylor & Francis Group, 1st Edition, 2022.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22ME201ES: ENGINEERING WORKSHOP

B.Tech. I Year II Sem.

L	T	P	C
1	0	3	2.5

Pre-requisites: Practical skill

Course Objectives:
* To Study of different hand operated power tools, uses and their demonstration.
* To gain a good basic working knowledge required for the production of various engineering products.
* To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
* To develop a right attitude, team working, precision and safety at work place.
* It explains the construction, function, use and application of different working tools, equipment and machines.
* To study commonly used carpentry joints.
* To have practical exposure to various welding and joining processes.
* Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes: At the end of the course, the student will be able to:
* CO 1: Study and practice on machine tools and their operations
* CO 2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
* CO 3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
* CO 4: Apply basic electrical engineering knowledge for house wiring practice.

1. TRADES FOR EXERCISES:
At least two exercises from each trade:
    I.   Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
   II.   Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
  III.   Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
  IV.   Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
   V.   Welding Practice – (Arc Welding & Gas Welding)
  VI.   House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
 VII.   Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:
Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:
1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:
1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EN201HS: ENGLISH FOR SKILL ENHANCEMENT

B.Tech. I Year II Sem.   **L   T   P   C**
                                                                     2   0   0   2

Course Objectives: This course will enable the students to:
1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

Course Outcomes: Students will be able to:
1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
6. Acquire basic proficiency in reading and writing modules of English.

UNIT - I
Chapter entitled '***Toasted English***' **by R.K.Narayan** from *"English: Language, Context and Culture"* published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT - II
Chapter entitled **'ApproJRD' by Sudha Murthy** from *"English: Language, Context and Culture"* ***published*** by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT - III
Chapter entitled **'Lessons from Online Learning' by F.HaiderAlvi, Deborah Hurst et al** from *"English: Language, Context and Culture"* published by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV
Chapter entitled **'Art and Literature' by Abdul Kalam** from *"English: Language, Context and Culture"* published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

UNIT - V
Chapter entitled **'Go, Kiss the World' by Subroto Bagchi**from *"English: Language, Context and Culture"* published by Orient BlackSwan, Hyderabad.

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: *Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.*

➢ **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is **Open-ended**,* besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

➢ **Note**: **2**. Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

TEXT BOOK:
1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:
1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
3. Wood,F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE207ES: ELECTRICAL CIRCUIT ANALYSIS – II

B.Tech. I Year II Sem.   **L T P C**
                                                             2 0 0 2

Prerequisites: Mathematics

Course Objectives:
- To study the transient analysis of various R, L and C circuits for different inputs
- To understand the Fourier series and Laplace transformation.
- To learn about two-port networks and concept of filters.

Course Outcomes: After learning the contents of this paper the student must be able to
- Observe the response of various R, L and C circuits for different excitations.
- Examine the behavior of circuits using Fourier, Laplace transforms and transfer functionof single port network.
- Obtain two port network parameters and applications and design of various filters.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To study the transient analysis of various R, L and C circuits for different inputs	3	3	3	3	3	3	1	1	2	2	1	3
To understand the Fourier series and Laplace transformation.	3	2	3	2	3	3	2	2	2	3	2	3
To learn about two-port networks and concept of filters.	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Observe the response of various R, L and C circuits for different excitations	3	3	3	3	3	3	3	1	2	1	1	2
Examine the behavior of circuits using Fourier, Laplace transforms and transfer function of single port network.	3	3	3	3	3	3	3	3	3	3	2	3
Obtain two port network parameters and applications and design of various filters.	3	2	2	2	3	3	3	2	1	3	3	2

UNIT-I:
Transient analysis: Transient response of R, L & C circuits, Formulation of integral differential equations, Initial conditions, Transient Response of RL, RC and RLC (series and parallel) networks subjected to internal energy, Response to impulse, step, and ramp, exponential and sinusoidal excitations.

UNIT-II:
Electrical circuit Analysis using Laplace Transforms: Application of Laplace Transforms to RL, RC and RLC (series and parallel) Networks for impulse, step, and ramp, exponential and sinusoidal excitations.

UNIT-III:
Two port network parameters: Open circuit impedance, short-circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks, System function, and Impedance and admittance functions.

UNIT-IV:
Fourier Series and Integral: Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integral and its properties, Continuous spectrum, Application to simple networks

UNIT-V:
Filters: Classification of filters – Low pass, High pass, Band pass and Band Elimination, Constant-k and M-derived filters-Low pass and High pass Filters and Band pass and Band elimination filters (Elementary treatment only)

TEXTBOOKS:
1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:
1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W. Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5th Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGraw Hill, 6th Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22CS208ES: PYTHON PROGRAMMING LABORATORY

B.Tech. I Year II Sem.   **L   T   P   C**
                                                              0   1   2   2

Course Outcomes: Upon completing this course, the students will be able to
1.   Build basic programs using fundamental programming constructs
2.   Write and execute python codes for different applications
3.   Capable to implement on hardware boards

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	1	1	-	-	1	-	1	1
CO2	2	3	2	1	1	2	-	-	1	-	1	1
CO3	2	3	2	1	1	2	-	-	1	-	1	1

LIST OF EXPERIMENTS:
Cycle - 1
1.   Downloading and Installing Python and Modules
     a)   Python 3 on Linux
          Follow the instructions given in the URL https://docs.python-guide.org/starting/install3/linux/
     b)   Python 3 on Windows
          Follow the instructions given in the URL https://docs.python.org/3/using/windows.html
          (Please remember that Windows installation of Python is harder!)
     c)   pip3 on Windows and Linux
          Install the Python package installer by following the instructions given in the URL
          https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/
     d)   Installing numpy and scipy
          You can install any python3 package using the command pip3 install <packagename>
     e)   Installing jupyterlab
          Install from pip using the command pip install jupyterlab
2.   Introduction to Python3
     a)   Printing your biodata on the screen
     b)   Printing all the primes less than a given number
     c)   Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum
          of all its factors (excluding the number itself) is equal to the number itself
3.   Defining and Using Functions
     a)   Write a function to read data from a file and display it on the screen
     b)   Define a boolean function *is palindrome*(<input>)
     c)   Write a function *collatz(x)* which does the following: if *x* is odd, *x = 3x + 1*; if *x* is even,
          then *x = x/2*. Return the number of steps it takes for *x* = 1
     d)   Write a function $N(m, s) = exp(-(x-m)^2/(2s^2))/sqrt(2\pi)s$ that computes the Normal
          distribution
4.   The package numpy
     a)   Creating a matrix of given order *m x n* containing *random numbers* in the range 1 to
          99999
     b)   Write a program that adds, subtracts and multiplies two matrices. Provide an interface
          such that, based on the prompt, the function (addition, subtraction, multiplication)
          should be performed
     c)   Write a program to solve a system of *n* linear equations in *n* variables using matrix inverse

