Curriculum Structure
and
Detailed Syllabus

Bachelor of Technology
in
ELECTRICAL ENGINEERING

GITAAUTONOMOUS COLLEGE

Affiliated to BPUT Odisha

Effective From Academic Year 2020-21

Approval History

Date	Resolutions
17.07.2021	The curriculum structure and detailed syllabus of 1st Year& 2nd Year as proposed bythe Boards of Studies is approved by the Academic Council. 1st Semester Syllabus as per BPUT syllabus.
08.10.2021	The curriculum structure and detailed syllabus approved by Governing body members.

Program Outcomes (UG Engineering)

Graduates Attributes (GAs) form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. The Program Outcomes (POs) for UG Engineering programmes defined by NBA are:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.

PO2. **Problem Analysis**: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend

and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Life-long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PEO: Program Educational Objectives Statements

PEO1 The graduates will utilize their expertise in engineering to solve industrial and technological problems.

PEO2 Graduates will be innovators and professionals in technology deployment, and system implementation.

PEO3 Graduates will function in their profession with social awareness and responsibilities.

PEO4 Graduates will interact with their peers in industry and society as engineering professionals and leaders.

PEO5 Graduates will succeed in achieving innovative skills in the field of research and computer application.

Program specific outcomes (PSO) of the Department:

PSO1 The graduates will have the ability to design, develop, and innovate software product or Process in a systematic way by applying algorithm design, Artificial Intelligence, Soft Computing and programming skills.

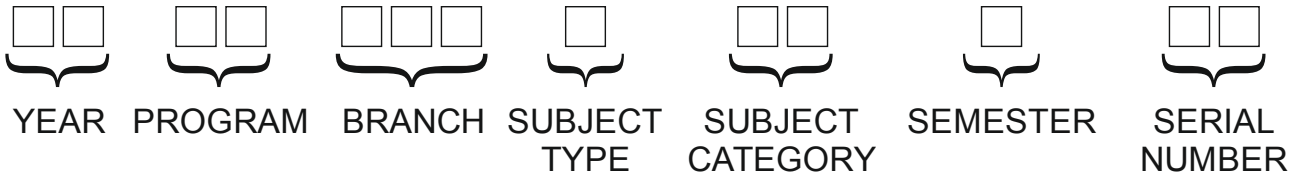
PSO2 The graduates will have the ability to take up higher studies, collaborative research and Entrepreneurships in the modern computing environment.

PSO3 The graduates will have the ability to achieve additional expertise through add-on programs in Machine Learning, Deep Learning, IoT etc and Lifelong learning.

Course Types & Definitions

L	Lecture
T	Tutorial
P	Laboratory / Practical / Sessional
BS	Basic Sciences
LC	Laboratory Courses
HS	Humanities & Social Sciences (including Management)
ES	Engineering Sciences
PC	Professional Core
PE	Professional Elective
OE	Open Elective
MC	Mandatory Course
OO	Massive Open Online Course (MOOC) - Self Study
PI	Summer Internship / Industry Internship / Project Work / Seminar
VV	Viva Voce

Subject Code Format



Curriculum Structure

First Semester

Theory

Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	BS	20BTEETBS101	Engineering Mathematics I	3-0-0	3
2	BS	20BTEETBS102 / 20BTEETBS103	Engineering Physics / Engineering Chemistry	3-0-0	3
3	ES	20BTEETES101 / 20BTEETES102	Basic Electrical Engg. / Basic Electronics Engg.	3-0-0	3
4	ES	20BTEETES103 / 20BTEETES104	Basic Mechanical Engg./ Basic Civil Engineering	3-0-0	3
5	HS	20BTEETHS101	Functional English	2-0-0	2
6	ES	20BTEETES105	Programming for Problem Solving using C	3-0-0	3
7	MC	20BTEEPMC101	Induction Training (21 Days)		0
			Total Credit (Theory)		**17**

Practical

1	BS	20BTEEPBS102 / 20BTEEPBS103	Physics Lab / Chemistry Lab	0-0-2	1
2	ES	20BTEEPES101 20BTEEPES102	Basic Electrical Engg. Lab / Basic Electronics Engg. Lab	0-0-2	1
3	ES	20BTEEPES103 20BTEEPES104	Basic Mechanical Engg. Lab / Basic Civil Engineering Lab	0-0-2	1
4	ES	20BTEEPES105 20BTEEPES106	Engineering Graphics & Design Lab / Workshop	0-0-2	1
5	HS	20BTEEPHS101	Functional English Lab	0-0-2	1
6	ES	20BTEETES105	Programming for Problem Solving using C Lab	0-0-2	1
			Total Credit (Practical)		6
			Total Semester Credit		**23**

Second Semester

Theory

Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	BS	20BTEETBS204	Engineering Mathematics II	3-0-0	3
2	BS	20BTEETBS202 / 20BTEETBS203	Engineering Physics / Engineering Chemistry	3-0-0	3
3	ES	20BTEETES201 / 20BTEETES202	Basic Electrical Engg. / Basic Electronics Engg.	3-0-0	3
4	ES	20BTEETES203 / 20BTEETES204	Basic Mechanical Engg./ Basic Civil Engineering	2-0-0	3
5	HS	20BTEETHS201	Business Communication and life Skills	2-0-0	2
6	ES	20BTEETES205	Programming for Problem Solving using Python	3-0-0	2
7	MC	20BTEEPMC201	NSS / NCC / Yogo		0
			Total Credit (Theory)		**16**

Practical

1	BS	20BTEEPBS202 / 20BTEEPBS203	Physics Lab / Chemistry Lab	0-0-2	1
2	ES	20BTEEPES201 / 20BTEEPES202	Basic Electrical Engg. Lab / Basic Electronics Engg. Lab	0-0-2	1
3	ES	20BTEEPES203 / 20BTEEPES204	Basic Mechanical Engg. Lab / Basic Civil Engineering Lab	0-0-2	1
4	ES	20BTEEPES205 20BTEEPES206	Engineering Graphics & Design Lab / Workshop	0-0-2	1
5	ES	20BTEEPES207	Programming for Problem Solving using Python Lab	0-0-2	2
			Total Credit (Practical)		6
			Total Semester Credit		**22**
			SUMMER INTERNSHIP TRAINING for 30 Days		

1st Semester	20BTEETBS101	ENGINEERING MATHEMATICS - I	L-T-P 3-0-0	Credit 3

Prerequisite

Function, Limit of a function, Continuity of function, Differentiation, Integration.

CourseObjectives:

- TodiscusstheconceptsassociatedwithAsymptote, Curvature,Special functions, Partial differentiation, Maxima, Minima and theirapplications.
- TodiscusstheconceptsanddifferentmethodsforsolutionofFirst order differential equations and its application to Electrical circuits.
- TodescribetheconceptsofLinear differential equation of second order and its methods of solution as well as application to Electrical circuits.
- TopresentthеconceptsofPower series method and its its use in solving differential equations.
- Topresenttheconcepts of Laplace Transformation and it's use in getting solution to differential equations.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module - I (8 Hrs)

Asymptote, Curvature (Cartesian and Polar), Gamma and Beta function, Partial differentiation, Maxima and Minima for function of two variables.

Module - II (8 Hrs)

Differential Equations: First order differential equations, Separable equation, Exact differential equation, Linear differential equation, Bernoulli's equation and application to Electrical circuits.

Module - III (9 Hrs)

Linear differential equation of second order, Homogeneous equation with constant co-efficient, Euler-Cauchy equations, Solution by undetermined co-efficient, Solutions by variation of parameters, Modeling of electric circuits.

Module - IV (10 Hrs)

Series solution of differential equations, Power series method, Legendre's equation and Legendre's polynomials, Bessel's equation, Bessel's function and its properties.

Module - V (10 Hrs)

Laplace Transformation and it's use in getting solution to differential equations, Convolution, Integral equations.

Text Books :

1. Differential Calculus by Santi Narayan and Mittal, Publisher: S. Chand.
2. Advanced Engineering Mathematics by E. Kreyszig, Publisher: Willey, 8th Edition.

References:

1. Higher Engineering Mathematics by B. V. Ramana , Publisher: Mc-Graw Hills Education.
2. Higher Engineering Mathematics by B.S. Grewal,, Khanna Publishers, 36th Edition, 2010.
3. Ordinary and Partial Differential Equations by J. Sinha Ray and S. Padhy, Publisher: Kayani Publishers.
4. Advanced Engineering Mathematics by P. V. O'NEIL , Publisher: CENAGE.

Online Resources :

Laplace Transform-https://onlinecourses.nptel.ac.in/noc21_ma69/preview

CourseOutcomes:

Afterreadingthis subject,students willbeableto:

1. Identify, formulate and solve Engineering problems.
2. Apply the knowledge of Mathematics in Physical sciences and Engineering.
3. Acquire knowledge about Advance Calculus.
4. Acquire knowledge about Series solution of Differential equations.
5. Acquire knowledge about Gamma and Beta function.
6. Acquire knowledge about Laplace transform and apply it to solve IVP.

*****

1st& 2nd Semester	20BTEETBS102 / 20BTEETBS202	ENGINEERING PHYSICS	L-T-P 3-0-0	Credit 3

PRE-REQUISITE:

Basic knowledge on intermediate Physics including mechanics, modern Physics, optics, wave motion, electricity and magnetism.

OBJECTIVE:

The objective of this course is to attract the students towards detail understanding of concepts, fundamentals and applications of Physics enriching engineering and its emerging branches. It makes students conceive new ideas to have theoretical and experimental knowledge to be applied in academics, designs and research.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

DETAILED SYLLABUS:

Module I

OSCILLATIONS& WAVES: (08 HOURS)

Simple Harmonic Oscillation: velocity of motion, acceleration, time period, frequency, phase; damped harmonic oscillation: Differential equation of damped vibration, logarithmic decrement, Forced oscillation, resonance, velocity resonance and amplitude resonance, coupled oscillation, Normal coordinates and normal frequencies, In- phase and out-Phase Oscillation, Concept of wave and wave equation, Velocity of transverse vibration in a stretched string. Superposition principle.

Module II

WAVE OPTICS:(08 HOURS)

Concept of interference, two sources interference pattern, Bi-prism, Fringe width, Newton's ring & measurement of wavelength and refractive index. Diffraction: Huygen's principle, Fresnel's Diffraction and Fraunhoffer's diffraction, Half period zone, Zone plate, construction, principle, multiple foci, comparison ofzone plate with convex lens, Fraunhoffer's diffraction of Single slit, intensity distribution.

Module III

LASER and FIBRE OPTICS : (08 HOURS)

Atomic excitation and energy states, Interaction of external energy with atomic energy states, Absorption, spontaneous emission and stimulated emission, Population inversion, Pumping mechanism, optical pumping, Electrical Pumping, Components of laser system, active medium, population inversion, Ruby laser, Helium-Neon laser (basic concepts, energy level diagram and Engineering application only),Structure of optical fibre, Principle of propagation and numerical aperture, Acceptance angle, classification of optical fibre (Single mode and Multimode, SINand GRIN), FOCL (Fiber Optic Communication Link)

SOLID STATE PHYSICS: (04 HOURS)

Crystalline and Amorphous solid, unit cell, lattice parameter, Miller Indices, Bragg's law, Fermi level and Fermi distribution Functions, Band theory of Solids(Qualitative),Classification of materials: metals, semiconductor and insulator in terms of band theory.

Module IV

ELECTROMAGNETISM: (06 HOURS)

(Student will be familiarized with some basic used in vector calculus prior to Development of Maxwell's electromagnetic wave equations. No proof of theorems and laws included in this unit expected- statement and interpretation should suffice) Introduction; Scalar & vector fields, Gradient Of Scalar Field, divergence and curl of Vector Field, Gauss divergence theorem, Stokes theorem (Only Statements, noproof), Gauss's law of electrostatics in free space and in a medium (Onlystatements), Faraday's law of electromagnetic induction (Only statements), Displacement

current, Ampere's circuital law, Maxwell's equation in Differential andIntegral form, Electromagnetic wave equation in E and B, Electromagnetic Energy,Poynting theorem and Poynting vector(no derivation)

Module V

QUANTUM PHYSICS: (08 HOURS)

Elementary concepts of quantum physics formulation to deal with physical systems. Need for Quantum physics- historical overviews (For concept), Einstein equation, de Brogliematter waves, Compton Scattering, Pair production (no derivation), Uncertainty Principle, Application of Uncertainty Principle, Non-existence of electrons in the Nucleus, Ground state energy of a harmonic oscillator.Basic Features of Quantum Mechanics: Transition from deterministic to Probabilistic,Wave function, probability density, Normalization of wave function (Simple problem),operators, expectation values (Simple problem), Schrodingerequation-Time dependent and time independent equations.
Applications of quantum mechanics: Free Particle, Potential step, Particle in a box.

Text Books:

1. Engineering Physics by D.R. Joshi, Mc GrawHill
2. Principle of Physics Vol. I & Vol. II by Md. M. Khan & S. Panigrahi(Cambridge Univ.Press).
3. Lectures on Engineering Physics by L. Maharana, Prafulla ku. Panda, Sarat Ku. Dash, Babita Ojha(Pearson)
4. Engineering Physics by D.K. Bhattacharrya and PoomTondon , Oxford UniversityPress

Reference Books:

1. Optics - A. K.Ghatak
2. Introduction to Electrodynamics - David J. Griffiths, PHI Publication
3. Concepts of Modern Physics – ArthurBeiser.
4. Physics-I for engineering degree students - B.B. Swain andP.K.Jena.

ONLINE RESOURSES

https://nptel.ac.in/courses/115/106/115106119/
https://nptel.ac.in/courses/122/106/122106034/
https://nptel.ac.in/courses/115/105/115105099/

COURSE OUTCOMES OF ENGINEERING PHYSICS :

Intended Learning Outcomes/ Course Outcomes (CO)

Upon completion of the subject, students will be able to

1. Learn vibrations and oscillatory systems. It helps in understanding multiple oscillatory systems and complex oscillations. It adds in developing ideas of wave propagation and superposition principle

2. Know the benefits the understanding of light and its wave nature in different experimental demonstration of interference. Diffraction in solids will help in dealing with XRD and structure of materials.

3. Make a clarity of making out crystal structures and crystallography to learn about different materials and characteristics of solids.

4. Different LASER'S like Ruby, He-Ne and S.C. Lasers will help to develop multiple ideas of its application. Principle of optical fibres will help to know new generation optical fibres in communication systems.

5. Gain some fundamental knowledge about electromagnetism. It will familiarize with some basic used in vector calculus prior to development of Maxwell's electromagnetic wave equations.

6. Dealwith elementary concepts of quantum physics formulation with physical systems and to gain knowledge on applied quantum physics.

It will help in solving problems using Schrödinger wave equation and to acquire knowledge about application of Quantum mechanics.

*****

1st& 2ndSemester	20BTEEPBS102 / 20BTEEPBS202	ENGINEERING PHYSICS LAB	L-T-P 0-0-2	Credit 1

PRE-REQUISITE:

Basic knowledge of measurements, errors and uses of different measuring instruments like vernier calipers, screw gauge and spherometer is required. Students are supposed to be aware of the fundamental principles of lens, oscillation, waves, electronics and mechanics..

OBJECTIVES:

To make students engage in learning the experimental aspects of Physics with hands-on experience in precision measurements, experiments of optics, electronics and mechanics.

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

DETAILS SYLLABUS OF ENGINEERING PHYSICS LABORATORY -20BTEEPBS102

A student is expected to perform ten experiments form the list given below.

