

HYDERABAD INSTITUTE OF TECHNOLOGY AND MANAGEMENT						
B.TECH. HR-22 COURSE STRUCTURE						
ELECTRICAL AND ELECTRONICS ENGINEERING						
(Applicable for the batch admitted from 2022-23 onwards)						
III – Semester (II – Year)						
S. No.	Subject Code	Subject	Hours Per Week			Credits
			L	T	P	
1	22BS3MT05	Numerical Methods & Complex variables	3	1	0	4
2	22PC3EE05	Analog Electronic Circuits	2	0	0	2
3	22PC3EE06	Electrical Machines – II	3	0	0	3
4	22PC3EE07	Electrical Machines – I Lab	0	0	2	1
5	22PC3EE08	Electrical Circuit Analysis-II	3	0	0	3
6	22PC3EE09	Electrical Circuit Analysis-II Lab	0	0	2	1
7	22PC3EE10	Electromagnetic Fields	3	0	0	3
8	22PR3EE01	Evaluation of Internship-1	0	1	0	1
9	22PR3EE02	Doing Engineering-1	0	1	2	2
TOTAL			14	3	6	20
10	22MC3HS01	Universal Human Values	2	0	0	0
IV – Semester (II – Year)						
S. No.	Subject Code	Subject	Hours Per Week			Credits
			L	T	P	
1	22PC4EE11	Electrical Measurements and Instrumentation	3	0	0	3
2	22PC4EE12	Electrical Measurements and Instrumentation Lab	0	0	2	1
3	22PC4EE13	Control Systems	3	0	0	3
4	22PC4EE14	Control Systems Lab	0	0	2	1
5	22ES4CS16	Data Structures using C*	3	0	2	4
6	22PC4EE15	Power systems II	3	0	0	3
7	22PC4EE16	Digital Electronics	3	0	0	3
8	22PC4EE17	Analog and Digital Electronics Lab	0	0	2	1
9	22PC4EE18	Electrical Machines – II Lab	0	0	2	1
TOTAL			15	0	10	20
10	22MC4HS6	Constitution of India	2	0	0	0

B. Tech II Year–I Sem
Subject Code: 22BS3MT05

L	T	P	C
3	1	0	4

NUMERICAL METHODS AND COMPLEX VARIABLES
(Common to EEE/ECE)

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To provide the student with

1. Various methods to find roots of an equation.
2. Concept of finite differences and to estimate the value for the given data using interpolation.
3. Evaluation of integrals using numerical techniques.
4. Solving ordinary differential equations using numerical techniques.
5. Differentiation and integration of complex valued functions.
6. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
7. Expansion of complex functions using Taylor's and Laurent's series.
8. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms.

MODULE I

Numerical Solutions of Algebraic Equations: Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Regula-Falsi method and Newton-Raphson method.

Interpolation: Newton's divided difference interpolation method. Finite differences- forward differences- backward differences-central differences-operational relations; Interpolation using Newton's forward and backward difference formulae. Gauss's forward and backward formulae; Sterling's formula, Lagrange's method of interpolation.

MODULE II

Numerical Differentiation and Integration: Forward, backward and central differences for first and second order derivatives. General quadrature formula, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Solutions Of Ordinary Differential Equations: Taylor's series; Picard's method, Euler's and modified Euler's methods; Runge-Kutta method of fourth order.

MODULE III

Complex Functions: Limit, Continuity and Differentiation of Complex functions.

Analytic Functions: Analyticity, Necessary and Sufficient condition for a function to be analytic (CR-Equations without proof), Harmonic function and finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties. Conformal mapping and Mobius transformation.

MODULE IV

Complex Integrals: Line integral, Cauchy's theorem (without proof), Cauchy's Integral formula (without proof), Zeros of analytic functions, Singularities.

Poles and Residues: Taylor's series, Laurent's series; Poles and Residues, Cauchy Residue theorem (without proof), Evaluation of Real definite integrals of the type $\int_0^{2\pi} f(\sin\theta, \cos\theta)d\theta$, $\int_{-\infty}^{\infty} f(x)dx$ (poles NOT on real axis).

MODULE V

Fourier Series: Introduction, Fourier series of periodic functions, Fourier series of even and odd functions, Change of interval, Half range sine and cosine series.

Fourier Transform: Fourier sine and cosine transforms - Inverse Fourier transforms.