5. The package scipy and pyplot
   a) Finding if two sets of data have the same *mean* value
   b) Plotting data read from a file
   c) Fitting a function through a set a data points using *polyfit* function
   d) Plotting a histogram of a given data set
6. The strings package
   a) Read text from a file and print the number of lines, words and characters
   b) Read text from a file and return a list of all *n* letter words beginning with a vowel
   c) Finding a secret message hidden in a paragraph of text
   d) Plot a histogram of words according to their length from text read from a file

Cycle -2

7. Installing OS on Raspberry Pi
   a) Installation using PiImager
   b) Installation using image file
      - Downloading an Image
      - Writing the image to an SD card
        - using Linux
        - using Windows
      - Booting up
   Follow the instructions given in the URL
   https://www.raspberrypi.com/documentation/computers/getting-started.html
8. Accessing GPIO pins using Python
   a) Installing GPIO Zero library.
      First, update your repositories list:
      sudo apt update
      Then install the package for Python 3:
      sudo apt install python3-gpiozero
   b) Blinking an LED connected to one of the GPIO pin
   c) Adjusting the brightness of an LED
         Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness)
using the in-built   PWM wavelength.
9. Collecting Sensor Data
   a) DHT Sensor interface
   ◦ Connect the terminals of DHT GPIO pins of Raspberry Pi.
   ◦ Import the DHT library using *import Adafruit_DHT*
   ◦ Read sensor data and display it on screen.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22PH202BS: APPLIED PHYSICS LABORATORY

B.Tech. I Year II Sem.	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Course Objectives: The objectives of this course for the student to
1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Able to measure the characteristics of dielectric constant of a given material.
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Understanding the method of least squares fitting.

Course Outcomes: The students will be able to:
1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Gain the knowledge of applications of dielectric constant.
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Carried out data analysis.

LIST OF EXPERIMENTS:
1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode
5. Input and output characteristics of BJT (CE, CB & CC configurations)
6. a) V-I and L-I characteristics of light emitting diode (LED)
   b) V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of the resistivity of semiconductor by two probe method.
9. Study B-H curve of a magnetic material.
10. Determination of dielectric constant of a given material
11. a) Determination of the beam divergence of the given LASER beam
    b) Determination of Acceptance Angle and Numerical Apertureof an optical fiber.
12.   Understanding the method of least squares – torsional pendulum as an example.

Note: Any 8 experiments are to be performed.

REFERENCE BOOK:
1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EN202HS: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:
- ✓ To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- ✓ To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- ✓ To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- ✓ To improve the fluency of students in spoken English and neutralize the impact of dialects.
- ✓ To train students to use language appropriately for public speaking, group discussions and interviews

Course Outcomes: Students will be able to:
- ✓ Understand the nuances of English language through audio- visual experience and group activities
- ✓ Neutralise their accent for intelligibility
- ✓ Speak with clarity and confidence which in turn enhances their employability skills

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:
a. **Computer Assisted Language Learning (CALL) Lab**
b. **Interactive Communication Skills (ICS) Lab**

Listening Skills:
Objectives
1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:
Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities

• Just A Minute (JAM) Sessions
The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise – I
CALL Lab:
Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.
Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs-Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises*
ICS Lab:
Understand: Spoken vs. Written language- Formal and Informal English.
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II
CALL Lab:
Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - *Testing Exercises*
ICS Lab:
Understand: Features of Good Conversation – Strategies for Effective Communication.
Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III
CALL Lab:
Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).
Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -*Testing Exercises*
ICS Lab:
Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing
Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV
CALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests - *Testing Exercises*
ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication-Presentation Skills.
Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V
CALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests -*Testing Exercises*
ICS Lab:
Understand: Group Discussion
Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:
1.   Computer Assisted Language Learning (CALL) Lab:
The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:
- i)   Computers with Suitable Configuration
- ii)   High Fidelity Headphones

2.   Interactive Communication Skills (ICS) Lab :
   The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.
Source of Material (Master Copy):
- *Exercises in Spoken English. Part 1,2,3.* CIEFL and Oxford University Press
Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:
- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS:
1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* Cengage Learning India Pvt. Ltd.
2. Shobha, KN&Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* Cambridge University Press

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE208ES: ELECTRICAL CIRCUIT ANALYSIS LABORATORY

B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Prerequisites: Elements of Electrical Engineering & Electrical Circuit Analysis

Course Objectives:
- To design electrical systems and analyze them by applying various Network Theorems
- To measure three phase Active and Reactive power.
- To understand the locus diagrams and concept of resonance.

Course Outcomes: After learning the contents of this paper the student must be able to
- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response of a given network by using theorems.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To design electrical systems and analyse them by applying various Network Theorems	2	1	2	2	2	2	2	1	1	1	2	3
To measure three phase Active and Reactive power	2	1	2	2	2	2	2	1	1	1	2	3
To understand the locus diagrams and concept of resonance.	2	1	2	2	2	2	2	1	1	1	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Analyse complex DC and AC linear circuits.	2	1	2	2	2	2	2	1	2	1	2	3
Apply concepts of electrical circuits across engineering	2	1	2	2	2	2	2	1	2	1	2	3
Evaluate response of a given network by using theorems.	2	1	2	2	2	2	2	1	2	1	2	3

The following experiments are required to be conducted as compulsory
1. To draw the locus Diagrams of RL (R-Varying) and RC (R-Varying) Series Circuits.
2. Verification of Series and Parallel Resonance.
3. Determination of Time response of first order RL and RC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error.
4. Determination of Two port network parameters – Z & Y parameters.
5. Determination of Two port network parameters – A, B, C, D parameters.
6. Determination of Co-efficient of Coupling and Separation of Self and Mutual inductance in a Coupled Circuits.
7. Frequency domain analysis of Low-pass filter.
8. Frequency domain analysis of Band-pass filter.

In addition to the above eight experiments, at least any two of the experiments from the following list arerequired to be conducted

1. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequencyspectrum.

2. Measurement of Active Power for Star and Delta connected balanced loads.
3. Measurement of Reactive Power for Star and Delta connected balanced loads.
4. Frequency domain analysis of High-pass filter.
5. Determination of Two port network parameters -Hybrid parameters.
6. To draw the locus Diagrams of RL (L-Varying) and RC (C-Varying) Series Circuits.
7. Determination of Time response of first order RLC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error.

TEXTBOOKS:
1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:
1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A. Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5th Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGraw Hill, 6th Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22MC201ES: ENVIRONMENTAL SCIENCE

B.Tech. I Year II Sem.