1. Determination of Young's modulus by Searle's method.

2. Determination of Young's modulus by bending of beams.
3. Determination of Rigidity modulus by static method.
4. Determination of surface tension by capillary rise method.
5. Determination of acceleration due to gravity by Bar pendulum.
6. Verification of laws of vibration of string using sono meter.
7. Determination of wave length of light by Newton's ring apparatus.
8. Determination of wavelength of laser source by diffraction rating method.
9. Determination of grating element of a diffractiongrating.
10. Plotting of characteristic curve of a PN junctiondiode.
11. Plotting of characteristic curves ofBJT.
12. Study of HallEffect.
13. Study of RCcircuit.
14. Determination of unknown resistance using MeterBridge.
15. Energy gap determination by Four-Probemethod.

Text Books:

1. Engineering Practical Physics, by S.Panigrahi and B. Mallick, (CENGAGE learning)
2. Practical Physics, by Dr. Rajendra Singh, J. N. Jaiswal

Reference Books :

1. Practical Physics, by Savinder Singh
2. A Text-book of Practical Physics byDr. William Watson

Course Outcomes:

Engineering Physics Laboratory:
Intended Learning Outcomes/ Course Outcomes (CO)
Upon completion of the subject, students will be able to.

1. Know the accuracy and precision in measurement.
2. know how to calculate Young's modulus, rigidity modulus of a wire and to understand the concept of vibration mechanism.
3. Determine the surface tension of liquid and to understand fluid properties.
4. To experiment with wave nature of light in diffraction through a grating.
5. To know the variation of I ~V of PN junction and BJT.
6. To determine the wavelength of light using Newton's ring.

*****

1st& 2nd Semester	20BTEETBS103 / 20BTEETBS203	ENGINEERING CHEMISTRY	L-T-P 3-0-0	Credit 3

Course Objectives

The main objective of the course is to impart knowledge on the fundamental concepts of chemistry involved in application of several important engineering materials that are used in the industry/day-to-day life.

The course aims to impart the basic understanding about the chemical behavior of fuels, alloy systems, corrosion, instrumental method of analysis and nanomaterials.

It also aims to develop selection of ideal engineering materials and its application in suitable engineering field.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module-1

Energy Sciences:

Types of fuels, Calorific value, Determination of Calorific value by using Dulong's formula, Combustion and its calculations, Solid fuel: Coal analysis (Proximate and ultimate analysis), Elementary ideas on some gaseous fuels (Natural gas, Water gas, Producer gas, LPG) (Synthesis is excluded), Liquid fuels: IC - engine fuel, concept of knocking, antiknocking, octane number and cetane number, Fractional Distillation of petroleum, introductory idea about Cracking of heavy oils; 12 hrs.

Module-2

Instrumental Techniques:

Spectroscopy: Selection ruleLambert Beer's Law, Principles and applications of UV-Visible MolecularAbsorption Spectroscopy; Chromophores, Auxochrome . Effect ofconjugation on chromophores, , Basic Principles and application of rotationaland vibrational Spectroscopy , selection rule of UV-visible, vibrational and rotational spectroscopy.

Module-3

Corrosion Science:

Definition and scope of corrosion, Dry and wet corrosion; Direct chemical corrosion, Electrochemical corrosion and its mechanisms; Types of electrochemical corrosion, (differential aeration, galvanic,& concentration cell Corrosion); Typical Electrochemical corrosion like Pitting, Waterline; Factors affecting corrosion, Protection against corrosion : Modifying the environment, Use of Inhibitors, Cathodic Protection: Sacrificial anode method, Impressed current Cathodic protection. Anodic &cathodic coating. 10 hrs

Module-4

Phase rule & Phase diagram

Statement of Gibb's phase rule and explanation of the terms involved, Advantages and imitations of phase rule, Phase diagram of one component system – water and sulpur system, Condensed phase rule, Phase diagram of two component system – Eutectic system: Bi-Cd, Pb-Tin system 7 Hrs

Module-5

Nanomaterials

Introduction, Top-down and Bottom-up approach, Classification on dimension(1D, 2D, 3D and 0D), Characteristic, properties & application: Carbon nanotube , Nanowire, Application of Nanomaterial : Catalysis, Medicine, Bio nanomaterials. 6Hrs

Text Books:

1. Text Book in Applied Chemistry by A. N. Acharya and B. Samantaray, Pearson India.
2. Engineering Chemistry, Jain and Jain, Dhanpat Rai Publication. Reference Books:
3. Textbook of nanoscience and Nanotechnology, McGraw Hill Education (India)Pvt. Ltd., 2012.
4. Fundamentals of Molecular Spectroscopy by Banwell, Tata McGraw Hill Education.
5. Quantum Chemistry by Ira N. Levine, Pearson 7th Edition.
6. Molecular Spectroscopy, Ira N. Levine, John Wiley and Sons

Reference Books:

1. R1. S. Chawla, Engineering Chemistry, Dhanpat Rai & Co.
2. R2. S. K. Bhasin and S. Rani, Engineering Chemistry, 3rd Edition, Dhanpat Rai & Co, 2012.
3. Introductory to Quantum Chemistry by A. K. Chandra. , 4th Edition, McgrawHill Education.
4. Inorganic Chemistry by Donald A. Tarr, Gary Miessler, Pearson India, Third Edition.
5. Engineering Chemistry (NPTEL web-book) by B. L. Tembe, Kamaluddin and M. S. Krishan.

Online Resources:

1. https://www.metrohm.com/en/industries/petro-lubricants/: Lubricant analysis according to international standards
2. http://www.eco-web.com/edi/01759.html: Efficient Wastewater Treatment: The field for analytical and monitoring

Course Outcomes

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

CO1 : Classify various fuels based on combustion parameters and understand the working principle of various batteries.

CO2 : Apply the concept of molecular spectroscopy to analyze organic compounds using spectrophotometer .

CO3 : Utilize the knowledge of electrochemistry and corrosion science in preventing engineering equipments from corrosion.

CO4 : To understand the microstructure of a given alloy systems and eutectic systems under a given set of conditions.

CO5: Discuss the benefits and applications of nano materials.

CO6: Compare and contrast thechemical behavior and physical properties of common substances.

*****

1st& 2nd Semester	20BTEEPBS103 / 20BTEEPBS203	ENGINEERING CHEMISTRY LAB	L-T-P 0-0-2	Credit 1

Objectives :

In this laboratory the engineering students are provided with the basic practical knowledge on Analysis of Portable & waste water, sample ore analysis, characterisation of lubricating oils, introducing the students to some theoretical topics through instrumental method of analysis such as PH measurement, Viscocity and flash point measurement &weight measurement.

Pre-Requisites :

Student should have the knowledge of balancing equations, principle of titrations, titrant, titrand, preparation of standard solutions, concentration of a solution, indicators used in a titration, principle of reduction-oxidation reactions, handling of instruments like pH meter & accurate measurement of sample by using electronic balance

Teaching Scheme :

Regular laboratory experiments conducted under supervision of the teacher. Demonstration will be given for each experiment.

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Detailed Syllabus

At least 10 Experiments

1 Estimation of calcium in limestone powder
2 Determination of dissolved oxygen in supplied water.
3 Determination of Total hardness of water sample by EDTA method
4 Determination of alkalinity of water.
5 Determination of available chlorine of bleaching powder/residual chlorine in tap water
6 Determination of Flash-point/fire point of a lubricant by Pensky-Martein's apparatus.
7 Determination of kinematic viscosity and Viscosity Index of a lubricant by Redwood viscometer.
8 Standardization of KMnO4 using sodium oxalate.
9 Determination of Ferrous ion in a given sample of Mohr,s salt
10 Determination of the partition coefficient of a substance between two immiscible liquids.
11 Determination of Acid value of oil.
12 Determination of concentration of a colour substance by Spectrophotometer
13 Green synthesis of noble metal/oxide based nanoparticles
14 Determination of the partition coefficient of a substance between two immiscible liquids.
15 Proximate analysis of coal sample.
16 Determination of iodine value of oil/fat.

Text Books:

T1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publishing Company, 2015.
T2. S. S. Dara, Engineering Chemistry, 12th Edition, S. Chand Publisher, 2014.
Reference Books:
R1. S. Chawla, Essentials of Experimental Engineering Chemistry, Dhanpat Rai & Co.
R2. S. K. Bhasin and S. Rani, Laboratory Manual on Engineering Chemistry, 3rd Edition, Dhanpat Rai & Co, 2012.

Online Resources:

1. https://www.metrohm.com/en/industries/petro-lubricants/: Lubricant analysis according to international standards
2. http://www.eco-web.com/edi/01759.html: Efficient Wastewater Treatment: The field for analytical and monitoring

Course Outcomes

The student at the end of the course will

CO1 learn and apply basic techniques used in chemistry laboratory for small/large scale water analyses/purification
CO2 be able estimate the ions/metal ions present in domestic/industry waste water.
CO3 utilize the fundamental laboratory techniques for analyses such as titrations, separation/purification and spectroscopy.
CO4 able to analyze and gain experimental skill.
CO5 Test the quality of an oil/fat by measuring its iodine or acid value by means of amount of unsaturation for various industrial use.
CO6 Verify quality of a lubricant by means of its viscocity or flash point which gives their nature & flammability for various industrial applications

*****

1st& 2nd Semester	20BTEETES101 / 20BTEETES201	BASIC ELECTRICAL ENGINEERING	L-T-P 3-1-0	Credit 3

Pre-Requisites:

Basic knowledge of intermediate Physics, knowledge of basic Mathematics suchas Calculus, Ordinary Differential Equations, Matrices etc.

Course Objectives:

- To provide an understanding of basics of Electricity and Magnetism.
- The course will cover the basics of DC & AC networks,principle of operation of different electrical machines.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module-1 (12 Hours)

Fundamentals of Electric Circuits:

Charge & current, Voltage & current sources, Electrical circuit elements (R, L and C) and their characteristics, Kirchoff's current and voltage laws;Star-Delta Conversion, Current Division and Voltage Division, Resistive Network Analysis: Node voltage & Mesh current analysis, Node voltage and mesh current analysis with controlled sources,Thevenin's Theorem, Norton's Theorem, Principle of superposition.Maximum power transfer theorem.

Module-2 (6 Hours)

AC Circuits:

Complex Algebra, Representation of sinusoidal waveforms, peak and rms values, phasor representation, realpower, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting ofR, L, C, and RL, RC, RLC combinations (series and parallel).

Module-3 (4 Hours)

Three Phase AC:

Three phase balanced circuits, Comparison between single phase and three phase circuits, voltage andcurrent relations in star and delta connections. Power measurement by wattmeter method,Brief introduction to generation, Transmission and Distribution of electrical power, Earthing& electrical safety

Module-4 (8 Hours)

Magnetic Circuits:

MMF, flux, reluctance, magnetic circuit and magnetic reluctance, Magnetic materials, BH characteristics and Hysteresis loss, Series and parallel magnetic circuits.Ideal and practical transformer, e.m.f. equation of transformer, Equivalent circuit, open circuit and short circuit test(no problem),Auto-transformer

Module-5

Electrical Machines (6 hours)

Construction andprinciple of operation of DC machines(Generator and Motor),emf equation. Types of DC Generators and Motors,Back emf, applications. synchronous generator(construction and principle of operation)

Brief idea about Induction Motors(construction and principle of operation), slip,Torque-slip characteristics.

Text Books:

1. G.Rizzoni, Principles and Applications of Electrical Engineering, 5th Edition, McGraw Hill, 2006

2. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
3. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison WelseyLongman Inc., 1995

Reference:

1. B. L. Theraja and A. K. Theraja, Textbook of Electrical Technology (Vol-I), 23rd Edition, S. Chand &Co.Ltd., 2002.
2. J.B. Gupta, “Fundamentals of Electrical Engineering and Electronics” S.K. Kataria& SonsPublications, 2002
3. Electrical Engineering Fundamentals, Vincent Del Toro, 2nd Edition, PHI

Course Outcomes:

- To analyze Electrical circuits to compute and measure the parameters of Electrical Energy.
- To comprehend the working principles of Electrical DC Machines.
- To comprehend the working principles of electrical AC machines.

*****

1st& 2nd Semester	20BTEEPES101/ 20BTEEPES201	BASIC ELECTRICAL ENGINEERING LAB	L-T-P 0-0-2	Credit 1

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Any Eight

1. Verification of theorems (Norton,Thevenin,Superposition).
2. Connection and measurement of power consumption of a fluorescent lamp.
3. Power and phase measurements in three phase system by two wattmeter method .
4. V-I characteristics of incandescent lamps and time-fusing current characteristics of a fuse.
5. Connection and testing of a single-phase energy meter.
6. Calculation of current, voltage and power in series R-L-C circuit excited by single-phase AC supply and calculation of power factor.
7. Calculation of no load losses of a single-phase transformer.
8. Measurement of Field and Armature Resistance of a DC Shunt Motor.
9. Study of House wiring.

*****

1st& 2nd Semester	20BTEETES102 / 20BTEETES202	BASIC ELECTRONICS ENGINEERING	L-T-P 3-0-0	Credit 3

Objectives :

- knowledge of the basic principles of electronic components and circuits operation,
- calculation and measurement of various parameters for electronic circuits,
- Knowledge of basic Digital electronics and communication in electronic field,
- This course will also help students to understand basic concepts of communication systems, VLSI design, Internet of Things etc.

Pre-Requisites :

Knowledge on structure of solid, Energy band gap, Basic of Semiconductors, Intrinsic and Extrinsic semiconductors in Physics of Higher Secondary Science level.

Teaching Scheme :

Regular classroom lectures with use of ICT as and when required, sessions are planned to be interactive with focus on problem solving activities.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module-1 (10 Hours)

Junction Diode, Principle of Diodes, V-I characteristics of junction diode, AC and DC Resistance of Diode, Diode Current Equation, Equivalent circuit of Diode, Breakdown Mechanism, Zener diode and applications, Rectifier circuit, Clipper and Clamper Circuit.

Module-2 (10 Hours)

Bipolar Junction Transistor: Transistor Operation, Current Equation in transistors, CB, CE, CC Configurations and their Characteristics, Load line Analysis, DC Biasing.

Module-3 (6 Hours)

Feedback Amplifiers: Principle, Types, Advantages and Disadvantages of Feedback, Different Negative Feedback Topologies. Oscillators – Barkhaunsen's criteria for oscillation. Field Effect Transistor (FET): Construction, Characteristics of Junction FET (JFET), Depletion and Enhancement type Metal Oxide Semiconductor FET (MOSFET), Fixed and Voltage divider Biasing Configurations, Introduction to Complementary MOS (CMOS) circuits

Module-4 (10 Hours)

Digital Electronic Principles: Number System, Number System Conversion, BCD arithmetic, Hexa decimal arithmetic, Binary arithmetic, Representation of Negative numbers, Complement arithmetic,Logic Gates, Realization of different gates using NAND and NOR gates. Boolean algebra –

Laws and Rules, De Morgan's theorem, Standard forms of Boolean expressions, Realization of Boolean expressions using AOI logic and NAND /NOR logic.

Module-5 (4 Hours)

Communication Systems: Signals, Frequency spectrum of signals, Analog and digital signals, Elements of Communication Systems, Modulation: Amplitude Modulation, AM Detection (Demodulation), Frequency and Phase Modulation. Modulation: A comparison. Introduction to Microprocessor, Microcontroller, Embedded System, Internet of Things (IOT).