Text Books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Introductory methods of numerical analysis, S.S. Sastry, PHI, 4th Edition, 2005.
3. Complex Variables and Applications, J. W. Brown and R. V. Churchill, 7th Ed., Mc-Graw Hill, 2004

Reference Books:

1. Advanced Engineering Mathematics, Erwin kreyszig, 9th Edition, John Wiley & Sons, 2006
2. **Advanced Modern Engineering Mathematics Glyn James, 5th edition, Prentice Hall, 2018.**
3. Complex Analysis, Lars V Ahlfors, 3rd edition, McGraw-Hill International, 2017

MOOC Courses:

1. Complex variables: <https://nptel.ac.in/courses/111/106/111106141/>
2. Numerical Methods: <https://nptel.ac.in/courses/127/106/127106019/>

E- Books:

1. Higher Engineering Mathematics by B.S. Grewal lib.in/book/2352263/9368cb
2. Introductory methods of numerical analysis by S.S. Sastry
<https://1lib.in/book/3380466/2e7cbd>
3. Complex Variables and Applications by J. W. Brown and R. V. Churchill
<https://1lib.in/book/2574161/794c8d>
4. Advanced Engineering Mathematics by Erwin Kreyszig
<https://1lib.in/book/1213502/92e465>
5. Advanced Modern Engineering Mathematics by Glyn James
<https://1lib.in/book/1204739/431eb2>
6. Complex Analysis by Lars V Ahlfors
<https://1lib.in/book/842200/9692f4>

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

CO1: Obtain the real roots of algebraic, transcendental equations also approximate solutions for evenly and unevenly spaced data.

CO3: Fit a given data to linear/non-linear curve and appreciate the concept of numerical differentiation and integration. Develop the skill of finding approximate solutions to problem arising in first order IVP in differential equations.

CO3: Analyse the complex function with reference to their analyticity, integration of complex functions by Cauchy's integral and residue theorems also Taylor's and Laurent's series expansions in complex function.

CO4: Express any periodic function in terms of sine and cosine.

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B.Tech II Year – I Sem
Subject Code: 22PC3EE05

L	T	P	C
3	0	0	3

ANALOG ELECTRONIC CIRCUITS

Course Objectives: This course will enable students to:

1. To understand operation of semiconductor devices, Transistors
2. To familiarize the different types of diodes
3. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
4. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback and generate the oscillations for different frequencies.

Course Outcomes

Upon completion of the Course, the students will be able to:

1. Analyze the Diode applications, Bipolar Junction Transistor characteristics and the biasing techniques.
2. Explain the different diodes using at various applications
3. Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
4. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations

Module I: Semiconductor diode:

Semiconductor diode, Conductivity of Semiconductor, Mass-Action Law, Drift and Diffusion currents, PN Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch-switching times

Diode Applications: Rectifier - Half Wave Rectifier, Center tap Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

Module II:

Special Diodes: Zener diode, Backward diode, Varactor diode, Metal semiconductor Junctions, Tunnel diode, Gunn diode, Impatt diode, PIN diode, PIN photo diode, Avalanche photo diode, Laser diode.

MODULE-III

Bipolar Junction Transistor (BJT): Construction, Transistor biasing, Operation of NPN and PNP transistors, Input Characteristics, Output characteristics, Transistor parameters for CB, CE, CC configurations, Transistor as a switch, Transistor as an amplifier, Breakdown in transistors, Reach through, EBERS-MOLL model, Bias stability – Need for biasing, Fixed bias, Emitter-feedback bias, Collector to Base bias, Voltage Divider bias

Field Effect Transistor (FET): Construction, Principle of Operation N-Channel JFET, characteristics parameters of JFET, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and JFET, Applications of JFET, JFET as Voltage – Variable Resistor, MOSFET, Enhancement MOSFET, Depletion MOSFET, Comparison of MOSFET and JFET, Biasing the FET, Biasing the MODFET.

Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response multistage amplifiers, Cascade RC Coupled amplifiers, Cascode amplifier, Darlington pair.

Text Books:

1. Electronic Devices and Circuits- Jacob Millman, McGraw Hill Education.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson.

1. Electronic Devices and Circuits-S Salivahanan, N Suresh Kumar, McGraw Hill Education PVT Ltd, 2014
2. Electronic Devices and Circuits,K.Lal Kishore B.S Publications
3. Electronic Devices and Circuits, G.S.N. Raju, I.K. International Publications, New Delhi, 2006.

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B.Tech II Year – I Sem

Subject Code: 22PC3EE06

L	T	P	C
3	0	0	3

ELECTRICAL MACHINES – II

Pre-requisite: Basic Electrical Engineering, ELECTRICAL MACHINES - I

Course Objectives:

1. To deal with the detailed analysis of poly-phase induction motors & Alternators
2. To understand operation, construction and types of single phase motors and their applications in house hold appliances and control systems.
3. To introduce the concept of parallel operation of alternators
4. To introduce the concept of regulation and its calculations.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- CO – 1** Describe different parts in induction motors and specify their functions
- CO – 2** Explain the operation of induction motors
- CO – 3** Analyze performance characteristics of ac machines.
- CO – 4** Describe the construction, operation, characteristics, of single phase motors and special machines

Module 1:

Poly-Phase Induction Machines: Principle of operation, Constructional details, production of a rotating magnetic field, effect of slip on rotor EMF, rotor frequency, rotor reactance, rotor current and Power factor at standstill and during operation.