	L	T	P	C
	3	0	0	0

Course Objectives:
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:
- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT - I
Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II
Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT - III
Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV
Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.
Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT - V
Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan

(EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:
1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:
1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22MA305BS: NUMERICAL METHODS AND COMPLEX VARIABLES

B.Tech. II Year I Sem.   L   T   P   C
                                                                                   3   1   0   4

Pre-requisites: Mathematics courses of first year of study.

Course Objectives: To learn
- Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
- Various numerical methods to find roots of polynomial and transcendental equations.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations of first order using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series.

Course outcomes: After learning the contents of this paper the student must be able to
- Express any periodic function in terms of sine and cosine
- Find the root of a given polynomial and transcendental equations.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given first order ODE's
- Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems
- Taylor's and Laurent's series expansions in complex function

UNIT-I: Fourier Series &Fourier Transforms: **10 L**
Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.

UNIT-II: Numerical Methods-I   **10 L**
Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method. Jacobi and Gauss-Seidal iteration methods for solving linear systems of equations.
Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-III: Numerical Methods-II   **8 L**
Numerical integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.
Ordinary differential equations: Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order for first order ODE

UNIT-IV: Complex Differentiation   **10 L**
Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties. (All theorems without Proofs), Conformal mappings, Mobius transformations.

UNIT-V: Complex Integration: **10 L**
Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem.

and their properties. (All theorems without Proofs)

TEXT BOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS:
1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill, 2004.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE309PC: ELECTRICAL MACHINES - I

B.Tech. II Year I Sem.

L	T	P	C
3	1	0	4

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2

Course Objectives:
- To study and understand different types of DC machines and their performance evaluation through various testing methods.
- To understand the operation of single and ploy-phase Transformers
- To analyze the performance of transformers through various testing methods.

Course Outcomes: After learning the contents of this paper the student must be able to
- Identify different parts of a DC machines & understand their operation.
- Carry out different excitation, starting, speed control methods and testing of DC machines.
- Analyze single & three phase transformers and their performance through testing.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To study and understand different types of DC machines an d t h ei r p erformance evaluation through various testing methods.	3	2	3	1	1	1	3	1	2	1	2	3
To understand the operation of single and ploy-phase Transformers	3	3	3	2	2	1	3	1	2	2	2	3
To analyse the performance of transformers through various testing methods	3	2	3	2	2	2	3	1	2	1	3	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Identify different parts of a DC machines & understand their operation	2	2	2	3	3	2	1	1	3	3	3	3
Carry out different excitation, starting, speed control methods and testing of DC machines	2	1	3	1	2	3	3	1	3	2	2	3
Analyse single & three phase transformers and their performance through testing	1	1	2	1	1	3	3	1	3	3	3	3

UNIT-I:

D.C. GENERATORS: Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation.

Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

Methods of Excitation – separately excited and self-excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self-excited and remedial measures. Load characteristics and applications ofshunt, series and compound generators.

UNIT-II:

D.C MOTORS: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series andcompound motors – Armature reaction and commutation.
Speed control of D.C. Motors - Armature voltage and field flux control methods.
Motor starters (3- point and 4- point starters) Testing of D.C. machines - Losses – Constant & Variable losses –calculation of efficiency – condition for maximum efficiency.

UNIT-III:

TESTING OF DC MACHINES: Methods of Testing – direct, indirect, and regenerative testing – Brake test – Swinburne's test – Hopkinson's test –Field's test - separation of stray losses in a D.C. motor test.

UNIT-IV:

SINGLE PHASE TRANSFORMERS: Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams and Applications.
Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency &supply voltage on iron losses.

UNIT-V:

TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS: Open Circuit and Short Circuit tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.
Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Scott connection and Applications.

TEXT BOOKS:
1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

REFERENCE BOOKS:
1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE312PC: POWER SYSTEM - I

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2
Electrical Machines-I & Electrical Machines-II

Course Objectives:
- To understand the power generation through conventional and non-conventional sources.
- To illustrate the economic aspects of power generation and tariff methods.
- To know about overhead line insulators, substations and AC & DC distribution systems.

Course Outcomes: After learning the contents of this paper the student must be able to
- Understand the operation of conventional and renewable electrical power generating stations.
- Evaluate the power tariff methods and Economics associated with power generation.
- Analyze the operations of AIS & GIS, Insulators and Distribution systems.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To understand the power generation through conventional and non-conventional sources	3	3	3	1	1	3	2	3	1	1	2	2
To illustrate the economic aspects of power generation and tariff methods	3	3	2	1	1	3	2	2	1	1	2	1
To know about overhead line insulators, substations and AC & DC distribution systems	3	3	2	1	1	3	2	3	1	1	1	1

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand the operation of conventional and renewable electrical power generating stations	3	3	2	1	1	3	2	2	2	1	2	1
Evaluate the power tariff methods and Economics associated with power generation	3	3	2	1	1	3	2	3	2	1	2	1
Analyse the operations of AIS & GIS, Insulators and Distribution systems	3	3	3	3	1	2	2	2	1	1	1	1

UNIT-I:
GENERATION OF ELECTRIC POWER:
Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant.
Non-Conventional Sources (Elementary Treatment):
Solar Energy, Wind Energy, Fuel Cells, Ocean Energy, Tidal Energy, Wave Energy, Cogeneration, Energy conservation and storage.

UNIT-II:
ECONOMICS OF POWER GENERATION: Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants.
Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT-III:
OVER HEAD TRANSMISSION LINES: Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and effect of earth on capacitance,skin and proximity effects.
OVERHEAD LINE INSULATORS: Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators, Sag and tension calculations.

UNIT-IV:
SUBSTATIONS:
AIR INSULATED SUBSTATIONS (AIS): Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.
GAS INSULATED SUBSTATIONS (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-V:
DC DISTRIBUTION: Classification of Distribution Systems. - Comparison of DC vs. AC and Under-Ground vs. Over- Head Distribution Systems. - Requirements and Design features of Distribution Systems. -Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.
A.C. DISTRIBUTION: Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

TEXT BOOKS:
1. C.L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", 2nd Edition, New AgeInternational, 2009.
2. V.K Mehta andRohit Mehta, "Principles of Power Systems", S. Chand & Company Ltd, New Delhi, 2004.