Total = 40 Hours

Text Books

1. R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, Pearson Education.
2. S. Sedra and K. C. Smith, Microelectronic Circuits, 7th Edition, Oxford University Press.
3. Microprocessors and Interfacing, Programming & Hardware - Douglas V. Hall, McGraw Hill Education Pvt Ltd., 3rd edition.

Reference Books

1. Agarwal and J. Lang, Foundations of Analog and Digital Electronic Circuits, 1st Edition, Morgan Kaufmann, 2005.

CO1 Familiarize with different semiconductor device with their applications
CO2 Familiarize with different types of transistors with their configurations
CO3 Idea about the different feedback circuits
CO4 Familiarize with JFET, MOSFET, MOS with their applications
CO5 Knowledge about number systems, basic gates and logical expression.
CO6 To be aware with basic communication system including modulations

2. V. K. Mehta and Rohit Mehta, Principles of Electronics, 3rd Edition, S. Chand Publishing, 1980.

Online Resources

1. http://www.electrical4u.com/circuit-analysis.htm
2. http://www.allaboutcircuits.com
3. https://www.electronics-tutorials.ws/
4. https://www.edx.org/course/circuits-electronics-1-basic-circuit-mitx-6-002-1x-0

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

Program outcomes relevant to the course:

PO1 **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in electronics and communication engineering.

PO2 **Problem analysis**: Identify, formulate, review research literature, and analyze complex electronics and communication engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 **Design/development of solutions**: Design solutions for complex electronics and communication engineering problems and design system components or processes that meet the specified

needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods related to electronics and communication including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Program Specific Outcomes (PSO) relevant to the course:

PSO1 Should be able to understand the concepts of Electronics & Communication engineering and their applications in the field of semiconductor technology, consumer electronics, communication/ networking and other relevant areas.

PSO3 Should have the capability to analyze, comprehend, design & develop electronic instruments, Display devices for a variety of engineering applications and thus demonstrating professional ethics & concern for societal well-being.

*****

1st& 2nd Semester	20BTEEPES102 / 20BTEEPES202	BASIC ELECTRONICS ENGINEERING LAB	L-T-P 0-0-2	Credit 1

Objectives

Know broadly the concepts and functionalities of the electronic devices, tools and instruments. Understand general specifications and deploy ability of the electronic devices, and assemblies. Develop confidence in handling and usage of electronic devices, tools and instruments in engineering applications.

Pre-Requisites

Knowledge on intrinsic and extrinsic semiconductors, Physics and Chemistry of Higher Secondary Science level.

Teaching Scheme

Regular laboratory experiments to be conducted under the supervision of teachers and demonstrators with the help of ICT, as and when required along with pre-lab session and demonstration for each experiment.

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Assignment/Experiment

1 Familiarization of electronic components and devices (Testing of semiconductor diodes and transistors using digital multi-meter).

2 Study and use of Oscilloscope, signal generator to view waveforms and measure amplitude and frequency of a given waveform.

3 V-I characteristics of semiconductor diode and determining its DC and AC resistances.

4 Study of half-wave and full-wave rectifier circuits without and with capacitor filter; recording of the waveforms and measurement of average and rms values of the rectified output.

5 Implementation of clipper circuits, both positive clipper and negative clipper. Observe its output waveforms and compare them with theoretical analyzed results.

6 Study of static characteristics of BJT in CE configuration.

7 DC biasing() of the transistor in CE configuration and determination of its operating point.

8 Studies on logic gates truth table verification of various gates, implementation of EXNOR and

9 Design of Half Adder and FULL Adder using gates.

10 Studies on Op-Amp applications (Inverting, non-inverting, integrating differentiating configurations) recording of the input-output waveforms.

Text Books:

T1. R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, Pearson Education.

T2.A. S. Sedra and K. C. Smith, Microelectronic Circuits, 7th Edition, Oxford University Press.

Reference Books:

R1.V. K. Mehta and R. Mehta, Principles of Electronics, 3rd Edition, S. Chand Publishing, 1980.

Online Resources:

1.http://vlab.co.in/ba labs all.php?id=1

2.http://iitg.vlab.co.in/?sub=59&brch=165

Course Outcomes:

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

CO1 Familiarize with various electronic components, measuring instruments

CO2 Acquire knowledge of characteristics of diodes and design, testing

CO3 Acquire knowledge of characteristics of transistors and design, testing & implementation of transistors in various applications

CO4 Develop understanding of digital logic gates and design & test digital circuits for various applications using logic gates.

CO5 Gain understanding of operational amplifiers (Op-Amp) and design & testing of electronic circuits for various applications using Op-Amp.

CO6 implementation of Diode in various applications RECTIFIER & CLIPPER

Program outcomes relevant to the course:

PO1 **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in electronics and communication engineering.

PO2 **Problem analysis**: Identify, formulate, review research literature, and analyze complex electronics and communication engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 **Design/development of solutions**: Design solutions for complex electronics and communication engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods related to electronics and communication including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern Electronics and communication engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO12 **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO) relevant to the course:

PSO1 Should be able to understand the concepts of Electronics & Communication engineering and their applications in the field of semiconductor technology, consumer electronics, communication/ networking and other relevant areas.

PSO2 Should have an ability to apply technical knowledge and usage of modern hardware tools related to Electronics & Communication engineering for solving real world problems.

PSO3 Should have the capability to analyze, comprehend, design & develop electronic instruments,Display devices for a variety of engineering applications and thus demonstrating professional ethics & concern for societal well-being.

*****

1st& 2nd Semester	20BTEETES103 / 20BTEETES203	BASIC MECHANICAL ENGINEERING	L-T-P 3-0-0	Credit 3

Prerequisites:

Basics of Physics, Basics of Chemistry, Mathematics

Course Objective:
This course aims to expose the students to the thrust areas in Mechanical Engineering and their relevance by covering fundamental concepts.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Course Contents:

Module I (8 Hours)

Concurrent forces on a plane – Composition and resolution of forces and equilibrium ofconcurrent coplanar forces, Methods of moment, Friction

Module II (8 Hours)

Centre of gravity- centroids of composite plane figureand curves, Moments of Inertia- Plane figure with respect to an axis in its plane and perpendicular to theplane- parallel axis theorem,
Plane trusses- method of joints and method of sections,

Module III (8 Hours)

Rectilinear Translation Kinematics- Principles of Dynamics, D'Alemberts Principles. Momentum and impulse, Work and Energy, impact. Curvilinear translation, projectile- D'Alemberts Principle in curvilinear motion, Moment of momentum, Kinetics of Rotation of rigid body

Module IV (08 Hours)

Application of Thermodynamics: I.C. Engines, Refrigerators and Steam Generators- Classification of Boilers only, Boiler Mountings and Accessories, Condensers- Function of condenser in a Steam Power Plant, Steam Turbine- Principle of Operation, Classification of Steam Turbines. (Brief Description of different components of above mentioned systems and working principles only)

Fasteners and Power transmission devices:

Forms of Screw Threads, Single-start and multiple-start threads, Right-hand and Left-hand threads, Different types of Nuts, Bolts & Rivets and their applications, Automobile Power Transmission System – Clutch and Gear Box. Automobile Braking System- Classification, Main Components, Hydraulic Braking System. (working principles with schematic diagram only).

Module V (08 Hours)

Basic manufacturing Processes:

Foundry Practices- Pattern, Mould & Casting, Mechanical working of metals - Sheet metal works. (Elementary ideas only)

Hydraulic Machines:

Hydraulic Turbines- Classifications and Applications.
Hydro Electric Power Plants (Schematic diagram of layouts & component description).
Hydraulic Pumps- Centrifugal Pump and Reciprocating Pump (Brief Description of different components of above mentioned systems and working principles with Schematic diagram only).

Text books-

1. Engineering Mechanics by S Timoshenko, D.H Young and J.V. Rao, McGraw Hill
2. Thermal Engineering by P. L. Ballaney, Khanna Publishers
3. Fluid Mechanics & Hydraulic Machines by Dr R. K. Bansal, Laxmi Publications.
4. Elements of Workshop Technology- Volume-I by S. K. HAJRACHOUDHURY,A. K. HAJRACHOUDHURY; Media Promoters & Publishers Pvt. Ltd.
5. Machine Drawing by N. D. Bhatt ;Charotar Publishing House
6. A Course in Automobile Engineering by R. P. Sharma ;Dhanpat Rai & Sons.
7. Basic Mechanical Engineering by A R Israni, P K Shah, B. S. Publications

Reference books

1. Manufacturing Technology by P.N.Rao, Tata McGraw Hill publication.
2. Manufacturing Science by A.Ghosh and A K Malick, EWP
3. A Text Book of Production Engineering by P.C.Sharma, S.Chand
4. Engineering Mechanics by K.L. Kumar, McGraw Hill
5. Basic Mechanical Engineering by .D. Mishra, P.K Parida, S.S.Sahoo, India TechPublishing company.
6. Elements of Mechanical Engineering by J K Kittur and G D Gokak,Willey

Course Outcomes

CO1 To be able to understand fundamentals statics, friction, truss, CG and MI
CO2 To be able to principle of dynamics, work, energy, impact, rotational and curvilinear motion.
CO3 To be able to understand application of Thermodynamics,: I.C. Engines, Refrigerators and Steam Generators- Steam Power Plant, Steam Turbine
CO4 To be able to understand the application of Screw Threads, Nuts, Bolts & Rivets, Clutch and Gear Box and Braking System
CO5 To be able to understand Foundry Practices- Pattern, Mould & Casting, Mechanical working of metals - Sheet metal works.

*****

1st& 2nd Semester	20BTEEPES103 / 20BTEEPES203	BASIC MECHANICAL ENGINEERING LAB	L-T-P 0-0-2	Credit 1

(Minimum 8 experiments/studies should be conducted)

1. To study Four stroke (a) Petrol engine and (b) Diesel engine.
2. To study Two stroke (a) Petrol engine and (b) Diesel engine
3. To study the working and construction details of Cochran and Babcock and Wilcox Boiler.
4. To study a hose-hold Vapour Compression Refrigeration System.
5. To study constructional features and working of Pelton wheel turbine,
6. To study constructional features and working of Francis turbine
7. To study constructional features and working of Kaplan turbine.

8. To study the construction and working of Centrifugal pump.
9. To study the working of Single Plate Clutch.
10. To study construction and working principle of different types of Gears.
11. To study power transmission system of an Automobile.

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Course Outcomes

CO1 To be able to understand different components and its function of an automobile.
CO2 To be able to understand different types of boiler and its construction.
CO3 To be able to understand the principle of vapour compression refrigeration system.
CO4 To be able to understand the different types of hydraulic turbine and pump and its construction.
CO5 To be able to understand principle and working of different types of gear, clutch.

*****

1st& 2nd Semester	20BTEETES104 / 20BTEETES204	BASIC CIVIL ENGINEERING	L-T-P 3-0-0	Credit 3

COURSE OBJECTIVES:

(1) To understand the Importance of Civil Engineering
(2) To have knowledge of Various Construction Materials and their uses.
(3) To learn basics of Surveying for layout of structures on ground.
(4) To understand the fundamentals of foundations of structures
(5) To understand basics of sources of water and its use in Irrigation Engineering
(6) To acquire Basic Knowledge of various Transportation Systems

Evaluation Scheme

Teacher's Assessment	Written Assessment	Total

Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

MODULE- I (12 hours)

Introduction and Scope of Civil Engineering. Broad disciplines of Civil Engineering; Development of various materials of construction and methods of construction.

Building Material and Building Construction:

Bricks: Brick and its use, Types of bricks, qualities of a good bricks, Tests for Bricks, Stone: Classification, Composition and their Characteristics, Types of Building stones, Cement: Uses of cement, Types of cement, Tests for cement, Mortar and Concrete: Ingredients of concrete, Workability, Compaction of concrete, Concrete mix design, Grade and strength of Concrete. Fundamentals of R.C.C., Pre-stressed concrete. Types of steels used in civil engineering works, Building Components, Stone masonry, Brick masonry, Type of roofs and flooring,

MODULE-II (8 hours)

Surveying: Linear measurement and chain survey: Use of chains and tapes for measurement of correct length of lines, direct and indirect ranging, Compass surveying: Use of prismatic compass, bearing of a line. General Layout of Buildings, Local attraction, Introduction surveying instruments, Level Instruments, Theodolites, EDM and Total Station.

MODULE-III (6 hours)

Geotechnical Engineering:

Fundamental of soil and its classification, Foundations: Types of shallow and deep foundations with sketches.

MODULE-IV (6 hours)

Water Resources Engineering: Sources of water and Irrigation Engineering: Hydrological Cycle, Rain gauges, Averaging Precipitation, Introduction of Hydraulics structure like canals, siphons, weirs, dams etc. and their purpose

MODULE-V (8 hours)

Transportation Engineering: Modes of transportation, Introduction to highway engineering, rail engineering, Airport engineering, Waterways, Traffic engineering, urban engineering

TEXT BOOKS

Basic Civil Engineering, S. Gopi, Pearson
Surveying and Levelling by R. Subramanian, Oxford University Press
Building Material and Construction, G C Sahu, Joygopal Jena, McGraw Hill
Water Resource Engineering, N.N. BasakMcGraw Hill

REFERENCE BOOKS

i. Engineering Materials, S.C. Rangwala, Charotar Publishing House
ii. Surveying Vol-1 by R Agor, Khanna Publishers
iii. Basic Civil Engineering, M.S. Palanichamy, McGraw Hill

E-Resources:
1.https://nptel.ac.in/courses/105/102/105102088/

*****

1st& 2nd Semester	20BTEEPES104 / 20BTEEPES204	BASIC CIVIL ENGINEERING LAB	L-T-P 0-0-2	Credit 1

(Minimum 8 experiments /studies)

1. Water absorption and efflorescence of bricks
2. Compressive strength of brick
3. Consistency of cement
4. Setting time of cement
5. Compressive strength of concrete
6. Tensile strength of reinforcing steel
7. Linear measurement by chain
8. Bearing of a line using compass
9. Levelling Instruments
10. Study of Total Station

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Beyond Syllabus: (As per availability of time)

1. Workability of Concrete
2. Use of Theodolite
3. Tensile and compressive strength of Cement

*****

1st& 2nd Semester	20BTEEPES105 / 20BTEEPES105	ENGINEERING GRAPHICS & DESIGN LAB	L-T-P 0-0-2	Credit 1

(Minimum 8 Sheets)

COURSE OBJECTIVES:

1. To create awareness and emphasize the need for Engineering Graphics in all the branches of engineering.
2. To follow basic drawing standards and conventions.
3. To develop skills in three- dimensional visualization of engineering component,
4. To solve specific geometrical problems in plane geometry involving lines, plane figures
5. To produce orthographic projection of engineering components working from pictorial drawings.

Evaluation Scheme

Quality of job	Understanding of the job and related theory	Quality of report and Viva – Voce	Total
50	30	20	100

Prerequisites:
Basic understanding of Geometry

1. Principles of Engineering Graphics and their significance, usage of various drawing instruments, lettering, dimensioning principles. (1 Sheet)
2. Orthographic Projections: Projection of points and straight lines. (2 Sheets)
3. Projections of Planes. (1 Sheet)
4. Projection of Solids. (1 Sheet)
5. Section of Solids. (1 Sheet)
6. Principles of Isometric projection. (1 Sheet)
7. Development of surface and intersection of surfaces. (2 Sheets)
8. Introduction to AUTOCAD tools. (1 Sheet)

TEXT BOOKS:

1. N. D. Bhat, M. Panchal, Engineering Drawing, Charotar Publishing House, 2008.
2. M. B. Shah, B. C. Rana, Engineering Drawing and Computer Graphics, Pearson Education, 2008.
3. R. K. Dhawan, A Text Book of Engineering Drawing, S. Chand Publications, 2007.