Torque equation, expressions for maximum torque and starting torque, torque Vs slip characteristic, equivalent circuit, phasor diagram, crawling and cogging.

Module 2:

Characteristics of Induction Machines: Rotor power input, rotor copper loss and mechanical power developed and their inter relation, No-load Test and Blocked rotor test, Predetermination of performance, Methods of starting.

Speed Control Methods: Change of voltage, change of frequency, voltage/frequency and injection of an EMF into rotor circuit.

Module 3:

Synchronous Machines: Principle and Constructional details of round rotor and salient pole machines, Armature windings– Integral slot and fractional slot windings; Distributed and concentrated windings, distribution, pitch and winding factors, E.M.F Equation. Harmonics in generated e.m.f., armature reaction - leakage reactance, synchronous reactance and impedance, phasor diagram

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B.Tech II Year – I Sem

L T P C

Subject Code: 22PC3EE07

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ELECTRICAL MACHINES – I LAB

Pre-requisite: Electrical Machines-I

Course Objectives:

1. To expose the students to the operation of DC Generator
2. To expose the students to the operation of DC Motor.
3. To examine the self-excitation in DC generators.

Course Outcomes: After completion of this lab the student is able to

1. Start and control the Different DC Machines.
2. Assess the performance of different machines using different testing methods
3. Identify different conditions required to be satisfied for self - excitation of Dc Generators.
4. Separate iron losses of DC machines into different components

List of Experiments:

Any Ten of the following experiments should be conducted

1. Magnetization characteristics of DC shunt generator (Determination of critical field resistance and critical speed)
2. Load test on DC shunt generator (Determination of characteristics)
3. Load test on DC compound generator (Determination of characteristics.
4. Brake test on DC compound motor (Determination of performance curves)
5. Brake test on DC shunt motor (Determination of performance curves)
6. Brake test on DC Series motor (Determination of performance curves)
7. Swinburne's test and speed control of DC shunt motor (Predetermination of efficiencies)
8. Hopkinson's test on DC shunt machines (Predetermination of efficiency)
9. Fields test on DC series machines (Determination of efficiency)
10. Retardation test on DC shunt motor (Determination of losses at rated speed)
11. Separation of losses in DC shunt motor.

Text Books:

1. "Electric Machinery", A. E. Fitzgerald and C. Kingsley, New York, McGraw Hill Education, 2013.
2. "Electrical Technology" B.L. Thereja and A.K. Thereja, ,S.Chand Publishers, 2004.
3. "Performance and design of DC machines", A. E. Clayton and N. N. Hancock, CBS Publishers, 2004.

Reference Books:

1. “Performance and design of AC machines”, M. G. Say, CBS Publishers, 2002.
2. “Electrical Machinery”, P. S. Bimbhra, Khanna Publishers, 2011.
3. “Electric Machines”, I. J. Nagrath and D. P. Kothari, McGraw Hill Education, 2010.

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B.Tech II Year – I Sem

L T P C

Subject Code: 22PC3EE08

3 0 0 3

ELECTRICAL CIRCUIT ANALYSIS – II

Pre-requisite: Mathematics

Course Objectives:

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

Course Outcomes:

1. CO1 – Analyse the transient behaviour of electrical circuits
2. CO2 – Analyse the behaviour of two-port networks
3. CO3 – Analyse the Fourier series for periodic functions.
4. CO4 – Analyse the working of different types of filter

Module I: Transient analysis

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

Module II: Electrical circuit Analysis using Laplace Transforms

Application of Laplace Transforms to RL, RC and RLC (series and parallel) Networks for impulse, step, and ramp, exponential and sinusoidal excitations.

Module III: Two port network parameters

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

Module IV: Fourier Series and Integral

Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integral and its properties, Continuous spectrum, Application to simple networks

Module V: Filters

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

TEXT BOOKS:

1. Van Valkenburg M.E, /T.S. Rathore “Network Analysis”, Pearson Education, 3rd Edition, 2019.
2. Chakravarthy A., “Circuit Theory”, Dhanpat Rai & Co., Seventh Edition, 2016.