REFERENCE BOOKS:
1. A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text book on Power System Engineering", Dhanpat Rai Publishing Company (P) Ltd, 2008.
2. C.L. Wadhwa, "Electrical Power Systems", 5th Edition, New Age International, 2009.
3. M.V. Deshpande, "Elements of Electrical Power Station Design", 3rd Edition, Wheeler Pub. 1998.
4. H.Cotton & H. Barber, "The Transmission and Distribution of Electrical Energy", 3rd Edition, 1970.
5. W.D.Stevenson, "Elements of Power System Analysis", 4th Edition, McGraw Hill, 1984.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EC311PC: ANALOG ELECTRONIC CIRCUITS

B.Tech. II Year I Sem.   **L T P C**
                                                                             3 0 0 3

Course Objectives:
- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of basic and feedback amplifier circuits such as small signal,cascaded, large signal and tuned amplifiers.
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will be able to
- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Designs OP-AMP based circuits with linear integratedcircuits.

UNIT-I:
Diode and Bipolar Transistor Circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base and common collector amplifiers;Small signal equivalent circuits,

UNIT-II:
FET Circuits: FET Structure and VI Characteristics, MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequencyequivalent circuit.

UNIT-III:
Multi-Stage and Power Amplifiers: Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers - Class A, Class B, Class C

UNIT-IV:
Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.
Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V:
Operational Amplifiers: Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave andtriangular- wave generators.

TEXT BOOKS:
1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2ndedition 2010
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.

REFERENCE BOOKS:
1. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson.
2. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
3. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
4. P. R. Gray, R. G. Meyer and S. Lewis, "Analysis and Design of Analog IntegratedCircuits", John Wiley & Sons, 2001.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE311PC: ELECTROMAGNETIC FIELDS

B.Tech. II Year I Sem.   L T P C
                                                                                             3 0 0 3

Prerequisites: Mathematics & Applied Physics

Course Objectives:
- To introduce the concepts of electric field and magnetic field.
- To know Applications of electric and magnetic fields in the development of the theory for power transmission linesand electrical machines.
- To study about electromagnetic waves.

Course Outcomes: After learning the contents of this paper the student must be able to
- Understand the basic laws of electromagnetism and their applications.
- Analyze time varying electric and magnetic fields.
- Understand the propagation of EM waves.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To introduce the concepts of electric field and magnetic field	3	1	1	1	3	3	3	1	1	1	0	3
To know Applications of electric and magnetic fields in the development of the theory for power transmission linesand electrical machines.	3	3	2	2	2	3	0	1	1	1	0	2
To study about electromagnetic waves	3	3	1	2	2	2	0	1	1	1	1	2

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand the basic laws of electromagnetism and their applications	3	3	3	3	3	3	3	3	1	1	1	2
Analyze time varying electric and magnetic fields.	3	3	3	1	1	3	2	3	1	1	3	0
Understand the propagation of EM waves	3	2	2	2	3	3	3	2	1	3	3	1

UNIT-I:
STATIC ELECTRIC FIELD: Review of conversion of a vector from one coordinate system to another coordinate system, Coulomb's law, Electricfield intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law andits applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT-II:
CONDUCTORS, DIELECTRICS AND CAPACITANCE: Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Capacitance of a two-wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation.

UNIT-III:
STATIC MAGNETIC FIELDS AND MAGNETIC FORCES: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.
Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions, Magnetic circuits, Self-inductances and mutual inductances.

UNIT-IV:
TIME VARYING FIELDS AND MAXWELL'S EQUATIONS: Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces.

UNIT-V:
ELECTROMAGNETIC WAVES: Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane wave in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors. Poynting theorem.

TEXT BOOKS:
1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

REFERENCE BOOKS:
1. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
2. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
3. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
4. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
5. E. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.
6. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers,International Edition, 1971.
7. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE310PC: ELECTRICAL MACHINES LABORATORY – I

B.Tech. II Year I Sem.   **L T P C**
                                                                                       0 0 2 1

Prerequisites: Electrical Machines- I
Course Objectives:
- To expose the students to the operation of DC Generators.
- To know the operation of various types of DC Motors.
- To examine the performance of Single and Three Phase Transformers.

Course Outcomes: After learning the contents of this paper the student must be able to
- Start and control the Different DC Machines.
- Assess the performance of different machines using different testing methods
- Evaluate the performance of different Transformers using different testing methods

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To expose the students to the operation of DC Generators	3	3	3	3	3	3	1	1	2	2	1	3
To know the operation of various types of DC Motors.	3	2	3	2	3	3	2	2	2	3	2	3
To examine the performance of Single and Three Phase Transformers	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Start and control the Different DC Machines	3	3	3	3	3	3	3	1	2	1	1	2
Assess the performance of different machines using different testing methods	3	3	3	3	3	3	3	3	3	3	2	3
Evaluate the performance of different Transformers using different testing methods	3	2	2	2	3	3	3	2	1	3	3	2

The following experiments are required to be conducted compulsory experiments:
1. Magnetization characteristics of DC shunt generator (Determination of critical field resistance and critical speed)
2. Load test on DC shunt generator (Determination of characteristics)
3. Load test on DC series generator (Determination of characteristics)
4. Hopkinson's test on DC shunt machines (Predetermination of efficiency)
5. Swinburne's test and speed control of DC shunt motor (Predetermination of efficiencies)
6. Brake test on DC compound motor (Determination of performance curves)
7. OC and SC Test on Single Phase Transformer
8. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)

In addition to the above eight experiments, at least any two of the experiments from the following list arerequired to be conducted:
1. Brake test on DC shunt motor (Determination of performance curves)
2. Load test on DC compound generator (Determination of characteristics.
3. Fields test on DC series machines (Determination of efficiency)
4. Retardation test on DC shunt motor (Determination of losses at rated speed)
5. Separation of losses in DC shunt motor.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-PhaseTransformer
7. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

TEXT BOOKS:
1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

REFERENCE BOOKS:
1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EC312PC: ANALOG ELECTRONIC CIRCUITS LABORATORY

B.Tech. II Year I Sem.   **L   T   P   C**
                                                                                   0   0   2   1

Prerequisites: Analog Electronic Circuits

Course Objectives:
- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of basic and feedback amplifier circuits such as smallsignal, cascaded, large signal and tuned amplifiers.
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Design OP-AMP based circuits with linearintegrated circuits.