REFERENCE BOOKS:

1. E. French, C. J. Vierck, R. J. Foster, Graphic Science and Design, 4th Edition, McGraw- Hill.
2. W. J. Luzadder, J. M. Duff, Fundamentals of Engineering Drawing, 11th Edition, PHI, 1995.
3. K. Venugopal, Engineering Drawing and Graphics, 3rd Edition, New Age International, 1998.

*****

	20BTEEPES206		0-0-2	1

Objective:

workshop Practice lab deals with different processes by which component of machines or equipments are made. Its purpose is to equip the trainee with knowledge, skill and attitude that enable them to perform basic workshop tasks.

FITTING PRACTICE

1. Use of hand tools in fitting, preparing a male female joint of M.S. or making a paper weight of Mild steel.

WELDING PRACTICE

2. Welding practice (Basic Theory to be explained prior to practice):
   A. Gas welding & Electric Arc welding practice.
   B. A joint such as a Lap joint, a T- joint or a Butt joint is to be prepared or to make furniture.

MACHINING PRACTICE

3. Machining (Basic Theory to be explained prior to practice):
   A. Stepped cylindrical Turning of a job and thread –cutting in lathe.
   B. Shaping
   C. Milling

Evaluation Scheme

Quality of job	Understanding of the job and related theory	Quality of report and Viva – Voce	Total
50	30	20	100

Outcomes:

Intellectual skills, Cognitive strategy, verbal information, motor skills and attitude

Course Outcomes

CO1 To be able to use various fitting tools and able to perform fitting operation.
CO2 To be able to understand principle of gas welding and able to perform gas welding operation.
CO3 To be able to understand principle of arc welding and able to perform arc welding operation.
CO4 To be able to understand different parts of a lathe and able to perform turning, facing, threading, tapering using lathe.
CO5 To be able to understand different parts of a shaping and milling machine and able to perform shaping and milling operation.

*****

1st Semester	20BTEETHS101	FUNCTIONAL ENGLISH	L-T-P 2-0-0	Credit 2

Course Objectives

This subject aims to:

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.
- To help students in improving their accent, overall presentation skills to enhance their employability.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

MODULE 1 Effective Reading Skills

Process of Reading, Global and Local Comprehension, Sub skills of Skimming, Scanning, Inferencing, Guessing word-meaning, Using appropriate speed for various kinds of reading. Correction of Reading faults of Eye-fixation, Regression, Finger-pointing, Sub-vocalising, Reading aloud, and indiscriminate use of the Dictionary.

The module will acclimatize students with short stories of R. K Narayan, which will enable them to understand the nuances of reading and comprehension.

Text Book:

Malgudi Days by R.K Narayan

1. An astrologer's day
2. The missing mail
3. The doctor's word
4. Gateman's gift Links:

- https://pdfroom.com/books/malgudi-days-narayan-r-k/or5WWqZn5qD
- https://www.press.umich.edu/9441812/building_academic_reading_skills_book_1_2nd_edition/?s=look_inside
- https://www.jmu.edu/valleyscholars/files/studyreadingskills.pdf
- https://files.eric.ed.gov/fulltext/ED583494.pdf

MODULE 2

Nitty Gritty of Writing in English

Writing Process, Paragraph writing, Summarizing, Blogging, Paraphrasing, Précis-writing, Essay writing and Reading Comprehension.

The module will familiarize students with the nitty gritty of writing in English by drawing from the referred text books.

Text Books:

1. The Submerged Vallley and Other Stories by Manoj Das
2. Real Writing with Readings by Susan Anker

Link:

https://ebin.pub/the-submerged-valley-and-other-stories.html

MODULE 3

The Quintessence of Effective Pronunciation

Introduction to Phonetics: IPA, Received Pronunciation, Phonetic and Non-Phonetic Writing Systems; IPA:

Vowels and Consonants, MTI, Problem sounds; Stress, Intonation, Rhythm, Strong and Weak forms. The module will familiarize students with the sounds of English language and help them to use it in day-today situations.

Text Book:

1. Better English Pronunciation by J D O'Connor
2. Phonetics A Coursebook by Rachel Anne Knight

Links:

- https://salahlibrary.files.wordpress.com/2017/03/a-practical-introduction-to-honetics.pdf
- https://bbooks.info/b/w/ef588b4a0491ac5e37669efa7c0d5476f92a872f/phonetics-for-dummies.pdf
- https://salahlibrary.files.wordpress.com/2018/10/d8b4d986d8a7d8aed8aa_d8a2d988d8a7.pdf

MODULE 4

Applied Grammar

Articles, Prepositions, Subject-Verb agreement, State and Event verbs, Modals and Auxiliaries, Finite and Non-finite Verbs; Tenses; Vocabulary

The student will get a better understanding of the nuances and application of grammar and vocabulary in day-to-day usage.

Text Books:

1. Oxford modern English Grammar
2. Destination B1 Grammar and Vocabulary with Answer Key (Malcolm Mann &Steve Taylore-Knowles)
3. English vocabulary in use (Michael MC Carthy)

Links:

https://pdfroom.com/books/oxford-modern-english-grammar/KRd6oO79gZp/download

Recommended Books:

1. Remedial English Grammar by F. T. Wood, Macmillan.
2. Essential English Grammar By Raymond Murphy, Cambridge University Press
3. The Visual Element in Language Teaching (Education Today Series) (ELT) by PIT CORDER
4. Introducing Applied Linguistics (Penguin modern linguistics texts) by S. Pit Corder
5. Advanced Grammar in Use with Answers, MARTIN HEWINGS
6. Phonetics for Dummies by William F. Katz

Intended Learning Outcomes/ Course Outcomes (CO)

By the end of the course the student will be able to:

- Use English Language effectively in spoken and written forms.

- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultural scenarios.
- Acquire proficiency in English including reading and listening comprehension, writing and speaking skills.
- Understand the nuances of spoken English and to be effective speakers.

*****

1st Semester	20BTEEPHS101	FUNCTIONAL ENGLISH LAB	L-T-P 0-0-2	Credit 1

1 "Find The Word" Reading Aloud Activity (Pair Work); "Reading Aloud" Task (Pair Work / Small Group Work); "Team Reading Aloud" – Pronunciation Reading (Whole Group); Key Word Bingo – Vocabulary Based Reading Activity (Individual)
Pre-Reading Activities
https://theidealteacher.com/21-mustuse-reading-activities-for-your-language

2 True or False? – Post-Reading Activity (Alone); Summarise The Text – Post Reading Activity (Individual); Re-write The Text – Reading Activity (Alone); Walking Text – Reading Comprehension Activity (Individual)
Post-Reading Activities
https://theidealteacher.com/21-mustuse-reading-activities-for-your-language

3 Filminute: One-minute films in different languages on different topics, can watch without sound too! - IDEAS FOR USE: 1. Watch film clip and describe in detail what happened; 2. Watch film clip and summarise; 3. Watch film clip and extend the story; 4. Listen to film clip without watching and imagine what the film is about and describe it.
Short video based – For Spontaneous Speaking & Writing in Language Learning
https://filminute.com/festival/

4 Picture interpretation: interpreting a given image and making a short presentation about the same.
Speaking Activity
https://ssol.tki.org.nz/Social-studies-110/Teaching-and-learning/Effectiveteaching-in-social-tudies/Teachingstrategies/writing_and_presenting_info rmation/Picture-interpretation

5 News Paper Article Analysis - (General Topics): Provide A Newspaper Article And Ask Students To Comprehend And Analyse And Then make a Presentation on it.
Listening, Speaking, Reading & Writing Based activity
https://cdn.ymaws.com/okpress.com/resource/resmgr/onf/nie/newspaper_ac tivities.pdf

6 Movie Talk Google Docs Database: Hundreds of short video clips and adverts with links and short descriptions of the clip content on a Google Doc. Most are French, Spanish, silent or with music only.
Short video based – For Spontaneous Speaking & Writing in Language Learning
https://docs.google.com/spreadsheets/d/1MjFKTuUu_fVwO30eJd9zGQliUIwNCO6VmT6kCZfI8V8

7 Digital Collage designing and presentation- students will design a collage in group based on a particular theme and will present it.
Speaking Activity
https://www.technokids.com/blog/app s/digital-collage-in-the-classroom/

8 Ppt-ask students to watch a web series of their choice. Give them few areas like Screenplay, Characterisation, Plot construction and ask them to make a power point presentation on it.
Listening, Speaking, Reading & Writing Based activity

9 Listening test: provide an audio clip and questions on it. Ask students to answer after listening to the audio. (Cambridge Assessment English content)
Listening, Reading & Writing Based activity
https://www.teachingenglish.org.uk/professional-development/podcast

10 Creavewri ng: students will be given a cue to write a short story.
Writing Activity
https://www-tc.pbs.org/now/classroom/acrobat/less on05.pdf

11 Grammar and Vocabulary Test
Writing Activity
https://toaz.info/doc-viewer

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

COURSE OUTCOMES

1. Understanding the sounds of English and using them in the right context.
2. Write paragraphs, stories etc. using short and crisp sentences.
3. Listen, speak, read & write the sounds of English using correct stress, tone and rhythm.
4. Language Skills- Grammar Exercises, Jumbled Sentences & correcting errors.
5. Writing- Paragraph & Precis Writing.
6. Role-Play- enacting ideas, themes(short duration & one-on-one activity)
7. Critical Appreciation - Article Analysis
8. Introducing Self & Others- Learning the nuances of Introduction, Asking questions and Overcoming stage fright.
9. Presentations- Power point Presentations on general topics, Book Review.

*****

1st Semester	20BTEETES105	PROGRAMMING FOR PROBLEM SOLVING USING C	L-T-P 3-0-2	Credit 3

Course objectives: The course aims to provide exposure to problem-solving through programming. It aims to train the student to the basic concepts of the C-programming language. This course involves a lab component which is designed to give the student hands-on experience with the concepts.

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To learn to write programs (using structured programming approach) in C to solve problems.
- To introduce the students to basic data structures. To make the student understand simple sorting and searching method

Unit-1

Basic of Computer and Introduction to the C Language (7 hours)

Components of a computer system, Fundamentals of Computing, Computer Languages, Problems, Algorithms, flowcharts, Pseudo-code. Compiler and interpreter.

Output statements, Literals, Identifiers, Variables, Datatypes, Number Systems & Conversion, Format specifiers, Input statements, Escape sequences, Constant, Operators(Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Comments

Unit-2

Control Statements and Array (10 hours)

Decision making: if, if-else, nested if, else if ladder, switch, break statement, goto. Loop: while, do-while, for, continue, infinite loop, nesting of loops. Array: 1-D array creation and memory representation, Manipulating array elements, Linear Search, Binary Search, Bubble sort. 2-D array creation and memory representation, Programs on 2-D array.

Unit -3

Pointer, Function and String (10 hours)

Pointer: Declaring and initializing Pointer, dereferencing pointer, Pointer and Array, Pointer Arithmetic, sizeof() operator, constant pointer, pointer to constant, void pointer, Null Pointer, Array of pointers and pointer to array.

Functions: Types of functions, Parts of function, User defined functions,

Call by value and call by reference, Passing array to function, pointer to function, function returning pointer.

Recursion, programs on recursion.

C Strings, String Input / Output functions, arrays of strings, string manipulation functions.

Unit-4

Dynamic memory allocation, Structure and Union (7 hours)

Dynamic memory allocation concept, heap area, malloc, calloc, free. Advantage of dynamic memory allocation wrt static allocation, Programs on dynamic memory allocation.

Structure and Union:Need of structure, Creating a structure, typedef, array of structures, pointer to structure, passing structure to function, returning structure from function, self-referential structure. Creating a union, difference between structure and union.

Enum creation, assigning value to enum variables.

Unit-5

Macro, Storage Class and File Handling (6 hours)

Macro: Macro expansion process, programs on Macro.

Storage class: auto, extern, static, register.

Command Line Argument.

File Handling: File opening modes, read and write text in file, file copy, reading and writing structure variables in a file, fseek, ftell.

Text Books:

1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

Reference Books:

1. Programming in C. P. Dey and M Ghosh, Oxford University Press.
2. ReemaThareja, Introduction to C Programming, 2nd Edition, Oxford University Press.
3. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
4. Problem solving with C, M.T.Somasekhara, PHI
5. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press.

Online Resources:

https://nptel.ac.in/courses/106/105/106105171/
https://nptel.ac.in/courses/106/104/106104128/

Course outcomes:

Students will be able to:

CO1: Design simple algorithms for arithmetic and logical problems
CO2: Implement the algorithms to programs (in C language).
CO3: Carryout experiments and correct syntax and logical errors.
CO4: Implement conditional branching, iteration and recursion.
CO5: Analyzea problem , decompose into functions and synthesize a complete program using divide andConquer approach.
CO6: Apply arrays, pointers and structures to formulate algorithms and programs.
CO7: Apply programming to solve simple numerical method problems, differentiation of function and simple integration.

*****

1st Semester	20BTEETES105	PROGRAMMING FOR PROBLEM SOLVING USING C LAB	L-T-P 0-0-2	Credit 1

Course objectives:

- To write, test, and debug simple C programs.
- To implement C programs with conditionals and loops.
- Use functions for structuring C programs.
- To understand and implement pointer and user defined data types
- To understand file concept and dynamic memory application
- To develop logic to solve problems using the programming

Experiment

Editing, compiling, executing, and debugging of simple C programs
Programs using operators and formatted input/output statements.

3,4	Decision making using if, if-else, else-if ladder, nested if
5	Decision making using switch-case construct.
6,7	Loop control structure (while, do-while, for) with jump statements
8	Nested loops (printing various formats)
9,10	1-D arrays including operation like searching, sorting, merging etc.
11	Handling 2-D arrays such as matrix operations
12 , 13	Programs on strings using various string handling functions (library functions)
14, 15	Designing user-defined functions.
16	Programs on recursion.
17	Designing user defined functions for string manipulation.

18 Passing arrays (both 1D and 2D) to functions
19 , 20 Structure, array of structure, nested structure.
21 Dynamic memory management.
22 Self-referential structure (create and display operation of single linked list)
23 , 24 File handling - reading from and writing to files.
25 Command-line argument, pre-processor directives.

Course outcomes:

CO1: Read, understand and trace the execution of programs written in C language.
CO2: Develop programs using the basic elements like control statements, Arrays and String
CO3: Implement Programs with pointers, and learn to use the pre-processors, command line arguments etc.
CO4: Write the C code for a given algorithm
CO5: Write programs that perform operations using derived data types.
CO6: Write programs that perform various operations on files

*****

2nd Semester	20BTEETBS204	ENGINEERING MATHEMATICS - II	L-T-P 3-0-0	Credit 3

Prerequisite

Matrix algebra, Determinants, Vector algebra.

CourseObjectives:

- TodiscusstheconceptsassociatedwithMatrix Algebra, Solution of system of linear equations, Vector Spaces.
- Todiscusstheconceptsof eigenvalues and eigenvectors, Real matrices, Complex matrices andDiagonalisation of Matrices.
- TodescribetheconceptsofVector differential calculus and its application.
- TopresenttheconceptsofVector integral calculus and its application.
- Topresenttheconcepts of Fourier series, Fourier Integral and Fourier transform.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module - 1 (8 hrs.)

Matrix Algebra, Solution of system of linear equations (Gauss Elimination), Rank and Inverse of matrices (Gauss-Jordan), Vector Space and its Examples.