REFERENCE BOOKS:

1. B. Subramanyam, “Electric Circuit Analysis”, Dreamtech Press & Wiley, 2021.
2. 2. James W.Nilsson, Susan A.Riedel, “Electric Circuits”, Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, “Circuits and Networks: Analysis and Synthesis”, McGraw Hill, 5 th Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., “Network Analysis”, B.S. Publications, 3 rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, “Engineering Circuit Analysis”, McGraw Hill, 6 th Edition, 2002.
6. Ravish R Singh, “Network Analysis and Synthesis”, McGraw-Hill, 2 nd Edition, 2019.

Web Resources:

1. <https://nptel.ac.in/courses/108/104/108104139/>
2. <https://nptel.ac.in/courses/117/103/117103063/>

E- Books:

1. https://www.academia.edu/42933156/Basic_Electrical_Engineering_VK_Mehta
2. https://www.opentextbooks.org.hk/system/files/export/9/9648/pdf/Fundamentals_of_Electrical_Engineering_I_9648.pdf

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B.Tech II Year – I Sem
Subject Code: 22PC3EE09

L	T	P	C
0	0	2	1

ELECTRICAL CIRCUIT ANALYSIS-II LAB

Pre-requisite: Electrical Circuit Analysis

Course Objectives:

1. To design electrical systems and analyze them by applying various Network Theorems
2. To measure three phase Active and Reactive power.
3. To understand the concept of resonance.

Course Outcomes: After completion of this lab the student is able to

1. Determine the parameters of two port networks.
2. Analyze the Transient Response of RL, RC & RLC circuits.
3. Analyze complicated circuits using different network theorems
4. Acquire skills of using MATLAB software for electrical circuit studies.

Note: Any Ten experiments should be conducted

1. Determination of average value, RMS value, form factor, peak factor of sinusoidal wave using digital simulation.
2. Verification of Superposition theorem by digital simulation.
3. Determination of Time response of first order RL and RC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error.
4. Determination of Two port network parameters – Z & Y parameters.
5. Determination of Two port network parameters – A, B, C, D parameters.
6. Verification of reciprocity theorem by digital simulation.
7. Frequency domain analysis of Low-pass filter.
8. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency spectrum.
9. Measurement of Active Power for Star and Delta connected balanced loads.
10. Measurement of Reactive Power for Star and Delta connected balanced loads.
11. Frequency domain analysis of High-pass filter.
12. Determination of Two port network parameters -Hybrid parameters.
13. Verification of Thevenin's and Norton's theorem using digital simulation
14. Determination of Time response of first order RLC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error

TEXT BOOKS:

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

2019.

REFERENCE BOOKS:

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

Web Resources:

1. <https://vlab.amrita.edu/?sub=1&brch=75>
2. <https://nptel.ac.in/courses/117/103/117103063/>

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B.Tech II Year – I Sem

L T P C

Subject Code: 22PC3EE10

3 0 0 3

ELECTROMAGNETIC FIELDS

Pre-requisite: Concepts of physics, Vector algebra, Derivatives and integration

Course Objectives:

1. To Apply the concepts of coordinate systems
2. To Analyze concepts of electrostatic field
3. To understand concepts of magnetic field
4. To understand the concepts of time varying fields
5. To Analyze the Maxwell's equation in different forms and different media

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

CO1: To Analyze electric fields due to simple charge configurations

CO2: To Analyze magnetic fields and forces due to different configurations

CO3: To Analyze Maxwell's equation in different forms and media

CO4: To Understand the Electromagnetic waves in different mediums

Module I: Concept of Electric field and its laws

Review of Vector Algebra, Co-ordinate Systems, Coulomb's Law, Electric Field Intensity, Electric field due to different charge distributions. Electric field due to Line charge, Surface charge, Volume charge distribution, Electric Flux Density, Gauss's law, Divergence theorem Applications of above laws. Electric potential, potential difference, calculation of potential differences for different configurations. Electric dipole.

Module II: Electrostatic fields

Energy in electrostatic field, Poisson's and Laplace Equation, Uniqueness theorem, Solution of Laplace's equation, Conductors, Dielectric capacitance, calculation of capacitance of a two wire line. Boundary conditions of conductors and dielectric materials.

Module III: Concept of Magnetic field and its laws

Steady magnetic field, Biot-savart's law, Ampere's law, Magnetic flux and Magnetic flux density, Force on a moving charge, Force on a differential current elements, Applications of above laws. Magnetic circuits, self and mutual inductances, Magnetic boundary conditions.

Module IV: Maxwell's equations

Maxwell's equations in differential and integral forms for static and time varying

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B.Tech II Year –I Sem
Subject Code: 22PR3EE02

L	T	P	C
0	1	2	2

ARDUINO PROGRAMMING (DOING ENGINEERING -2)

Pre-requisite: Basics of C programming language

Course Objectives:

1. To train the students to write the code for different applications.
2. To make the students how Arduino IDE software is interconnected with hardware components.
3. To make the students, understand the usage of different sensors for specific applications.
4. To develop the Software/hardware prototype for various applications.