List of Experiments:
1. Draw the VI Characteristics of given PN Junction diode. Determine the Static and Dynamic resistance of theDiode.
2. Determine the Ripple factor, %Regulation PIV and TUF of the given Rectifier with & without filter.
3. Obtain the I/O Characteristics of CE configurations of BJT. Calculate h-parameters from the Characteristics.
4. Obtain the I/O Characteristics of CB configurations of BJT. Calculate h-parameters from the Characteristics.
5. Obtain the I/O Characteristics of CC configurations of BJT. Calculate h-parameters from the Characteristics.
6. Obtain the Drain and Transfer characteristics of CD,CS configuration of JFET. Calculate gm, rd fromthe Characteristics Adder and Subtractor using Op Amp.
7. Inverting and Non-inverting Amplifiers using Op Amps
8. Adder and Subtractor using Op Amp
9. Integrator Circuit using IC 741.
10. Differentiator circuit using Op Amp.
11. Current Shunt Feedback amplifier
12. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for givenfrequency.
13. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.
14. Design transformer coupled class A power amplifier and draw the input and output waveforms, find itsefficiency

- Experiments related to MOSFET may be included

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE313PC: ELECTRICAL SIMULATION TOOLS LABORATORY

B.Tech. II Year I Sem.   **L T P C**
                                                                 0 0 2 1

Course Objectives:
- To understand basic block sets of different simulation platform used in electrical/electronic circuit design.
- To understand use and coding in different software tools used in electrical/ electronic circuit design.
- To understand the simulation of electric machines/circuits for performance analysis.

Course Outcomes: After learning the contents of this paper the student must be able to
- Develop knowledge of software packages to model and program electrical and electronics systems.
- Model different electrical and electronic systems and analyze the results.
- Articulate importance of software packages used for simulation in laboratory experimentation by analyzing the simulation results.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To understand basic block sets of different simulation platform used in electrical/electronic circuit design	3	3	3	3	3	3	2	2	1	2	2	1
To understand use and coding in different software tools used in electrical/ electronic circuit design	3	3	3	1	1	3	1	2	1	2	2	1
To understand the simulation of electric machines/circuits for performance analysis	3	3	2	1	2	3	2	1	2	1	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Develop knowledge of software packages to model and program electrical and electronics systems	3	3	1	3	2	3	2	3	1	2	2	3
Model different electrical and electronic systems and analyse the results	3	2	2	1	2	1	2	1	2	2	2	3
Articulate importance of software packages used for simulation in laboratory experimentation by analysing the simulation results	3	2	0	0	2	0	1	0	2	0	2	3

Students should be encouraged to use open-source software's such as **SCILAB, ORCAD, LTSPICE, Ngspice, Octave, Solve Elec, Simulide, CircuitLab, QElectroTech, Circuit Sims, DcAcLab, Every Circuit, DoCircuits**etc. for carrying out the lab simulation listed below.

Use of Professional Licensed versions of softwares**like MATLAB, LabVIEW, NI Multisim, PSpice, PowerSim, TINA** etc. is also allowed.

Use of **'Python'** platform for simulating components/ circuit behaviour.

Suggested List of Laboratory Experiments:

The following experiments need to be performed from various subject domains.
1. Introduction to basic block sets of simulation platforms. Basic matrix operations, Generation of standard test signals
2. Solving thelinear and nonlinear differential equations
3. Measurement of Voltage, Current and Power in DC circuits.
4. Verification of different network theorems with dependent and independent sources using suitable simulation tools.
5. Verification of performance characteristics of basic Electronic Devices using suitable simulation tools.
6. Analysis of series and parallel resonance circuits using suitable simulation tools
7. Obtaining the response of electrical network for standard test signals using suitable simulation tools.
8. Modeling and Analysis of Low pass and High pass Filters using suitable simulation tools
9. Performance analysis of DC motor using suitable simulation tools
10. Modeling and analysis of Equivalent circuit of transformer using suitable simulation tools.
11. Analysis of single-phase bridge rectifier with and without filter using suitable Simulation tools.
12. Modeling and Verification of Voltage Regulator using suitable simulation tools.
13. Modeling of transmission line using simulation tools.
14. Performance analysis of Solar PV model using suitable simulation tools

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22MC302: GENDER SENSITIZATION LAB
(An Activity-based Course)

B.Tech. II Year I Sem.   **L T P C**
                                                                                      0 0 2 0

COURSE DESCRIPTION
This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course
- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes
➢ Students will have developed a better understanding of important issues related to gender in contemporary India.
➢ Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
➢ Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
➢ Students will acquire insight into the gendered division of labor and its relation to politics and economics.
➢ Men and women students and professionals will be better equipped to work and live together as equals.
➢ Students will develop a sense of appreciation of women in all walks of life.
➢ Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I: UNDERSTANDING GENDER
Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men
- Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*
Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**
  - ➢ *Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".*

   - ⮚ **ESSENTIAL READING**: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:
  - Discussion & Classroom Participation: 20%
  - Project/Assignment: 30%
  - End Term Exam: 50%

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22ME414ES: SOLID MECHANICS AND HYDRAULIC MACHINES

B.Tech. II Year II Sem.　　　　　　　　　　　　　　　　　　　　　**L　T　P　C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3　1　0　4

Course Objectives:

- To identify an appropriate structural system and work comfortably with basic engineering mechanics and types of loading & support conditions that act on structural systems.
- To Understand the meaning of centers of gravity, centroids, moments of Inertia and rigid body dynamics.
- To Study the characteristics of hydroelectric power plant and Design of hydraulic machinery.

Course Outcomes: After learning the contents of this paper the student must be able to

- Solve problems dealing with forces, beam and cable problems and understand distributed force systems.
- Solve friction problems and determine moments of Inertia and centroid of practical shapes.
- Apply knowledge of mechanics in addressing problems in hydraulic machinery and its principles that will be utilized in Hydropower development and for other practical usages.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To identify an appropriate structural system and work comfortably with basic engineering mechanics and types of loading & support conditions that act on structural systems.	3	3	3	3	3	3	1	1	2	2	1	3
To Understand the meaning of centers of gravity, centroids, moments of Inertia and rigid body dynamics.	3	2	3	2	3	3	2	2	2	3	2	3
To Study the characteristics of hydroelectric power plant and Design of hydraulic machinery.	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Solve problems dealing with forces, beam and cable problems and understand distributed force systems.	3	3	3	3	3	3	3	1	2	1	1	2
Solve friction problems and determine moments of Inertia and centroid of practical shapes.	3	3	3	3	3	3	3	3	3	3	2	3
Apply knowledge of mechanics in addressing problems in hydraulic machinery and its principles that will be utilized in Hydropower development and for other practical usages.	3	2	2	2	3	3	3	2	1	3	3	2

UNIT–I:
INTRODUCTION OF ENGINEERING MECHANICS: Basic concepts of System of Forces-Coplanar Forces–Components in Space–Resultant- Moment of Forces andits Application – Couples and Resultant of Force System-Equilibrium of System of Forces-Free body diagrams-Direction of Force Equations of Equilibrium of Coplanar Systems and Spatial Systems – Vector cross product- Support reactions different beams for different types of loading – concentrated, uniformly distributedand uniformly varying loading. Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Angle of Friction –Cone of limiting friction

UNIT–II:
CENTROID AND CENTER OF GRAVITY: Centroids – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies – Area momentof Inertia:–polar Moment of Inertia–Transfer–Theorems - Moments of Inertia of Composite Figures.
SIMPLE STRESSES AND STRAINS ANALYSIS: Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Pure shear and Complementary shear - Elastic modulii, Elasticconstants and the relationship between them

UNIT–III:
KINEMATICS & KINETICS: Introduction – Rectilinear motion – Motion with uniform and variable acceleration–Curvilinear motion– Components of motion– Circular motion Kinetics of a particle – D'Alembert's principle – Motion in a curved path – work, energy and power. Principleof conservation of energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum.