Module - 2 (8 hrs.)

Eigen values and eigen vectors, Symmetric and skew-symmetric matrices, Orthogonal matrices, Complex matrices, Hermitian and skew matrices, Unitary matrices and similarity of matrices, Diagonalisation of Matrices.

Module - 3 (9hrs.)

Vector differential calculus: vector and scalar functions and fields, Derivatives, Curves, tangents and arc Length, gradient, divergence, curl.

Module - 4 (10 hrs.)

Vector integral calculus: Line Integrals, Green Theorem, Surface integrals, Gauss theorem and Stokes Theorem.

Module - 5 (10 hrs.)

Fourier series, Fourier expansion of functions of any period, Even and odd functions, Half range Expansion, Fourier Integral and Fourier transform.

Text Books:

1. Advanced Engineering Mathematics by E. Kreyszig, 8th Edition, Willey.

References:

1. Higher Engineering Mathematics by B.V. Ramana, McGraw Hills Education.
2. Higher Engineering Mathematics by B.S. Grewal,, Khanna Publishers, 36th Edition, 2010.
3. Advance Engineering Mathematics by P.V.O'NEIL, CENGAGE.
4. A text book of Engineering Mathematics by N.P. Bali and Manish Goyal, , Laxmi Publications, Reprint, 2008.

Online Resources :

Linear algebra-https://onlinecourses.nptel.ac.in/noc21_ma50/preview

CourseOutcomes:

Afterreadingthis subject,students willbeableto:

1. Apply the knowledge of Mathematics in Physical sciences and Engineering.
2. Modeling of Physical Problems to Mathematical problems.
3. Acquire knowledge of Double and Triple Integral and their applications in engineering subjects.
4. Acquire knowledge about Fourier series and Fourier transform.
5. Apply Knowledge vector calculus in engineering and physical sciences.
6. Acquire knowledge of Matrix Algebra, Determinants and their applications in engineering subjects.

*****

2nd Semester	20BTEETHS201	BUSINESS COMMUNICATION AND LIFE SKILLS	L-T-P 2-0-0	Credit 2

Course Objectives

This subject aims to:

- Understand the concepts of business communication in a diverse workplace. It aims at building their business acumen in order to work in an inter-cultural environment.
- Improve the listening, conversation and writing skills of students, which would help them co-exist in the business world.
- Groom the learners as potential and prospective candidates to take on the present-day challenges in the job sector with their acquired soft skills.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

UNIT-1

Writing Business messages and Documents (10 hours)

1.1 Importance of written Business communication, Types of Business messages, Stages of writing business messages, Plagiarism

1.2 Business letters- Common components and Strategies of writing a letter, Types of Business Letters, Sales Letters

1.3 Writing effective Memos - Principles and fundamentals to be followed to draft Business Memos, Letters Versus Memos, Characteristics of Effective Memos, Form and Structure, Parts of a Memo, Writing Strategies, Model Memos

1.4 Business Reports - Nature and Significance, Types of Reports, Formats of Reports, Structure of a formal Business Report.

1.5 Business Proposals – Types, Structure of a Business Report. Model Business Proposals.

1.6 E-mail Writing - Advantages of E-mail, Characteristics of Successful E-mail Messages Formatting, E-mail Format, Standard E-mail Practices, E-mail Writing Strategies

UNIT-2

Communicating at Workplace (10 hours)

2.1 Effective Listening - Introduction, Active and Passive Listening, Process of Listening, Advantages of Listening, Types of Listening, Effective and Ineffective Listening Skills

2.2 Factors affecting Listening, Role of Listening in Leadership Styles, Six Styles of Leadership, Listening at Three Managerial Levels

2.3 Benefits of Listening for Leaders and Teams, Motivational Benefits of Listening in the Workplace, Poor Listening Habits, Strategies for Effective Listening

2.4 Business Conversations - Importance of Business Conversations and Essentials of a Business Conversation

2.5 Conversation Management - Use Verbal and Non-verbal Cues appropriately in Conversations - How to Identify Cues and Clues Signs and Signals; Stressful Conversations

2.6 Business Presentations - Planning, Preparing, Practicing, Performing, Reviewing, Emphatic Closing, Stage Fright

2.7 Business Meetings – Agenda, Minutes of a Meeting, Leading Effective Meetings

UNIT-3

Communication for Career Management (08 hours)

3.1 Cover letter, Resume and CV Writing - Types, Formats, Cover letter - Format of cover letters, solicited and un-solicited job applications.

3.2 Group Discussion - Benefits of a GD; Workplace GD Guidelines - Planning and Preparation, Organizer's Role, Procedure; Functional and Non-functional Roles in Group Discussions; Tips for Success in GDs

3.3 Interviews - Fundamental Principles of Interviewing; General Preparation for an Interview, Stage of an interview, Success in an interview, Types of interviews

3.4 Life Skills – Problem Solving, Time Management, Stress Management, Leadership, Emotional Intelligence

UNIT-4

Use of Technology in Communication (04 hours)

4.1 Technology in Business Communication - Advantages and Disadvantages of Technology, Changing Role of Technology in Communication

4.2 Classification of Various Technologies Available - Internet, Technology Tools, Collaborative Tools, Technology for Daily Use, Intranet and Communication; How much Technology does Your Company Need for Communicating? Latest Trends in Technology; Online Etiquettes

Intended Learning Outcomes/ Course Outcomes (CO)

- Upon completion of the subject, students will be able to:
- Understand and learn different formats of business correspondence at the workplace through which communication takes place.
- Understand the importance of writing an effective Resume and Cover letter in the professional world and its uses.
- Learn the concept and the use of oral presentation to improve professional presentation and the importance of Personal Interview.
- Learn the concept and procedure of Group Discussion.
- Build qualities like Teamwork and leadership. Learning effective time management skills and assertiveness.
- Learn the nuances of effective listening and conversation and use them in their professional life.

Text Books:

1. Technical Communication, Principle and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford University Press
2. Effective Technical Communication by M. Ashraf Rizvi, Mcgraw-Hill Education Recommended Books:
1. Basic Communication Skills by P.KiranmaiDutt, Geetha Rajeevan, Cambridge University Press Books
2. Business Communication- concepts, cases &applications, Chaturvedi & Chaturvedi, Pearson
3. Communication Technology by Everette M.Rogers,Free Press.
4. 101 Great Resumes. 5thJaico Impression. (2008). New Delhi: Jaico Publishing House.
5. Krannich, Caryl Rae &Krannich, Ronald L.. (2003). Nail the Job interview!
6. 101 Dynamite Answers to Interview Questions. (5th ed.). United States of America: Impact Publications.
7. Murphy, A. Herta; Hildebrandt, W. Herbert; Thomas, P. Jane. (2008) Effective Business Communication (7th, ed.). New Delhi: Tata Mc Graw – Hill Publishing Company Company Ltd.

Links:

- https://pdfroom.com/books/technical-communication-principles-and-practice/kZdowxNWdM8
- https://www.thebalancecareers.com/job-interview-questions-and-answers-2061204
- http://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/Business-Communicationby-P.-D.-Chaturvedi-Mukesh-Chaturvedig.pdf

*****

2nd Semester	20BTEETES205	PROGRAMMING FOR PROBLEM SOLVING USING PYTHON	L-T-P 3-0-0	Credit 3

Course objectives:

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.
- To do input/output with files in Python.
- To use OOP concept such as class, object, inheritance in Python.

Prerequisites: Basic knowledge of programming

Unit-1 (7 hours)

Data, Expressions, Statements: Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments;

Unit-2 (10 hours)

Control Flow, Functions: Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays.

Unit 3 (8 hours)

Lists, Tuples, Dictionaries: Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension;

Unit-4 (7 hours)

Files, Modules, Packages: Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages

Unit-5 (8 hours)

OOP Concepts: Basic Concepts of Object-Oriented Programming, Class, Objects and object instantiation, Class constructor, Class methods, creating more than one object of a class, Inheritance in Python Class.

Text Books:

T1: Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

T2: Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Reference Books:

R1: Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

R2: John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013

R3: Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

R4: Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers,LLC,2013.

Online Resources:

https://wiki.python.org/moin/BeginnersGuide
https://nptel.ac.in/courses/106/106/106106182/

Course outcomes:

CO1: To get familiar with python environment.
CO2: To implement control structures and user defined functions in python
CO3: To understand the use of tuples, lists or maps.
CO4: To implement file and exception handling in python programs
CO5: To implement basic OOP concepts in python

*****

2nd Semester	20BTEEPES207	PROGRAMMING FOR PROBLEM SOLVING USING PYTHON LAB	L-T-P 0-0-2	Credit 1

Course objectives:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.
- To use OOP concept such as class, object, inheritance in Python.

Assignment/Experiment

1 Editing, compiling, executing, and debugging of simple Python programs
2 Programs on decision control
3 Programs on iterative control
4 Programs on nested loops
5 Programs on user defines functions
6 Programs of String manipulations
7 Programs to use list, tuples & dictionary
8 Programs to read/write files and use command line arguments
9 Programs to create modules and packages
10 Programs to create classes and corresponding objects
11 Programs to implement inheritance

Course Outcomes:

CO1: Understand the basic concept of programming
CO2: Apply programming concept to solve problem
CO3: Develop logic for problem solving
CO4: Remember the python programming approach for problem solving
CO5: Design various model to handle and process data.

3rd Semester

Theory					
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	BS	20BTEETBS305	**Engineering Mathematics III**	3-0-0	3
2	ES	20BTEETES306	**Data Structure**	3-0-0	3
3	HS	20BTEETHS303	Engineering Economics and Costing / **Organisational Behaviour**	2-0-0	2
4	PC	20BTEETPC301	**Electrical Circuit Analysis**	3-0-0	3
5	PC	20BTEETPC302	**Analog Electronic Circuits**	3-0-0	3
6	HS	20BTEETHS304	**Universal Human Value**	2-0-0	2
7	MC	20BTEETMC301	**Environmental Science**	2-0-0	0
				Total Credit (Theory)	16
Practical					
1	PC	20BTEEPPC301	ECA-Lab	0-0-2	1
2	PC	20BTEEPPC302	AEC-Lab	0-0-2	1
3	ES		OOPS with JAVA Lab (ES-9-Lab)	0-0-2	1
4	PSI		Evaluation of Summer Internship-I	0-0-2	1
5	PC		Employability Skill I	0-0-3	1
				Total Credit (Practical)	5
				Total Semester Credit	**21**

Engineering Mathematics III,
Code : 20BTCSETBS305, 3-0-0-3

Module-I (10 hrs)

Solution of Non-linear equation in one variable:(Bisection method, Secant method, Newton Rapson method, Fixed point iteration method), Numerical solutions of system of linear equations: (Gauss-Seidel, Successive over relaxation), Interpolation: (Newton's forward and backward interpolation, Newton's divided difference interpolation, Lagrange interpolation).

Module-II (8 hrs)

Numerical differentiation, Numerical integration, Solution of differential equations: The Trapezoidal rule, The Simpson's rule, Gauss integration formulas,Solution of ordinary differential equations: Euler's method, Improvement of Euler's method, Runge-Kutta

methods, Multi-step methods and Methods for system and higher order differential equations.

Module-III (8 hrs)
Sample space, Probability, Conditional probability, Independent events, Baye's theorem, Random variables, Probability distributions, Expectations, Mean and Variance, Moments.

Module-IV (9 hrs)
Bernoulli trials, Binomial distribution, Poisson distribution, Hyper-geometric distribution, Uniform distribution, Exponential distribution, Normal distribution and Bivariate distributions.

Module-V (10 hrs)
Correlation and Regression analysis, Rank correlation, Maximum likelyhood estimate, Method of moments, Confidence intervals for mean and variance of Normal distribution, p-value, Testing of Hypothesis, Test for goodness of fit, Test for single mean and variance of a Normal distribution.

Text Books :
1. Advanced Engineering Mathematics by E. Kreyszig, Publisher: Willey, 8th Edition.
2. Numerical methods for scientific and engineering computation by M. K. Jain, S. R. K. Iyengar and R. K. Jain, 6^{th} edition, Publisher: New Age International Publishers.

References:
1. Numerical Analysis by R. L. Burden, J. D. Faires, Publisher: CENAGE learning india Pvt. Ltd.
2. A First Course in Probability by S. Ross, 6th Ed., Pearson Education India, 2002.
3. Probability and Statistics for Engineering and Sciences by J. L. Devore, Publisher: Thomson/CENAGE learning india Pvt. Ltd. – 7^{th} Edition.
4. Probability and Statistics by R. E. Walpole, R. H. Myers, S. L. Myers, K. E. Ye, Publisher: Pearson.
5. Higher Engineering Mathematics by B. V. Ramana , Publisher: Tata Magraw Hill.
6. Introductory methods of Numerical Analysis by S. S. Sastry, 5^{th} edition, Publisher: PHI.

CourseObjectives:
- Todiscusstheconceptsof Numerical solutions for Non-linear equation in one variable, system of linear equations and Interpolation.
- Todiscusstheconceptsof Numerical differentiation, Numerical integration and Numerical solution of differential equations.
- TodescribetheconceptsofProbability, Random variables and Probability distributions.
- TopresenttheconceptsofUnivariate and Bivariate distributions.
- Topresenttheconcepts of Maximum likelyhood estimate, Confidence intervals

for mean and variance of Normal distribution, Testing of Hypothesis and Test for goodness of fit.

CourseOutcomes:

Afterreadingthis subject,students willbeableto:

1. Understand briefly how to get approximation solution of the problems related to engineering, where we don't have adequate information about analytic solution and classical solution.
2. Know about interpolation. Enhance this idea towards numerical integration.
3. Solve Initial value Problem and Boundary value problem using single step and multistep method.
4. Acquire knowledge about algebra of probability, random variable , probability distributions, Expectation, variance and standard deviation.
5. Acquire knowledge about point estimation, interval of estimation, testing hypothesis, regression analysis and statistical quality control.

Course Name: Data Structure - 20BTEETES306

Credits. 3
Contact Hrs./Sem. 40

Course objectives:

• To understand the concept of algorithms and step by step approach in solving problems.
• To Understand basic concepts data structures like array, stacks, queues, linked lists, trees, graphs, searching and sorting techniques, hashing and solve problems using these data structures and writing programs for these solutions.

Prerequisites:

For implementation, knowledge of " C" language specifically on structures, pointers, functions, recursion etc., are required.

Course outcomes:

CO1: Analyze performance of algorithms and implement various operations on array and sparse matrix.
CO2: Apply the basic operations of stacks and queues to solve real world problems.
CO3: Implement different types of linked list operations and their applications.
CO4: Represent data using trees & graphs to use them in various real life applications.
CO5: Analyze various sorting algorithms and explore different hashing techniques.

Unit□1 (7 hours)

Introduction to algorithm, characteristics of algorithm, algorithm vs pseudocode, complexity of algorithms, asymptotic notations(Briefly), Introduction to data structures, classification of data structures, abstract data types. Arrays:Introduction, representation of arrays, basic operations on

arrays (traverse, insert, delete, linear search, Binary search) Sparse matrix:Introduction to Sparse matrix, types of sparse matrix, representation of sparse matrix in triplet form.

Unit□2(8 hours)
Stack: Introduction to stack, representation of stack using array, basic operations on stack (PUSH, POP, traverse etc.), Infix, prefix and postfix expression, Application of stacks:□ use in recursion, conversion of infix to post fix and prefix expression using stack, evaluation of postfix and prefix expression. Queue: Introduction to queue, representation using array, basic operations with analysis, circular queue, introduction to priority queue, Some applications areas of Queue.