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

1. CO1 –Understand the programming Software of Arduino IDE
2. CO2 –Apply the different types of sensors for specific applications.
3. CO3 –Develop a code in the Arduino for different applications
4. CO4 –Analyse the interfacing of RFID & Motor driver circuits according to the application.

Module I:Introduction to Hardware and Software interfacing

Introduction to Software

Hardware- Arduino Board- Types of Boards-Pin Configuration, software (Arduino IDE), Coding basics- Syntax for coding.

Interfacing of Hardware and Software through LED

Introduction to LED and BUZZER Pin Configuration-Interfacing LED (turning ON and OFF and to perform a sequence of operations)-Interfacing Buzzer turning ON and OFF.

Module II:Interfacing of Sensors

Light Dependent Resistor (LDR) and Temperature Sensors

Introduction to LDR sensor, pin Configuration-Interfacing LDR Sensor-Counter with LDR sensor, Introduction to LM35-Pin Configuration-Interfacing temperature sensor-writing code to measure temperature.

Soil Moisture Sensor

Introduction to Soil moisture sensor-Pin Configuration-Interfacing Soil moisture sensor, setting Level of moisture value based on soil moisture value turning ON and OFF of LED/BUZZER.

Smoke Sensor and Ultrasonic Sensor

Infrared (IR) Sensor and PIR Sensor

Module IV: Configurations of Display and Relay

LCD

Relays

Module V: Interfacing RFID Reader and Motor Driver

RFID Reader Module

Motor Driver

TEXTBOOKS:

- ### REFERENCE BOOKS:

1. “Paul Bradt and David Bradt” Science and Engineering Projects using the Arduino and Raspberry Pi.
2. “Jack Purdum, Ph.D.” Beginning of C for Arduino, Second Edition, Learn C Programming for the Arduino.

CO-PO/PSO Mapping Chart (3/2/1 indicates the strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2			3								2	2
CO2	1	2	2		3								2	2
CO3	2	3	2		3								2	2

CO4	2	3	2		3								2	2
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B.Tech II Year – ISem

Subject Code: 22MC3HSO1

L	T	P	C
2	0	0	0

Universal Human Values (UHV)
(Common to ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM branches)

Course Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they ‘really want to be’ in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcome: On completion of this course, the students will be able to
CO1: Explore on the basic aspiration of Human being and its fulfilment

CO2: Distinguish the difference between the Self and the Body

CO3: Explore the value of harmony in family, society and nature

CO4: Understanding of gender related issues and gender relationship.

Module I

Self- Exploration on UHV Basic Guidelines

Content and Process for Value Education Understanding the need, basic guidelines, 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.

Module II

Understanding Harmony in the Human Being

Harmony in Myself 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’

Understanding Harmony in self

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,

Module III

Understanding Harmony in the Family

Harmony and Values in Relationships in the Family- the basic unit of human interaction, Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas & Samman; Difference between intention and competence,

Understanding Harmony in the Society

Understanding the harmony in the society: Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha).

Module IV

Understanding Harmony in the Nature and Existence

Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature

Understanding Harmony in the Existence

Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Module V

Exploring Attitudes towards gender

Understanding gender and Basic Gender Concepts/terminology- exploring attitude towards gender-construction of gender- socialization: Making Women, making Men.

Gender relationship and Culture

Gender roles and relationship matrix, sex selection and consequences, declining sex ratio, Gender Issues- Gender sensitive language, Just Relationships: Being together as equals.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Towards a World of Equals: a bilingual Textbook on Gender. A Suneetha, and others... Telugu Academy, Telangana Gov. 2015

References:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.

MOOC Course: NPTEL -Exploring Human Values: Visions of Happiness and Perfect Society - Web course

O-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	Program Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1								3				
CO2								3				
CO3								3				
CO4								3				
CO5								3				

B.Tech II Year – IISem

Subject Code: 22PC4EE11

L	T	P	C
3	0	0	3

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Pr-requisite: Basic Electrical Engineering, Analog Electronics, Electrical Circuit Analysis & Electro -Magnetic fields.

Course Objectives:

- 1) To introduce the basic principles of all measuring instruments
- 2) To deal with the measurement of voltage, current, Power factor, power, energy, and magnetic measurements.
- 3) To understand the basic concepts of smart and digital metering.

Course Outcomes:

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

- 1) CO1 – Understand different types of measuring instruments, their construction, operation, and characteristics
- 2) CO2 – Identify the instruments suitable for typical measurement
- 3) CO3 – Apply the knowledge about transducers and instrument transformers to use them effectively.
- 4) CO4 – Apply the knowledge of smart and digital metering for industrial applications.