UNIT-IV:
BASICS OF HYDRAULIC MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency Elements of a typical Hydropower installation – Heads and efficiencies

UNIT-V:
TURBINES & PUMPS: Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency. Governing of turbines, Performance of turbines
Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel

TEXT BOOKS:
1. M.V. Seshagirirao and Durgaih, "Engineering Mechanics",University Press.
2. P.N Modi and Seth, "Fluid Mechanics and Hydraulic Machinery", standard Book House

REFERENCE BOOKS:
1. B. Bhattacharya, "Engineering Mechanics", Oxford University Publications.
2. Hibbler, "Engineering Mechanics (Statics and Dynamics)", Pearson Education.
3. Fedrinand L. Singer, "Engineering Mechanics" Harper Collings Publishers.
4. A.K.Tayal, "Engineering Mechanics", Umesh Publication.
5. Domkundwar & Domkundwar, "Fluid mechanics & Hydraulic Machines", Dhanpat Rai & C
6. R.C.Hibbeler, "Fluid Mechanics", Pearson India Education Servieces Pvt. Ltd
7. D.S.Kumar, "Fluid Mechanic & Fluid Power Engineering", Kataria & Sons Publications Pvt. Ltd.
8. Banga & Sharma, "Hydraulic Machines" Khanna Publishers.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE414PC: MEASUREMENTS AND INSTRUMENTATION

B.Tech. II Year II Sem.   **L T P C**
                                                                                         3 0 0 3

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2, Analog Electronics
             Electro Magnetic Fields.

Course Objectives:
- To introduce the basic principles of all measuring instruments.
- To deal with the measurement of voltage, current, Power factor, power, energy and magneticmeasurements.
- To understand the basic concepts of smart and digital metering.

Course Outcomes: After learning the contents of this paper the student must be able to
- Understand different types of measuring instruments, their construction, operation and characteristics and identify the instruments suitable for typical measurements.
- Apply the knowledge about transducers and instrument transformers to use them effectively.
- Apply the knowledge of smart and digital metering for industrial applications.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To introduce the basic principles of all measuring instruments	3	3	3	3	3	3	1	1	2	2	1	3
To deal with the measurement of voltage, current, Power factor, power, energy and magnetic measurements.	2	1	2	2	2	2	2	1	1	1	2	3
To understand the basic concepts of smart and digital metering	2	1	2	2	2	2	2	1	1	1	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand different types of measuring instruments, their construction, operation and characteristics and identify the instruments suitable for typical measurements	2	1	2	2	2	2	2	1	2	1	2	3
Apply the knowledge about transducers and instrument transformers to use them effectively	2	1	2	2	2	2	2	1	2	1	2	3
Apply the knowledge of smart and digital metering for industrial applications	2	1	2	2	2	2	2	1	2	1	2	3

UNIT - I:
INTRODUCTION TO MEASURING INSTRUMENTS: Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of rangeusing shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – extension of range of E.S. Voltmeters.

UNIT-II:

POTENTIOMETERS & INSTRUMENT TRANSFORMERS: Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratioand phase angle errors

UNIT-III:

MEASUREMENT OF POWER & ENERGY: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems.

Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – tri-vector meter, maximum demand meters.

UNIT-IV:

DC & AC BRIDGES: Method of measuring low, medium and high resistance – sensitivity of Wheat-stone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson's bridge - Owen's bridge. Measurement of capacitance and loss angle –Desaunty's Bridge - Wien's bridge – Schering Bridge.

UNIT-V:

TRANSDUCERS: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

INTRODUCTION TO SMART AND DIGITAL METERING: Digital Multi-meter, True RMS meters, Clamp- on meters, Digital Energy Meter, Cathode Ray Oscilloscope, Digital Storage Oscilloscope.

TEXTBOOKS:
1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications,2005.
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers 1989.

REFERENCE BOOKS:
1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd.,2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice – Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition,Wheeler Publishing, 2011.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE417PC: ELECTRICAL MACHINES – II

B.Tech. II Year II Sem.   **L T P C**
                                                                               3 0 0 3

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2 & Electrical Machines-I

Course Objectives:
- To deal with the detailed analysis of poly-phase induction motors & Alternators.
- To understand operation, construction and types of single-phase motors and their applications in household appliances and control systems.
- To introduce the concept of parallel operation of alternators.

Course Outcomes: After learning the contents of this paper the student must be able to
- Understand the concepts of rotating magnetic fields.
- Examine the operation of ac machines.
- Analyze performance characteristics of ac machines.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To deal with the detailed analysis of poly-phase induction motors & Alternators	2	1	2	1	1	2	2	1	1	1	2	3
To understand operation, construction and types of single-phase motors and their applications in household appliances and control systems	2	1	2	1	1	2	2	1	2	1	2	3
To introduce the concept of parallel operation of alternators	2	1	2	1	1	3	2	1	2	2	3	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand the concepts of rotating magnetic fields	2	1	1	2	1	1	1	1	1	1	1	3
Examine the operation of ac machines	2	1	1	2	2	1	1	1	1	1	2	3
Analyse performance characteristics of ac machines	2	1	2	1	3	3	3	1	1	1	3	3

UNIT-I:
POLY-PHASE INDUCTION MACHINES: Constructional details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation.

UNIT-II:
CHARACTERISTICS OF INDUCTION MACHINES: Torque equation-expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - crawling and cogging, No-load Test and Blocked rotor test –Predetermination of performance-Methods of starting and starting current and Torque calculations, Applications.
SPEED CONTROL METHODS: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT-III:
SYNCHRONOUS MACHINES: Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.
Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT-IV:
PARALLEL OPERATION OF SYNCHRONOUS MACHINES: Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing -Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactance's and Applications.
SYNCHRONOUS MOTORS: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed. - Hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT-V:
SINGLE PHASE MACHINES: Single phase induction motor – Constructional Features-Double revolving field theory – split-phase motors – AC series motor- Universal Motor- -Shadedpole motor and Applications.

TEXT BOOKS:
1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

REFERENCE BOOKS:
1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EC407ES: DIGITAL LOGIC DESIGN

B.Tech. II Year II Sem.