Unit 3 (7 hours)
Linked list: Introduction to Linked List, types of linked list (single, double, circular), representation in memory, operations on single linked list (creation, insertion of node at various positions, deletion of nodes from various positions, traversal, search, sort, merge) in each type with analysis. Representation of polynomial .

Unit 4(8 hours)
Sorting Introduction to sorting:- bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort. Hashing and hash functions.

Unit□5 (10 hours)
Tree Terminologies, representation, binary tree □ tree traversal algorithms ,Binary search tree, Operations on Binary Search Tree with analysis, threaded binary tree, Height balanced tree(AVL tree),B□trees. Graph Terminologies, representation (adjacency matrix, incidence matrix, path matrix, linked representation), graph traversal (BFS, DFS)

Text Books:
T1. E. Horowitz, S. Sahni, S. Anderson□Freed, Fundamentals of Data Structures in C, 2ndEdition,Universities Press, 2008.
T2. M. A. Weiss, Data Structures and Algorithm Analysis in C, 2ndEdition, Pearson Education, 2002.

Reference Books:
R1. A. M. Tenenbaum, Y. Langsam, and M. J. Augenstein,Data Structures Using C, 3rdEdition, PearsonEducation, 2007.
R2. J. P. Tremblay and P. G. Sorenson,An Introduction to Data Structures with Applications, 2ndEdition,McGraw Education, 2017.
R3. S. Lipschutz,Data Structures, 1stRevised Edition, McGraw Education, 2014.
R3. A. K. Rath and A. K. Jagadev, “Data Structures Using C”

Online Resources:
1. https://nptel.ac.in/courses/106/106/106106127/: By Prof. H. A. Murthy, Prof. S. Balachandran, andDr. N. S. Narayanaswamy, IIT Madras
2. https://nptel.ac.in/courses/106/102/106102064/: By Prof. N. Garg, IIT Delhi
3. https://nptel.ac.in/courses/106/106/106106130/: By Dr. N. S. Narayanaswamy, IIT Madras4. https://www.geeksforgeeks.org/data-strucure

Subject – Organisational Behaviour - 20BTEETHS303
Prerequisite

The main objective of Organizational Behavior course is to help the students to acquire and develop skill to take rational decisions in the process of O.B. People have always been regarded as important in managing organizations. In view of this, organizational behavior has assumed great importance. This course is designed primarily for students who are being exposed to Organizational Behavior for the first time to enhance them professionally.

Course Objectives:

1. To develop an understanding of the behaviour of individuals and groups inside organizations
2. To enhance skills in understanding and appreciating individuals, interpersonal, and group process for increased effectiveness both within and outside of organizations
3. To develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes.
4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour and improve results.

MODULE – I (5 Hours)

Fundamentals of OB: Definition, scope and importance of OB, Theoretical framework (cognitive), behaviouristic and social cognitive), Limitations of OB. Models of OB

MODULE – II (10 Hours)

Personality: Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Personality Tests and their practical applications.

Perception: Meaning and concept of perception, Factors affecting perception, Figure Ground Principle, Attribution theory, Perceptual process, Perceptual Errors

Motivation: Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow's Need Hierarchy & Herzberg's Two Factor model Theory), The Process Theories (Vroom's expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation. Alderfer's ERG Theory

MODULE – III (10 Hours)

Group and Team types, Decision Making, Definition of leadership and importance of leader and managers. Transactional and transformational leadership, styles of leadership

CONFLICT: Nature of Conflict & Conflict Resolution

Stress management – Importance of stressors and various techniques involved to balance.

Case Study Analysis

Module – IV (8 Hours)

Performance appraisal, Potential Appraisal, Performance appraisal methods, Training and methods and Knowledge transferVarious practices and trends adopted by organisation for employee satisfaction (Work life balance, Safety measures, compensation benefits, etc.)

Module – V (7 Hours)

Organizational Communication and Learning:

Nature of learning, Learning Models and determinants, Emotional Intelligence at the workplace, Communication importance, Types, Barriers to communication, Communication as a tool for improving Interpersonal Effectiveness.

Various Tool and Techniques (Johari Window, Transactional Analysis ,Lateral Thinking ,Brain Storming ,Delphi Technique,Power of grapevine and other informal communication techniques,etc)

Module - VI

Lectures of industry experts

Text Books
Understanding Organizational Behaviour, Parek, Oxford
Organizational Behaviour, K. Aswathappa,HPH
Organizational Behaviour, VSP Rao, Excel

Reference Books
1. Organizational Behaviour, Robbins, Judge, Sanghi, Pearson
2. Introduction to Organizational Behaviour, Moorhead, Griffin, Cengage
3. Organizational Behaviour, Hitt, Miller, Colella, Wiley

Online Sources
1.https://onlinelibrary.wiley.com
2.https://www.coursera.org
3.http://obweb.org

Electrical Circuit Analysis - 20BTEETPC301

Credit-3,Hours-35

Prerequisites: Basic course in Electrical Engineering.

Course Objectives
To learn techniques of solving circuits involving different active and passive elements.
To analyze the behavior of the circuit's response in time domain.
To analyze the behavior of the circuit's response in frequency domain.
To understand the significance of network functions.

Course outcomes
CO1: apply the knowledge of basic circuital law and simplify the network using reduction techniques
CO2: Analyse the circuit using Kirchhoff's law and Network simplification theorems
CO3: Infer and evaluate transient response, Steady state response, network functions
CO4: Obtain the maximum power transfer to the load, and Analyse the series resonant and parallel resonant circuit
CO5: Evaluate two-port network parameters, design attenuators and equalizers
CO6: Synthesize one port network using Foster and Cauer Forms.

Module-1, Hours-15
Review of circuit concepts
L, C, mutual inductance, controlled sources, Transformers, dot convention for coupled circuits, Nodal & loop analysis, relation between field & circuit parameters.Thevenin's theorem, Norton's theorem, Tellegen's theorem, Reciprocity theorem, Maximum power transfer theorem, Compensation theorem and substitution theorem. Time and frequency domain analysis of circuits for step, ramp, exponential and damped exponential, impulse; wave form synthesis, Laplace transform method and complex frequency approach.

Module-2, Hours-12
Driving point and transfer function, calculations of network function poles and zeroes and their significance, concept of stability of active networks, frequency response (frequency and phase plots).Single and double tuned circuits, Analysis of mutually coupled circuits; two port parameters, relations among different parameters.

Module-3, Hours-8
Low pass, high pass and band pass and band reject filters, Design of 1st order and 2nd order low-pass filters, active and passive filters.
Text Books / Reference Books
1. Kou, F.F., “Network Analysis”, John Wiley and Sons Inc.,1966.
2. Valkenburg, Van “Network Analysis”, PHI.
3. Network Theory by P.K.Satapathy, S.P.Ghosh and A.K.Chakraborty, MGH
4.Circuit theory analysis and synthesis by A.Chakrabarti, Dhanpot Rai and Co.
5. Network analysis with applications by W.D. Stanley, Pearson

Analog Electronic Circuits - 20BTEETPC302

Credit-3,Hours-35

Pre-Requisites :
Basic knowledge of semiconductor diodes and Bipolar Junction Transistors (BJT) is required.
Objectives The objective of this course is to be familiar with Transistors (BJT, JFET and MOSFET) amplifiers, differential amplifiers and their implementations, and also study their characteristics and applications.

Course Outcome
CO1 Understand and analyze the structural configuration, different biasing methods of BJT.
CO2 Analyze the structural behavior, characteristics and different biasing configurations of JFET and MOSFET.
CO3 Design small signal models and estimate the performance parameters of different amplifier configurations required for the industry.
CO4 Study the construction and characteristics of an Op-Amp and design circuits for various linear applications using Op-Amp.
CO5 Design various industrial circuits such as oscillators & negative feedback amplifiers using transistors and validate their experimental results.

MODULE -I (12 Hours)
Biasing of BJTs: Load lines (AC and DC); Operating Points; Fixed Bias and Self Bias, voltage divider Bias; DC Bias with Voltage Feedback; Design operation; Bias Stabilization; Examples.
MOS Field-Effect Transistor: Principle and Operation of JFETs and MOSFETs; P-Channel and N-Channel MOSFET; Complimentary MOS; V-I Characteristics of E- MOSFET and D-MOSFET; MOSFET as an Amplifier and as a Switch.
Biasing of FETs and MOSFETs: Fixed Bias Configuration and Self Bias Configuration, Voltage Divider Bias and Design.

MODULE - II (08 Hours)
Small Signal Analysis of BJTs: Small-Signal Equivalent-Circuit Models of CB, CE, and CC configuration; Small Signal Analysis of CE Fixed Bias, CE Emitter Bias, Voltage Divider Bias and Emitter Follower Configuration. Effects of Rs and RL on CE amplifier operation. Cascade amplifier, Darlington Connection and Current Mirror Circuits.
Small Signal Analysis of FETs: Small-Signal Equivalent-Circuit Model, Small Signal Analysis of CS, CD, CG Amplifiers. Effects of Rsig and RL, on CS Amplifier; Source Follower and Cascaded System.

MODULE - III (15 hours)
Frequency Response of BJTs and FETs: Low Frequency Response of BJT and FET Amplifiers; Miller Effect Capacitance; High Frequency Response of and BJTs and FETs; Multistage Frequency Effect.
Feedback amplifier and Oscillators: Concepts of negative and positive feedback; Four Basic Feedback Topologies, Practical Feedback Circuits, Principle of Sinusoidal Oscillator, Wein-Bridge, Phase Shift and Crystal Oscillator Circuits, Power Amplifiers (Class A, B, AB, C).
Operational Amplifier: Ideal Op-Amp, Differential Amplifier, Op-Amp Parameters, Non-
Inverting and Inverting Configurations, Open-loop and Closed-loop Gains; Adder; Sub tractor; Differentiator and Integrator; Active Filters (Low Pass, High Pass and Band Pass); Instrumentation amplifier.

Books:
Micro electronics Circuits, Adel Sedra and Kenneth C Smith, Oxford University Press, New Delhi, 5" Edition, International Student Edition, 2009. (Selected portion of Chapter 2, 4, 5, 6,8, 13, and 14)
2. Electronic Devices and Circuits theory, R.L. Boylestad and L. Nashelsky, Pearson
Education, New Delhi, 9/10" Edition, 2013. (Selected portions of Chapter 4, 5, 6, 7, 8, 9)
3. Integrated electronics by J. Millman and C. Halkias (Reference book)

Universal Human Value - 20BTEETHS304

Credit-2,Hours-20

Pre-requisite- Basic knowledge of social science is required to apprehend the subject.

Course Objectives:
This introductory course input is intended
1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcome
1. Understand the significance of value inputs in a classroom and start applying them in their life and profession.
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the value of harmonious relationships based on trust and respect in their life and profession
4. Understand the role of a human being in ensuring harmony in society and nature.
5. Distinguish between ethical and unethical practices, and start identifying a strategy to actualize a harmonious environment wherever they work.

Module 1, Hours-10
Course Introduction - Basic Guidelines, Content and Process for Value Education
Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic

requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels. Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer),Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya - Practice Exercises and Case Studies will be taken up in Practice Sessions.

Module 2, Hours-10

Understanding Harmony in the family – the basic unit of human interaction, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals,Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVawastha)- from family to world family! - Practice Exercises and Case Studies will be taken up in Practice Sessions, Understanding the harmony in the Nature,Interconnectedness and mutual fulfilment among the four orders of nature cyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence - Practice Exercises and Case Studies will be taken up in Practice Sessions, Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems c) Ability to identify and develop appropriate technologies and management patterns for above production systems, Case studies of typical holistic technologies, management models and production systems.

Text books

1) R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2 b.
2) The teacher's manual R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

Reference books

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Common wealth Publishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, and Universe Books.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.

Electrical Circuit Analysis Lab - 20BTEEPPC301

Type	Code	ElectricalCircuit AnalysisLab	L-T-P	Credits	Marks
ES	20BTEEPPC301		0-0-2	1	100

Objectives	i. To learn techniques of solving circuits involving different active and passive elements. i. To analyze the behaviour of the circuit's response in time domain. i. To analyze the behaviour of the circuit's response in frequency domain. v. To understand the significance of network functions.
Pre-Requisites	Basic Knowledgeon Applied Mathematics and Basic Electrical Engineering.
TeachingScheme	Regularlaboratoryexperimentstobeconductedunderthesupervisionofteachersand demonstrators with the help of ICT, as and when required along with pre-labsessionanddemonstrationforeachexperiment.

EvaluationScheme

Attendance	Daily Performance	Lab Record	Lab Test/ Mini Project	Viva-voce	Total
10	30	15	30	15	100

List of Experiments

1. Verification of superposition theorem
2. Verification of The venin's and Norton's Theorem
3. Verification of maximum power transfer theorem
4. Verification of Z and Y parameters
5. Verification of h and ABCD parameters
6. Determination of coefficient of coupling using two single phase transformers as coupled circuit.
7. Determination of characteristic of low pass and high pass passive filter.
8. Determination of characteristic of band pass and band reject passive filter.
9. Verification of conductance parameters
10. Verification of transmission parameters of a transmission line for lumped parameters.

Text Books:

1. Kou, F.F., "Network Analysis", John Wiley and Sons Inc., 1966.
2. Valkenburg, Van "Network Analysis", PHI.
3. Network Theory by P.K.Satapathy, S.P.Ghosh and A.K.Chakraborty, MGH
4. Circuit theory analysis and synthesis by A.Chakrabarti, Dhanpot Rai and Co.
5. Network analysis with applications by W.D. Stanley, Pearson

Reference Books:

1. Kou, F.F., "Network Analysis", John Wiley and Sons Inc., 1966.
2. Circuit theory analysis and synthesis by A.Chakrabarti, Dhanpot Rai and Co.

CourseOutcomes:*Attheendofthiscourse,thestudentswillbeableto:*

CO1	Verification of all network parameters.
CO2	Study and verification of the polarity test of transformer.
CO3	Verification of series and parallel resonant circuits.
CO4	Experimentally verify the basic circuit theorems subjected to various types of sources.
CO5	Measure various performance characteristics of filters.
CO6	Determination f self and mutual inductance of 1 phase transformer.

Program outcomes relevant to the course:

PO1	**Engineering knowledge:** Apply knowledge of mathematics, science, engineering fundamentals, and electrical engineering to the solution of engineering problems**.**
PO2	**Problem analysis:** Identify, formulate, review literature and analyze electrical engineering problems to design, conduct experiments, analyze data and interpret data.
PO3	**Design /development of solutions:** Design solution for electrical engineering problems and design system component of processes that meet the desired needs with appropriate consideration for the public health and safety, and the cultural, societal and the environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions in electrical engineering.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to electrical engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to electrical engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the electrical engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the electrical engineering practice.
PO9	**Individual and team work:** Function affectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings in electrical engineering.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering committee and with society at large, such as, being able to comprehend and write affective reports and design documentation, make effective presentations in electrical engineering.
PO11	**Project Management and finance:** Demonstrate knowledge & understanding of the electrical engineering principles and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments in electrical engineering.
PO12	**Life-long learning:**Recognize the need for, and the preparation and ability to engage in independent research and lifelong learning in the broadest contest of technological changes in electrical engineering.