Module I: Introduction to Measuring Instruments

MC and MI Instruments: Classification – deflecting, control, and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations.

Extension of the range of instruments: Extension of the range of instruments using shunt and series multipliers-Multi Range Ammeter, Multi-Range Dc Voltmeter, Potential Divider Arrangement, Ayrton Shunt.

Module II: Potentiometer s & Instrument Transformers

DC Potentiometer s: Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage

AC Potentiometer s: A.C. Potentiometer s: polar and coordinate type's standardization – applications. CT and PT – Ratio and phase angle errors

Module III: Measurement of Power & Energy

Measurement of Power: Single-phase dynamometer watt-meter, LPF and UPF, Double element and three-element dynamometer watt-meter, the expression for deflecting and control torques – Extension of range of watt-meter using instrument transformers.

Measurement of Energy: Single-phase induction type energy meter – driving and braking torques – errors and compensations.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2										1		
CO2	2	3										2	2	
CO3	2	3										2	2	
CO4	3	2										2	1	

B.Tech II Year – II Sem

Subject Code: 22PC4EE12

L	T	P	C
0	0	2	1

ELECTRICAL MEASUREMENTS LAB

Pre-requisite: Measurements and Instrumentation

Course Objectives:

1. To calibrate LPF Watt Meter, energy meter, P. F Meter using electro dynamo meter type instrument as the standard instrument
2. To determine unknown inductance, resistance, and capacitance by performing experiments on D.C Bridges & A. C Bridge
3. To determine three-phase active & reactive powers using the single wattmeter method practically.
4. To determine the ratio and phase angle errors of the current transformer and potential transformer.

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

1. CO1 – Able to choose instruments
2. CO2 – Able to test any instrument
3. CO3 – Analyze the accuracy of any instrument by performing experiment
4. CO4 – Able to Calibrate PMMC instrument using D.C potentiometer

Any Eight Experiments Should be Conducted

1. Calibration and Testing of single-phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance
5. Dielectric oil testing using H.T. testing Kit
6. Schering Bridge & Anderson Bridge
7. Measurement of 3 - Phase reactive power with single-phase wattmeter
8. Measurement of displacement with the help of LVDT
9. Calibration LPF wattmeter – by Phantom testing
10. Measurement of 3-phase power with single wattmeter and two CTs

Any Two experiments should be conducted

11. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given CT by Null method
12. PT testing by comparison – V. G. as Null detector – Measurement of % ratio error and phase angle of the given PT
13. Resistance strain gauge – strain measurements and Calibration
14. Transformer turns ratio measurement using AC bridges
15. Measurement of % ratio error and phase angle of given CT by comparison

1. “G. K. Banerjee”, “Electrical and Electronic Measurements”, PHI Learning Pvt. Ltd., 2nd Edition, 2016
2. “S. C. Bhargava”, “Electrical Measuring Instruments and Measurements”, BS Publications, 2012

1. “A. K. Sawhney”, “Electrical & Electronic Measurement & Instruments”, Dhanpat Rai & Co. Publications, 2005
2. “R. K. Rajput”, “Electrical & Electronic Measurement & Instrumentation”, S. Chand and Company Ltd., 2007
3. “Buckingham and Price”, “Electrical Measurements”, Prentice – Hall, 1988
4. “Reissland, M. U”, “Electrical Measurements: Fundamentals, Concepts, Applications”, New Age International (P) Limited Publishers, 1st Edition 2010
5. “E.W. Golding and F. C. Widdis”, “Electrical Measurements and measuring Instruments”, fifth Edition, Wheeler Publishing, 2011

[illegible]

B.Tech II Year – II Sem

L T P C

Subject Code: 22PC4EE13

3 0 0 3

CONTROL SYSTEMS

Pre-requisite: Electrical circuit Analysis, M-II.

Course Objectives:

1. To model the electrical & Mechanical LTI Systems
2. To obtain the transfer function model
3. To Study the time domain response of LTI system.
4. To study the frequency response of LTI System.
5. To model system using state space analysis

Course Outcomes:

1. CO1 – Apply various control strategies to different applications (power systems, electrical drives, mechanical systems)
2. CO2 – Apply various time domain and frequency domain techniques to assess the system performance.
3. CO3 – Design a suitable controller and/or a compensator for the specific application to improve the system performance.
4. CO4 – Test system controllability and observability using state space representation and applications of state space representation to various systems.

Module I

Mathematical modelling of systems:

Introduction to Systems, Control systems, Open Loop and closed loop control systems and their differences- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and Transfer function –

Block diagram algebra & Servo motors:

Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula, Synchro's, AC & DC servo motor characteristics.