L	T	P	C
2	0	0	2

Course Objectives:
1. To understand common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used inthe design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

Course Outcomes: Upon completing this course, the students will be able to
1. Acquire the knowledge on numerical information in different forms and Boolean Algebratheorems.
2. Define Postulates of Boolean algebra and to minimize combinational functions, and designthe combinational circuits.
3. Design and analyse sequential circuits for various cyclic functions.
4. Characterize logic families and analyze them for the purpose of AC and DC parameters.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	1	-	-	-	-	-	2
CO2	3	2	2	1	2	1	-	-	-	-	-	2
CO3	2	3	3	2	2	1	-	-	-	-	-	1
CO4	3	2	1	1	1	-	-	-	-	-	-	-

UNIT - I
Number Systems: Number systems, Complements of Numbers, Codes- Weighted and Non-weightedcodes and its Properties, Parity check code and Hamming code.

Boolean algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT - II
Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison..

UNIT – III
Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers,Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

Sequential Circuits Fundamentals: Basic Architectural Distinctions between

Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

UNIT - IV
Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Sequential Machines: Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N – Counters.

UNIT – V
Finite state machine: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs. Asynchronous design-modes of operation, Hazards, synthesis of SIC fundamental mode circuits, synthesis of burst mode circuits. Introduction to ASM Charts

TEXT BOOKS
1. Zvi Kohavi &Niraj K. Jha, - Switching and Finite Automata Theory, 3rd Ed., Cambridge, 2010.
2. R. P. Jain - Modern Digital Electronics, 3rd Edition, 2007- Tata McGraw-Hill

REFERENCE BOOKS
1. Morris Mano, Fredriac J. Hill, Gerald R. Peterson - Introduction to Switching Theory and LogicDesign –3rd Ed., John Wiley & Sons Inc.
2. Charles H. Roth - Fundamentals of Logic Design, 5th ED., Cengage Learning, 2004.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE416PC: POWER SYSTEMS - II

B.Tech. II Year II Sem.　　　　　　　　　　　　　　　　　　　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 0 0 3

Prerequisites: Power Systems –I & Electro Magnetic Fields

Course Objectives:

- To study the performance of transmission lines and travelling waves.
- To understand the concept of voltage control, compensation methods and per unit representation of power systems.
- To know the methods of overvoltage protection, Insulation coordination, Symmetrical components and fault calculation analysis.

Course Outcomes: After learning the contents of this paper the student must be able to

- Analyze transmission line performance and Apply load compensation techniques to control reactive power.
- Understand the application of per unit quantities in power systems.
- Design over voltage protection, insulation coordination and determine the fault currents for symmetrical and unbalanced faults.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To study the performance of transmission lines and travelling waves	3	3	3	1	1	3	2	3	1	1	2	2
To understand the concept of voltage control, compensation methods and per unit representation of power systems.	3	3	2	1	1	3	2	2	1	1	2	1
To know the methods of overvoltage protection, Insulation coordination, Symmetrical components and fault calculation analysis.	3	3	2	1	1	3	2	3	1	1	1	1

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Analyse transmission line performance and Apply load compensation techniques to control reactive power.	3	3	3	3	3	3	3	3	3	1	3	2
Understand the application of per unit quantities in power systems	3	3	3	1	1	2	2	3	3	1	2	2
Design over voltage protection, insulation coordination and determine the fault currents for symmetrical and unbalanced faults	3	3	2	1	1	3	2	2	2	1	2	1

UNIT - I:

PERFORMANCE OF LINES: Representation of lines, short transmission lines, medium length lines, nominal T and PI- representations, long transmission lines. The equivalent circuit representation of a

long Line, A, B, C, D constants, Ferranti Effect.

Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and Communication lines.

UNIT-II:

VOLTAGE CONTROL & POWER FACTOR IMPROVEMENT: Introduction – methods of voltage control, shunt and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers, power factor improvement methods.

COMPENSATION IN POWER SYSTEMS: Introduction - Concepts of Load compensation – Load ability characteristics of overhead lines – Uncompensated transmission line – Symmetrical line – Radial line with asynchronous load – Compensation of lines.

UNIT-III:

PER UNIT REPRESENTATION OF POWER SYSTEMS: The one-line diagram, impedance and reactance diagrams, per unit quantities, changing the base of per unit quantities, advantages of per unit system.

TRAVELLING WAVES ON TRANSMISSION LINES: Production of travelling waves, open circuited line, short-circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T-junction line terminated through a capacitance, capacitor connection at a T-junction, Attenuation of travelling waves.

UNIT-IV:

OVERVOLTAGE PROTECTION AND INSULATION COORDINATION: Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods, counter poise, surge absorbers, insulation coordination, volt-time curves.

UNIT-V:

SYMMETRICAL COMPONENTS AND FAULT CALCULATIONS: Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks, fault calculations, sequence network equations, single line to ground fault, line to line fault, double line to ground fault, three phase fault, faults on power systems, faults with fault impedance, reactors and their location, short circuit capacity of a bus.

TEXT BOOKS:
1. C.L. Wadhwa, "Electrical Power Systems", New Age International Pub. Co, Third Edition, 2001.
2. D.P. Kothari and I.J. Nagrath, "Modern Power System Analysis", Tata Mc Graw Hill Pub. Co., New Delhi, Fourth edition, 2011.

REFERENCE BOOKS:
1. A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text book on Power System Engineering", Dhanpat Rai Publishing Company (P) Ltd, 2008.
2. John J. Grainger & W.D. Stevenson, "Power System Analysis", Mc Graw Hill International,1994.
3. Hadi Scadat, "Power System Analysis", Tata Mc Graw Hill Pub. Co. 2002.
4. W.D. Stevenson, "Elements of Power system Analysis", McGraw Hill International Student Edition.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EC408ES: DIGITAL LOGIC DESIGN LABORATORY

B.Tech. II Year II Sem.
L T P C
0 0 2 1

Course Outcomes: Upon completing this course, the students will be able to
1. Acquire the knowledge on numerical information in different forms and Boolean Algebratheorems.
2. Define Postulates of Boolean algebra and to minimize combinational functions, and designthe combinational circuits.
3. Design and analyze sequential circuits for various cyclic functions.
4. Characterize logic families and analyze them for the purpose of AC and DC parameters.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	1	-	-	1	-	-	2
CO2	3	2	2	1	2	1	-	-	1	-	-	2
CO3	2	3	3	2	2	1	-	-	1	-	-	1
CO4	3	2	1	1	1	-	-	-	-	-	-	-