Program Specific Outcomes (PSO) relevant to the course:

Mapping of COs to POs and PSOs (Low: 1, Medium: 2, High: 3)

PSO1	Able to provide distinct knowledge of various theoretical and experimental concepts to real world engineering applications involving real time computation.
PSO2	Able to provide socially acceptable technical solutions to complex electrical engineering problems with the application of modern and appropriate techniques for sustainable development.
PSO3	Able to provide global solution for transformer testing, filter design and networking in electrical and electronic industry.

COs / POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	3	3	0	0	0	0	2	2		1	1	2
CO2	3	3	3	3	3	3	0	0	0	0	2	2		2	1	2
CO3	2	2	2	2	2	2	0	0	0	0	3	3		2	1	1
CO4	1	1	1	2	1	1	0	0	0	0	2	2		2	1	1
CO5	3	3	2	2	1	1	0	0	0	0	2	2		2	1	1
CO6	3	3	3	3	3	3	1	1	1	1	2	3		3	1	1`

2.Analog Electronics Lab 20BTEEPPC302

Type	Code	Analog Electronics Lab	L-T-P	Credits	Marks
PC	20BTEEPPC302		0-0-3	2	100

Objectives	I. Design of BJT bias circuit.. II. Design of JFET/MOSFET bias circuit III. Design of BJT common emitter circuit and compare AC and DC performance IV. Design of MOSFET common emitter circuit and compare AC and DC performance V. Determine the frequency response of common emitter amplifier: Low frequency , mid frequency ,high frequency VI. Differential amplifier circuits: DC bias and AC operation with and without current source. VII. Applications of op-amp as integrator, differentiator , square wave generator. . VIII. Obtain the bandwidth of BJT/FET using square wave testing.
Pre-Requisites	Basic Knowledge on Applied Mathematics, Applied Physics of Higher Secondary Science level.
Teaching Scheme	Regularlaboratoryexperimentstobeconductedunderthesupervisionofteachersand demonstrators with the help of ICT, as and when required along with pre-lab session and demonstration for each experiment.

Evaluation Scheme

Attendance	Daily Performance	LabRecord	Lab Test/MiniProject	Viva-voce	Total

10	30	15	30	15	100

Experiment 1: Construct , design & test BJT bias circuit and compare the result.
Experiment 2:Design and simulate JEET/MOSFET bias circuit and compare the results.
Experiment 3:Design and simulate BJT common emitter circuit and compare D.C and A.C performance.
Experiment 4:Determine the frequency response of a common-emitter amplifier: low frequency high frequency and mid frequency response and compare with simulated results.
Experiment 5: Differential amplifiers circuits: D.C bias and A.C operation without and with current source.
Experiment 6: OP-Amp Frequency Response and compensation.
Experiment 7:Application of Op-Amp as differentiator and integrator.
Experiment 8: Obtain the band width of FET/BJT using square wave testing of an amplifier.
Experiment 9: R.C phase shift oscillator/wien-Bridge Oscillator using OP-Amp/Crystal Oscillator.
Experiment 10: Class A and Class B power Amplifier.

Experiments beyond syllabus
Experiment 1:Design and simulate JFET/MOSFET common-emitter circuit and compare D.C and A.C performance.
Experiment 2:Study of Darlington connection and current mirror circuits.

Text Books:

1. A. S. Sedra and K. C. Smith, ***Microelectronic Circuits: Theory and Applications (International Version)***, 6th Edition, Oxford University Press, 2013.

2. R. L. Boylestad and L. Nashelsky, ***Electronic Devices and Circuit Theory***, 10th Edition, Pearson Education, 2009.

3.J. Millman and A. Grabel, ***Microelectronics***, 2nd Edition, McGraw-Hill Education, 2017

Reference Books:

1.J. Millman and C. C. Halkias, ***Integrated Electronics: Analog and Digital Circuits and Systems***, 2nd Edition, TMH Publications, 2017.
2.A. Malvino and D. J. Bates, ***Electronic Principles***, 7th Edition, McGraw-Hill, 2017.

Course Outcomes: *At the end of this course, the students will be able to:*

CO1	Study the DC load line , operating point , biasing of transistors.
CO2	Details of MOSFETs along with its superiority in comparison to BJTs
CO3	DC analysis of BJT and MOSFETs
CO4	AC analysis of BJTs and MOSFETs.
CO5	Frequency response of both BJTs and MOSFETs
CO6	Design of integrated circuit.

Program outcomes relevant to the course:

PO1	**Engineering knowledge:** Apply knowledge of mathematics, science, engineering fundamentals, and electrical engineering to the solution of engineering problems**.**
PO2	**Problem analysis:** Identify, formulate, review literature and analyze electrical engineering problems to design, conduct experiments, analyze data and interpret data.
PO3	**Design /development of solutions:** Design solution for electrical engineering problems and design system component of processes that meet the desired needs with appropriate consideration for the public health and safety, and the cultural, societal and the environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,

	and synthesis of the information to provide valid conclusions in electrical engineering.

PSO1	Able to provide distinct knowledge of various theoretical and experimental concepts to real world engineering applications.
PSO2	Able to provide socially acceptable technical solutions to complex electrical engineering problems with the application of modern and appropriate techniques for sustainable development.
PSO3	Able to apply the knowledge of ethical and management principles required to work in a team as well as to lead a team.
PSO4	Competence in using modern Electrical IT tools (both software and hardware) for the

PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to electrical engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to electrical engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the electrical engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the electrical engineering practice.
PO9	**Individual and team work:** Function affectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings in electrical engineering.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering committee and with society at large, such as, being able to comprehend and write affective reports and design documentation, make effective presentations in electrical engineering.
PO11	**Project Management and finance:** Demonstrate knowledge & understanding of the electrical engineering principles and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments in electrical engineering.
PO12	**Life-long learning:**Recognize the need for, and the preparation and ability to engage in independent research and lifelong learning in the broadest contest of technological changes in electrical engineering.

Program Specific Outcomes (PSO) relevant to the course:

	design and analysis of complex electrical systems in furtherance to research activities.

Mapping of COs to POs and PSOs (Low: 1, Medium: 2, High: 3)

COs/ POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2	2	2	2	2	2	2	2	0	0	**0**		1	1	2	3
CO2	3	3	3	3	3	3	3	3	3	3	2	2		2	1	2	3
CO3	2	2	2	2	2	2	2	2	0	1	1	1		2	1	1	3
CO4	1	1	1	2	1	1	0	0	0	0	0	1		2	1	1	3
CO5	3	3	2	2	1	1	0	0	0	0	0	0		2	1	1	3
CO6	3	3	3	3	3	3	3	3	0	0	0	3		3	1	1`	3

Data Structures Lab 20BTEEPES306

Contact Hrs./Week 2 **Sessional Marks 100**

Contact Hrs./Sem. 28 **No Of Experiments 14**

Course objectives:

1: To understand the principles of linear and non-linear data structure
2: Study the basic operations of array, stack and queue
3: To understand the operations of linked list
4: To Know the application of tree and graph
5: Study the sorting and searching techniques and hashing mechanisms.

Experiment 1: Write a menu driven program to perform various operation like insertion , deletion , merging on an array.

Experiment 2: Write a menu driven program to create a stack using an array and perform push pop and display operation.

Experiment 3: i) Write a menu driven program to create linear queue using an array and perform insertion, deletion and traversal operation.
ii) Write a menu driven program to create circular queue using an array and perform insertion deletion and traversal operation.

Experiment 4: Write a menu driven program to create a single linked list and perform insertion, deletion at desired place of the list.
Experiment 5: Write a menu driven pro
gram to create a stack and queue using linked list and perform
various operation on it.
Experiment 6: i)Write a menu driven program to create a double linked list and perform insertion, deletion at the desired place.
ii) Write a program to implement circular linked list
Experiment 7: Write a program for Polynomial addition using linked-list.
Experiment 8: Write a menu driven program to create a BST and display it.
Experiment 9: Write a menu driven program to perform selection, bubble, insertion sort and Merge Sort.
Experiment 10: Write a program to perform
i) Binary Search
ii) Quick Sort
Experiment 11: Write a program to implement BFS and DFS graph traversals.
Experiment 12: Write a program to implement Dijkstra's algorithm.

Experiment 13: Write a program to implement evaluation of postfix expression using stack
Experiment 14:Write a program to implement conversion of infix expression to postfix expression using stack.

Text Books:

T1. E. Horowitz, S. Sahni, S. Anderson-Freed, Fundamentals of Data Structures in C, 2ndEdition,Universities Press, 2008.
T2. M. A. Weiss, Data Structures and Algorithm Analysis in C, 2ndEdition, Pearson Education, 2002.

Reference Books:

R1. A. M. Tenenbaum, Y. Langsam, and M. J. Augenstein,Data Structures Using C, 3rdEdition, PearsonEducation, 2007.
R2. J. P. Tremblay and P. G. Sorenson,An Introduction to Data Structures with Applications, 2ndEdition,McGraw Education, 2017.
R3. S. Lipschutz,Data Structures, 1stRevised Edition, McGraw Education, 2014.
R3. A. K. Rath and A. K. Jagadev, "Data Structures Using C"

Online Resources:

1. https://nptel.ac.in/courses/106/106/106106127/: By Prof. H. A. Murthy, Prof. S. Balachandran, andDr. N. S. Narayanaswamy, IIT Madras
2. https://nptel.ac.in/courses/106/102/106102064/: By Prof. N. Garg, IIT Delhi
3. https://nptel.ac.in/courses/106/106/106106130/: By Dr. N. S. Narayanaswamy, IIT Madras4.
https://www.geeksforgeeks.org/data-strucure

Course Outcomes:

CO1:Implement array operations to solve problems
CO2: Understand stack operations using programming
CO3: Implementation of queue and its operations
CO4: Apply Liked list to solve problems
CO5: Apply tree concept to design the model
CO6: Implement graph to solve routing problems.

4th Semester

ELECTRO MAGNETIC THEORY

MODULE-I ,

Representation of vectors in Cartesian, Cylindrical and Spherical coordinate system, Vector products, Coordinate transformation.
The Law of force between elementary electric Charges, Electric Field Intensity and Potential due to various charge configuration, Electric Flux density, Gauss law and its application, Application of Gauss Law to differential Volume element, Divergence Theorem. Potential Gradient, Dipole, and Energy Density in Electrostatic Field.

MODULE-II

Current and Conductors, Continuity of Current, Conductor Properties and Boundary Conditions. The Method of Images, Nature of dielectric Materials, Boundary Conditions for Perfect Dielectric Materials Capacitance, Poisson's & Laplace equation, Uniqueness Theorem, Steady Magnetic Field: Biot Savart Law, Ampere's Circuital Law, Stoke's Theorem, Scalar and Vector Magnetic Potential,

MODULE-III

Force on a moving Charge, Force on a differential Current Element, Force & Torque Magnetisation& Permeability, Magnetic Boundary Conditions, Inductance & Mutual Inductance. Time Varying Fields: Faraday's Law, Displacement Current, Maxwell's Equation.

MODULE-IV

Wave propagation in Free Space, Dielectric, and Good Conductor. Poynting's Theorem and wave power, Wave polarization, Reflection and Transmission of Uniform Plane Waves at Normal & Oblique incidence, Standing Wave Ratio.

Module-V

Formulation of Field Equations; Wave Types; the Parallel-Plate Waveguide; the Rectangular Waveguide. TE and TM modes of propagation in a Rectangular waveguide.

BOOKS

1. Principles of Electromagnetic, S.C. Mahapatra, S. Mahapatra, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2nd Edition, 2015.
2. Principles of Electromagnetics**,**Mathew N.O. Sadiku & S.V. Kulkarni., Oxford University Press, 6th edition,2009.
3. Electromagnetic Waves and Radiating Systems, E.C. Jordan and K.G. Balmain, Pearson Education, New Delhi, 2nd Edition,2009.
4. Engineering Electromagnetic Essentials, B. N. Basu, University Press.
5. Engineering Electromagnetic Essentials, Nathan Ida, Springer
6. Engineering Electromagnetic, William H. Hayt& J. Buck, Tata McGraw Hill Publishing
7. Company Ltd., New Delhi, 7th Edition,2006

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

CO1 : Explain various co-ordinate systems and solve problems involving vector calculus.
CO2: Describe electrostatic fields, their characteristics and associated parameters.
CO3 : Visualize magneto-static fields, their characteristics and associated parameters.
CO4 :Analyze and apply Maxwell's equations to various electromagnetic fields.
CO5: Interpret the propagation of EM waves through different mediums.

Program Outcomes Relevant to the Course:

PO1	**Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Digital Signal Processing

Course Code	Course Title			Core / Elective
PC-DSP	Digital Signal Processing			Core
	L	T	P	Credits
	3	0	0	0

Pre-Requisites:
Fundamental knowledge of basic mathematics is required.
Course Objectives:
The objective of this course is to study the presentation, stability, causality,
sampling, analysis in Z-domain, Fourier Transform and FFT, Structural realizations of systems
Course Outcomes:

- To analyze the systems in discrete domain
- To analyze the system in frequency domain.
- To realize the different structures of systems, design of filters

Module – I (08 Hrs)
Discrete Time System: Basic Discrete Time Signals and their classifications,Operation on Discrete time signals, Discrete times systems and their classifications, Stability of discrete time system, Analysis and response (convolution sum) of discrete - time linear LTI system, Recursive and Non-recursive discrete time system, difference equations, impulse response of LTI system, Correlation of discrete time Signal.
Module –II (14 Hrs)
Z-Transform and Its Application to the Analysis of LTI Systems: Z-Transform, Direct Z-Transform, Properties of the Z- Transform, Inverse Z-Transform, Inversion Z-Transform by Power Series Expansion, Inversion of the Z-Transform by Partial-Fraction Expansion, Relation of Z-transform with Fourier, DTFT.
Discrete Fourier Transform: Frequency-Domain Sampling and Reconstruction of Discrete-Time Signals, Discrete Fourier Transform, DFT as a Linear Transformation, Relationship of DFT to other Transforms, Properties of DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs and Circular Convolution, Use of DFT in Linear Filtering, Filtering of Long Data Sequences. Efficient Computation of DFT: FFT Algorithms, Direct Computation of the DFT, Radix-2 FFT Algorithms, Decimation-In-Time (DIT), Decimation-In-Time (DIF).
Module – III (7 Hrs)

Structure and Implementation of FIR and IIR Filter: Structure for the Realization of Discrete-Time Systems, Structure of FIR Systems: Direct- Form Structure, Cascade-Form Structure, Design of FIR Filters: Symmetric and Anti symmetric FIR Filters, Structure for IIR Systems: Direct-Form Structure, Signal Flow Graphs and Transposed Structure, Cascade-Form Structure, Parallel-Form Structure.

Module – IV (07 Hrs)

IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation. Design of Linear-Phase FIR Filters by using Windows, Design of Linear-Phase FIR Filters by Frequency-Sampling Method. Basic adaptive filter: Structure of Adaptive FIR filter, System Modelling .

• Digital Signal Processing – Principles, Algorithms and Applications by J. G. Proakis and D. G. Manolakis, Pearson.

• Digital Signal Processing: Tarun Kumar Rawat, Oxford University Press.

• Digital Signal Processing – S. Salivahan, A. Vallavraj and C. Gnanapriya, Tata McGrawHill.

• Digital Signal Processing – Manson H. Hayes (Schaum's Outlines) Adapted by Subrata Bhattacharya, Tata McGraw Hill.

• Digital Signal Processing - Dr.Shalia D. Apte, Willey Publication

Digital Signal Processing Lab(0-0-2)

Pre-Requisites:

Basic knowledge of Signals & systems and MATLAB programming are requiredto conduct the experiments.