Module II

Time domain Analysis:

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants.

Stability analysis using Routh-Hurwitz & Root Locus:

The concept of stability – Routh’s stability criterion – qualitative stability and conditional stability – limitations of Routh’s stability, Root-Locus technique. Construction of Root-loci.

Module III

Frequency domain Analysis:

Frequency domain specifications, correlation between time domain and frequency domain specifications, Bode Plots. Advantages of frequency response, frequency response of LTI system.

Frequency response plots:

Polar Plots-Nyquist Plots, Relative stability using Nyquist criterion – gain and phase Margin. Closed-loop frequency response.-Bode plots.

Module IV

P, PI and PID controllers:

Effect of addition of pole and zero to open loop transfer function, Design specifications– Effects of proportional derivative, proportional integral systems, and PID controllers.

Design of compensators:

Practical constraints to implement PID controllers, Designing of Lag, Lead and Lead- Lag compensators, Design problems.

Module V

State Space Model:

Concepts of state, state variables and state space model, derivation of state models from block diagrams, Solution of state equations. Eigen values and Stability Analysis. Diagonalization of State Matrix.

Solution of state equations of LTI systems:

Solving the Time invariant state Equations- State Transition Matrix and its Properties. Controllability and Observability. Pole-placement by state feedback. Discrete-time systems. Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems.

Text Books:

1. Automatic Control Systems 8th edition –B. C. Kuo 2003– John wiley and sons.
2. Control Systems Engineering – I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

Reference Books:

1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems – N.K. Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. – NISE 3rd Edition – John wiley, 2014.
4. “Modeling & Control of Dynamic Systems” – Narciso F. Macia George J. Thaler, Thomson Publishers, 2000.

Equivalent MOOC Courses if any:

https://onlinecourses.nptel.ac.in/noc20_ee90

E-Books:

1. [file:///C:/Users/Naresh/Downloads/Control%20Systems%20Engineering%20by%20Norman%20S.%20Nise%20\(z-lib.org\).pdf](file:///C:/Users/Naresh/Downloads/Control%20Systems%20Engineering%20by%20Norman%20S.%20Nise%20(z-lib.org).pdf)
2. [file:///C:/Users/Naresh/Downloads/Control%20Systems%20engineering%20by%20I.%20J.%20NAGARATH%20M.%20GOPAL%20\(z-lib.org\).pdf](file:///C:/Users/Naresh/Downloads/Control%20Systems%20engineering%20by%20I.%20J.%20NAGARATH%20M.%20GOPAL%20(z-lib.org).pdf)

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B.Tech II Year – II Sem

L T P C

Subject Code: 22PC4EE14

0 0 2 1

CONTROL SYSTEMS LAB

Prerequisite: Control Systems

Course Objectives:

1. To understand the different ways of system representations such as Transfer function Representation and state-space representations and to assess the system dynamic response
2. To assess the system performance using time-domain analysis and methods for improving it
3. To assess the system performance using frequency domain analysis and techniques for Improving the performance
4. To design various controllers and compensators to improve system performance

Course Outcomes:

1. CO1: Improve the system performance by selecting a suitable controller and/or a compensator for a specific application.
2. CO2: Apply various time domain and frequency domain techniques to assess the system performance.
3. CO3: Apply various control strategies to different applications (example: Power systems, electrical drives, etc.).
4. CO4: Test system controllability and observability using state space representation and applications

Mandatory Eight Experiments Should be conducted

1. Analyse the Time Domain Specifications of the Second-order system
2. Determination of Characteristics of Synchro Transmitter-Receiver pair
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions, and application of speed control of the motor.
4. Analyse the feedback effect on DC servo motor Speed using PID Controller
5. Determination of Transfer function of DC motor
6. Determination of Transfer function of DC generator
7. Analyse the Temperature using P, I, and PID Controller
8. Determine the Speed vs Torque and Speed vs Back EMF Characteristics of AC servo motor

Any Four Experiments Should be conducted

9. Analyse the Steady State Error and Overshoot of a second-order system using PID Controller
10. Determine the Magnitude and Phase plot for Lag, Lead, and Lag-Lead Compensator Networks
11. Determine the Displacement-Time characteristics for P, PI, PID Controller using

12. Determination of the Time Domain Specifications for Linear System using MATLAB

14. Analysing State-space model for classical transfer function using MATLAB

16. Determine the Characteristics between Control Current and Load Current by connecting in series and Parallel manner for Magnetic Amplifier

2. B. C. Kuo, "Automatic Control System", Prentice-Hall, 1995.

2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009.