Note:
* Minimum of 13 experiment are to be completed

List of Experiments
1. Realization of Logic circuit to generate r's Compliment using Logic Gates.
2. Realization of given Boolean function using universal gates and minimizing the same. Compare thegate count before and after minimization.
3. Design and realize Full Adder and Full Subtractor circuit using gates/universal gates.
4. Designing a 2 – bit Comparator using AND, OR and NOT gates. Realize 4 – bit Comparator using 2 – bit Comparators.
5. Realize 2:1 MUX using the given gates and Design 8:1 using 2:1 MUX.
6. Implement the given Boolean function using the given MUX.
7. Realize a 2x4 Decoder using logic gates and implement 3x8 Decoder using 2x4 Decoder.
8. Implement the given Boolean function using Gates.
9. Convert Demultiplexer to Decoder and vise versa.
10. Verification of truth tables of flipflops.
11. Design a Synchronous binary counter using D-flipflop/given flipflop.
12. Design a asynchronous counter for the given sequence using given flipflops.
13. Designing of sequence detecting State Machine with minimal states using the given flipflops.
14. Designing of Parity Bit (even/odd) generator using Gates.
15. Realize all logic gates with TTL logic.
16. Realize all logic gates with DTL logic.

Major Equipment required for Laboratories:
1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeter.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE415PC: MEASUREMENTS AND INSTRUMENTATION LABORATORY

B.Tech. II Year II Sem.   **L T P C**
                                                                                 0 0 2 1

Prerequisites: Measurements and Instrumentation
Course Objectives:
- To calibrate Watt, Energy and PF Meter and determination of three phase active & reactive powers.
- To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges.
- To determine the ratio and phase angle errors of Instrument transformers.

Course Outcomes: After learning the contents of this paper the student must be able to
- Choose and test any measuring instruments.
- Find the accuracy of any instrument by performing experiments.
- Calculate the various parameters using different types of measuring instruments.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To calibrate Watt, Energy and PF Meter and determination of three phase active & reactive powers.	3	3	3	3	3	3	1	1	2	2	1	3
To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges.	3	2	3	2	3	3	2	2	2	3	2	3
To determine the ratio and phase angle errors of Instrument transformers	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Choose and test any measuring instruments	3	3	3	3	3	3	3	1	2	1	1	2
Find the accuracy of any instrument by performing experiments	3	3	3	3	3	3	3	3	3	3	2	3
Calculate the various parameters using different types of measuring instruments	3	2	2	2	3	3	3	2	1	3	3	2

The following experiments are required to be conducted as compulsory experiments:
1. Calibration and Testing of single-phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit.
6. Schering Bridge & Anderson Bridge.
7. Measurement of 3 - Phase reactive power with single-phase wattmeter.
8. Measurement of displacement with the help of LVDT.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:
1. Calibration LPF wattmeter – by Phantom testing.
2. Measurement of 3-phase power with single watt meter and two CTs.
3. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given CT by Null method.
4. PT testing by comparison **–** V. G. as Null detector – Measurement of % ratio error and phase angle of the given PT
5. Resistance strain gauge – strain measurements and Calibration.
6. Transformer turns ratio measurement using AC bridges.
7. Measurement of % ratio error and phase angle of given CT by comparison.

TEXT BOOKS:
1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications,2005.
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers 1989.

REFERENCE BOOKS:
1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd.,2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice – Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition,Wheeler Publishing, 2011.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE418PC: ELECTRICAL MACHINES LABORATORY – II

B.Tech. II Year II Sem.   **L T P C**
                                                                                                         0 0 2 1

Prerequisites: Electrical Machines-I & Electrical Machines-II

Course Objectives:
- To understand the operation of Induction, Synchronous machines and Transformers.
- To study the performance analysis of Induction and Synchronous Machines through various testing methods.
- To analyze the performance of single and 3-phase phase transformer with experiments.

Course Outcomes: After learning the contents of this paper the student must be able to
- Assess the performance of different types of AC machines using different testing methods.
- Analyze the suitability of AC machines and Transformers for real word applications.
- Design the machine models based on the application requirements.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To understand the operation of Induction, Synchronous machines and Transformers	3	3	3	1	1	3	2	3	2	1	3	1
To study the performance analysis of Induction and Synchronous Machines through various testing methods	3	3	3	1	1	3	2	3	1	2	3	1
To analyse the performance of single and 3-phase phase transformer with experiments	3	3	3	2	1	2	1	3	1	1	3	1

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Assess the performance of different types of AC machines using different testing methods	3	3	3	2	1	3	2	1	1	1	3	2
Analyse the suitability of AC machines and Transformers for real word applications	3	3	3	1	3	2	2	2	1	1	1	3
Design the machine models based on the application requirements	3	3	3	2	1	3	2	2	1	2	1	3

The following experiments are required to be conducted as compulsory experiments:

1. Sumpner's test on a pair of single-phase transformers
2. No-load & Blocked rotor tests on three phase Induction motor
3. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods

4. 'V' and 'Inverted V' curves of a three—phase synchronous motor.
5. Equivalent Circuit of a single-phase induction motor
6. Determination of Xd and Xq of a salient pole synchronous machine
7. Load test on three phase Induction Motor
8. Regulation of three-phase alternator by Z.P.F. and A.S.A methods

In addition to the above experiments, at least any two of the following experiments are required to beconducted from the following list:
1. Separation of core losses of a single-phase transformer
2. Efficiency of a three-phase alternator
3. Parallel operation of Single-phase Transformers
4. Heat run test on a bank of 3 Nos. of single-phase Delta connected transformers
5. Measurement of sequence impedance of a three-phase alternator.
6. Vector grouping of Three Transformer
7. Scott Connection of transformer

TEXT BOOKS:
1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

REFERENCE BOOKS:
1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22MC403: CONSTITUTION OF INDIA

B.Tech. II Year II Sem.	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

Course Objectives: Students will be able to:
1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:
1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
4. Discuss the passage of the Hindu Code Bill of 1956.

UNIT - 1 History of Making of the Indian Constitution- History of Drafting Committee.
UNIT - 2 Philosophy of the Indian Constitution- Preamble Salient Features
UNIT - 3 Contours of Constitutional Rights & Duties - Fundamental Rights
* Right to Equality
* Right to Freedom
* Right against Exploitation
* Right to Freedom of Religion
* Cultural and Educational Rights
* Right to Constitutional Remedies
* Directive Principles of State Policy
* Fundamental Duties.

UNIT - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

SUGGESTED READING:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE
(AUTONOMOUS)
22EE446PR: REAL-TIME RESEARCH PROJECT/FIELD BASED PROJECT

B.Tech. II Year II Sem.   **L T P C**
                                                               0 0 4 2