Course Objectives:

The objective of the lab course is to perform basic signal processing operations such as linear & circular convolution, auto & cross correlation, frequency analysis,and implementation of FIR & IIR filters using MATLAB

.

Course Outcomes:

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

- Understand the generation of various elementary signals in MATLAB.
- Perform basic signal processing operations like convolution, correlation etc.
- Analyze the spectrum of discrete time signals using DFT.
- Implement various efficient computation techniques using FFT-DIT and FFT-DIF algorithms.
- Design FIR and IIR filters using various techniques.

Detailed Syllabus

1.Generation of various types of waveforms (sine, cosine, square, triangular etc.) using MATLAB.

2.Linear convolution of sequences (without using the inbuilt conv. function in MATLAB).

3.Computation of autocorrelation of a sequence, cross correlation of two sequences using MATLAB.

4. Computation of the power spectral density of a sequence using MATLAB.

5.Finding the circular convolution of a periodic sequence using DFT and IDFT in MATLAB.

6.Circular convolution of two sequences and comparison of the result with the result obtained from linear convolution using MATLAB.

7.Convolution of long duration sequences using overlap add, overlap save method using MATLAB.

8.Implementation of FFT algorithm by decimation in time (DIT) and decimation in Frequency (DIF) using MATLAB.

9.Design and implementation of FIR (lowpass and highpass) Filters using windowing techniques (rectangular window, triangular window and Kaiser window) using MATLAB.

10.Design and implementation of IIR (lowpass and highpass) Filters (Butterworth and Chebyshev) using MATLAB.

Course Code	Course Title			Core / Elective
PC	Electrical Machine-I			Core
	L	T	P	Credits
	3	1	0	3

Electrical Machine-I

OBJECTIVE:- This course makes an engineering student to understand and evaluate the performance of different electrical machines (both AC & DC). This course covers the basic concepts of electromechanical energy conversion , working principles , various methods of speed control and applications of its characteristics.

Pre-requisites :- knowledge of magnetic electric current, laws governing the electrical machines , basic electrical engineering , basic mathematics such as calculus , differential equations and network theory in required.

Evaluation process or scheme :-

(1) various methods of evaluation by the concerned teacher throughout the completion of syllabus

(a) Quiz
(b) Surprise test
(c) Assignment
(d) Attendance

(2) Written assessment
(a) Mid - term
(b) End – term

DETAILED SYLLABUS

Module –I

Principles of electromechanical energy conversion , force and torque in magnetic field system , energy balance, energy and forces of electromagnetic origin- single and multi excited magnetic field system , elementary concepts of rotating machines.

Module-II

Basic concepts of Dc machines :-

Principle of operation , action of commutator , constructional features , armature windings (simplex lap and simplex wave) , emf equations and torque equation , armature reaction and its effect , commutation compensating winding ,methods of improving commutation.

Module-III

Dc generator:-Methods of excitation , separately excited and self excitedgeneratorS ,voltage buildup ,causes for failure to self excite and remedial means, load and no load characteristics of shunt , series and compound generator , parallel operation of dc generator and load sharing.

Module-iv

Dc motor :- principle of operation ,back emf and torque ,characteristics and application of shunt ,series and compound motors ,starting and speed control of dc motor , 3 point , 4 point starters ,calculation of efficiency and condition for many efficiency ,losses , methods of testing .Direct n indirect testing. Separation of losses.

Module –V

single phase and three phase transformer :- Single phase transformer constructional details , core winding principle of operation , emf equation , magnetizing current core losses , no load and load operation ,Phasor diagram. Equivalent circuit ,losses & efficiency. Condition for maximum efficiency. Voltage regulation. Approximate expression for voltage regulation .Regulation .open circuit n short circuit tests. Sumpners test. Auto transformer. VA conducted magnetically n electrically. Comparative study with two winding transformer.

Three phase transformers

constructional features, As a single unit and as a bank of three single phase transformer .three phase transformer connections, the per unit system for three phase transformer ,two single phase transformers connected in open delta(v connection scott connection of two single phase transformer ,transform 3 phase connection :-connection diagrams and phase diagrams of various vector group . (Yy0,Dd0,Dz0,Yy6,Dd6,Dz6,Yd1,Dy1,Yz1,Yd11,Dy11,Yz11), oscillating neutral 3 winding transformer,inrush of mounting switches,switches of load transfer.

TESTBOOK

(1) s. j. chapman electric machinery fundamentals mcgraw-hill 4th edition 2017

(2) p.s.bimbhra 'electrical machinery'latest edition khanna publications

(3)A. E. Fritzgerald, C. Kingsley, and S. Umans, "Electric Machinary", 6th edition MGH Publisher

REFERENCE BOOK

(1) d.p. Kothari &i. j. nagrath 'electric machinery' 5th edition mc graw -hill Publisher

(2) BHATTACHARYA S.K 'electric machinery'

(3) k mangeshkumar dc mechanic & transformer

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

CO1 :- Apply the knowledge on the basic concepts electromechanical energy conversion.

CO2:- Understand the constructional features and winding and operating principle of dc motor .

CO3:-Analyze the performance like speed control, starting bearing characteristics and uses of dc machine

CO4:-Analyze the performance construction of single phase of transformer .both single phase & three phase.

CO5:- Understand the different vector group of 3 phase transformer.

Digital Electronics Circuit

Course Code	Course Title			Core / Elective
ES-DEC	Digital Electronics Circuit			Core
	L	T	P	Credits
	3	1	0	4

Pre-Requisites:

Basic knowledge of basic electronics, binary arithmetic

Course Objectives:

- To provide an understanding of basics of Digital components,circuits
- The course will cover the basics of combinational and sequential circuits
-

Course Outcomes:

Understand working of logic families and logic gates.

• Design and implement Combinational and Sequential logic circuits.

• Understand the process of Analog to Digital conversion and Digital to Analog conversion.

• Be able to use PLDs to implement the given logical problem

Module-1 **(9 Hours)**

Fundamentals of Digital Systems and logic families

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-statelogic

Module-2

Combinational Digital Circuits (9 Hours)

Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De- Multiplexer/Decoders, Adders, Sub tractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization

Module-3

Sequential Circuits

Sequential Logic Design(Flip-Flops and FSMs): Flip Flops – A 1-bit memory, Bistable latch (SR and D), the clocked SR flip flop, J-K, T and D type flip-flops, Race Around Condition, Master Slave JK-flip flop, Conversion of flip-flops; Finite State Machines (FSMs) – Mealy and Moore models of Finite State Machines.

Module-4

Sequential Logic Design(Shift registers and Counters)

Shift Registers –SISO, SIPO, PISO, PIPO and Universal Shift Register, Applications of Shift

Registers (Serial to Parallel Converter, Parallel to Serial Converter), Ring Counter, Twisted Ring Counter (Johnson Counter); Counters – Design of Ripple (Asynchronous) Counters (Up/Down Counter, Mod-N Counter),Design of Synchronous Counters, Gray Code Counter and Random Sequence Counter using State Diagrams.

Module-5

Programmable Logic Devices: Programmable Logic Array (PLA),Programmable Array Logic (PAL), Complex Programmable Logic Devices(CPLDs);Semiconductor Memories: Basics of ROM, SRAM & DRAM;

Basic Hardware Description Language: Introduction to VHDLprogramming language, Different Modeling Styles (Dataflow, Behavioral and Structural), Data types and Objects, VHDL program combinational and sequential circuits.

Text Books:

1. M. M. Mano and M. D. Ciletti, **Digital Design: With an Introduction to Verilog HDL**, 5th Edition,Pearson Education, 2013.

2. L. K. John and C. H. Roth Jr., **Digital System Design using VHDL**, 2nd Edition, Cengage Learning,2012.

Reference Books:

1. D. V. Hall, **Digital Circuits and Systems**, International Student Edition, McGraw-Hill Education,1989.
2. A. A. Kumar, **Fundamentals of Digital Circuits**, 3rd Edition, PHI Learning, 2014.
3. R. P. Jain, **Modern Digital Electronics**, 4th Edition, McGraw-Hill Education, 2009.
4. W. H. Gothmann, **Digital Electronics - An Introduction to Theory and Practice**, 2nd Edition, PHILearning, 1982.
5. J. P. Uyemura, **A First Course in Digital System Design : An Integrated Approach**, Vikas-Thomson Learning, 2002.

SIGNALS & SYSTEMS (3-0-2)

MODULE – I

Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Some Elementary Discrete-Time signals, Representations and different operations, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals – Classification of systems- CT systems and DT systems- – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable. Discrete-Time Systems : Input-Output Description, Block Diagram Representation, Interconnection;

MODULE – II

Analysis of Discrete-Time LTI Systems: Techniques, Response of LTI Systems, Properties of Convolution, Causal LTI Systems, Stability of LTI Systems; Discrete-Time Systems Described by Difference Equations; Implementation of Discrete-Time Systems. Correlation of Discrete-Time Signals: Cross correlation and Autocorrelation Sequences, Properties.

MODULE – III

The Continuous-Time Fourier Series:

Basic Concepts and Development of the Fourier series; Calculation of the Fourier Series, Properties of the Fourier Series.

The Continuous-Time Fourier Transform:

Basic Concepts and Development of the Fourier Transform; Properties of the Continuous Time Fourier Transform.

MODULE- IV

The Z-Transform and Its Application to the Analysis of LTI Systems:

The Z-Transform: The Direct Z-Transform, The Inverse Z-Transform; Properties of the Z-Transform; Rational Z-Transforms: Poles and Zeros, Pole Location and Time-Domain Behavior for Causal Signals, The System Function of a Linear Time-Invariant System; Inversion of the Z-Transforms: The Inversion of the Z-Transform by Power Series Expansion, The Inversion of the Z-Transform by Partial-Fraction Expansion; The One-sided Z-Transform: Definition and Properties, Solution of Difference Equations.

MODULE- V

The Discrete Fourier Transform: Its Properties and Applications: Frequency Domain Sampling: The Discrete Fourier Transform; Properties of the DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs and Circular Convolution, Additional DFT Properties.

Text Books

1. Digital Signal Processing – Principles, Algorithms and Applications, John. G. Proakis and Dimitris. G. Manolakis, 4th Edition, Pearson.
2. Fundamentals of Signals and Systems - M. J. Roberts, TMH

3. Signals and systems, second edition-Alan. V. Oppenheim, Alan. S. Willsk,S. Hamid Nawab, PHI learning Pvt ltd
Reference Books
1. Signals and Systems - P. Ramakrishna. Rao, TMH.
2. Signals and Systems – A NagoorKani, TMH
3. Principles of Signal Processing and Linear Systems, B.P. Lathi, Oxford.
4. Principles of Linear Systems and Signals, B.P Lathi, Oxford

SIGNALS AND SYSTEMS LAB
List of Experiments:
(At least 10 out of 12 experiments should be done)
1. Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.
2. Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.
3. Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.
4. Write a program to find the trigonometric and exponential Fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
5. The signal x (t) is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for this signal.
6. Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
7. Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
8.Write a program to find the autocorrelation and cross correlation of sequences.
9.Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.
10. Circular convolution of two sequences and comparison of the result with the result obtained from linear convolution using MATLAB.
11. Computation of autocorrelation of a sequence, cross correlation of two sequences using MATLAB.

Electrical Measurement & Measuring Instrument

Module- I

Measurement and Error: Definition, Accuracy and Precision, Significant Figures, Types of Errors. Types of measuring instrument: Ammeter and Voltmeter: Derivation for Deflecting Torque of; PMMC, MI (attraction and repulsion types), Electro Dynamometer and Induction type Ammeters and Voltmeters. Energy meters and watt meter.: Construction, Theory and Principle of operation of Electro-Dynamometer and Induction type wattmeter, compensation, creep, error, testing, Single Phase and Poly phase Induction type Watt-hour meters. Frequency Meters: Vibrating reed type, electrical resonance type, Power Factor Meters. Measuring instruments: Absolute and secondary instrument, indicating and recording instrument.

Module-II

Measurement of Resistance, Inductance and Capacitance: Resistance: Measurement of Low Resistance by Kelvin's Double Bridge, Measurement of Medium Resistance, Measurement of High Resistance, Measurement of Resistance of Insulating Materials, Portable Resistance Testing set (Megohm meter), Measurement of Insulation Resistance when Power is ON, Measurement of Resistance of Earth Connections. Inductance: Measurement of Self Inductance by Ammeter and Voltmeter, and AC Bridges (Maxwell's, Hay's, & Anderson Bridge), Measurement of Mutual Inductance by Felici's Method, and as Self Inductance. Capacitance: Measurement of Capacitance by Ammeter and Voltmeter, and AC Bridges (Owen's, Schering & Wien's Bridge), Screening of Bridge Components and Wagnor Earthing Device. Transducer: Strain Gauges, Thermistors, Thermocouples, Linear Variable Differential Transformer (LVDT), Capacitive Transducers, Peizo-Electric transducers, Optical Transducer,inductive torque transducers, electric tachometers, photo-electric tachometers

MODULE- III

Galvanometer: Construction, Theory and Principle of operation of D'Arsonval, Vibration (Moving Magnet & Moving Coil types), and Ballistic Galvanometer, Influence of Resistance on Damping, Logarithmic decrement, Calibration of Galvanometers, Galvanometer Constants, Measurement of Flux and Magnetic Field by using Galvanometers. Potentiometer: Construction, Theory and Principle of operation of DC Potentiometers (Crompton, Vernier, Constant Resistance, & Deflection Potentiometer), and AC Potentiometers (DrysdaleTinsley& Gall-Tinsley Potentiometer). pH- Meter, volt ratio boxes and other auxiliary apparatus.

MODULE- IV

Current Transformer and Potential Transformer : Construction, Theory, Characteristics and Testing of CTs and PTs. Electronic Instruments for Measuring Basic Parameters: Amplified DC Meters, AC Voltmeters using Rectifiers, True RMS Voltmeter, Considerations for choosing an Analog Voltmeter, Digital Voltmeters (Block Diagrams only), Q-meter

MODULE- V

Oscilloscope: Block Diagrams, Delay Line, Multiple Trace, Oscilloscope Probes, Oscilloscope Techniques, Introduction to Analog and Digital Storage Oscilloscopes, Measurement of Frequency, Phase Angle, and Time Delay using Oscilloscope.

Books:

• Electrical Measurements and Measuring Instruments – Golding &Widdis – 5th Edition, Reem Publication.

• Modern Electronic Instrumentation and Measurement Techniques – Helfrick& Cooper – Pearson Education.

• A Course in Electrical and Electronic Measurements and Instrumentation – A K Sawhney – Dhanpat Rai & Co.

• Electronic Instrumentation – H C Kalsi – 2nd Edition, Tata McGraw Hill.

• Electronic Measurement and Instrumentation – Oliver & Cage – Tata McGraw Hill.

ELECTRICAL AND ELECTRONICS MEASUREMENT LAB

Select any 8 experiments from the list of 10 experiments

1. Measurement of Low Resistance by Kelvin's Double Bridge Method.
2. Measurement of Self Inductance and Capacitance using Bridges.
3. Study of Galvanometer and Determination of Sensitivity and Galvanometer Constants.
4. Calibration of Voltmeters and Ammeters using Potentiometers.
5. Testing of Energy meters (Single phase type).
6. Measurement of Iron Loss from B-H Curve by using CRO.
7. Measurement of R, L, and C using Q-meter.
8. Measurement of Power in a single phase circuit by using CTs and PTs.
9. Measurement of Power and Power Factor in a three phase AC circuit by two-wattmeter method.
10. Study of Spectrum Analyzers.