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B.Tech I Year–II Sem

Subject Code: 22PC3CS16

L	T	P	C
2	0	4	4

DATA STRUCTURES USING C
(Common to CSE, AIML, EEE, ECE)

Prerequisite: Basic mathematical, analytical and logical capability, problem solving through C.

Course Objectives:

- Introduce Analysis of Algorithm in terms of space and time complexity.
- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms.

Course Outcomes:

- Understand concepts of ADT and to write an algorithm for a given problem statement, also calculate time and space complexity.
- Ability to develop C programs for computing real-life applications using data structures like linked lists, stacks, queues.
- Understand different types of trees like Red-Black, AVL, Splay trees.
- Ability to implement searching and sorting algorithms, and pattern matching algorithms.

Module I

Introduction: Basics of Data Structures, Abstract data types, Dynamic aspects of operations on data, Characteristics of data structures, Creation and manipulation of data structures, Operations on data structures.

Algorithms: Mathematical notations and functions, Asymptotic, Analysis of algorithms Time and Space complexity.

Programs:

1. Asymptotic notations to calculate the running time complexity of any algorithm.
O Notation (Big-O Notation), Ω Notation (Big-Omega Notation), θ Notation (Theta Notation)
2. Calculate complexity analysis of control structures

3. Calculate complexity analysis of any recursive algorithm
4. Calculating Time complexity of Linear Search algorithm
5. Calculate Time Complexity of quick sort in all possible cases.

Module II

Linked lists: Types of linked lists – singly, doubly and circularly linked lists, operations on linked lists.

Stacks: Implementation of stacks– array and linked list, operations on stacks, Applications of Stacks, Notations – infix, prefix and postfix, Conversion and evaluation of arithmetic expressions using Stacks.

Queues: Implementation of queues– array and linked list, operations on queues, Types of queues – queue, double ended queue and priority queue.

Programs:

1. Write a Program to Implement Stack Operations using Dynamic Memory Allocation.
2. Write a program to convert expressions infix to postfix using stack.
3. Write a program to evaluate arithmetic expressions using stack
4. Write a program that uses functions to perform the following operations on Singly linkedlist.
 - i) Creation
 - ii) Insertion
 - iii) Deletion
 - iv) Traversal
5. Write a program that uses functions to perform the following operations on Circular linkedlist.
 - i) Creation
 - ii) Insertion
 - iii) Deletion
 - iv) Traversal
6. Write a program that implement Queue (its operations) using Arrays.
7. Write a program that implement stack (its operations) using Pointers

Module III

Dictionaries: Linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing- linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

Programs:

1. Write a program to implement dictionary linear list representation and its operations
2. Write a Program to Implement Hash Tables with Quadratic Probing
3. Write a Program to Implement Hash Tables with Linear Probing

4. Write a Program to Implement Hash Tables Chaining with Binary Trees
5. Write a Program to Implement Hash Tables Chaining with Doubly Linked Lists

Module- IV

Graph: Basic terminologies and Representation Traversal algorithms Breadth First Search, Depth First Search, Shortest path: Depth first search in directed and undirected graphs. Union-find data structure and applications. Directed acyclic graphs, topological sort.

Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

Programs:

1. Write a program to implement the Binary Search tree.
 - a) Insertion b) Deletion c) Traversal d) Searching element in tree.
2. Write a program to implement the AVL tree.
 - a) Insertion b) Deletion c) Traversal d) Searching element in tree.
3. Write a program to implement the Red-Black tree.
 - a) Insertion b) Deletion
4. Write a program to implement the Splay tree.
 - a) Insertion b) Deletion
5. Write a program to implement graph traversal methods
 - a) Breadth First Search, b) Depth First Search

Module V

Sorting: objective and Properties of different sorting Algorithms Insertion Sort, Bubble sort, Selection Sort, Merge sort, Quick Sort, Heap sort, Radix sort, Bucket sort. Performance and comparison among all the methods Algorithm design techniques: Divide and conquer, Greedy approach, dynamic programming.

Pattern Matching and Tries: Pattern matching algorithms-Brute force, The Boyer –Moore algorithm, Naive algorithm, The Knuth-Morris-Pratt algorithm; Tries- Standard Tries, Compressed Tries, Suffix tries.

Programs:

1. Write a program to implement merge sort using divide and conquer technique
2. Write a program to implement bubble sort using greedy approach.
3. Write a program to implement brute-force method of string matching.
4. Write a Program to perform string matching using Naive String Matching
5. Write a program to implement Standard Trie
6. Write a program to implement Compressed Trie

7. Write a program to implement Suffix Trie

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
3. AV Aho. J. Hopcroft, JD Ullman, Data Structures and Algorithms, Addison-Wesley, 1983.

REFERENCE BOOKS:

1. **Data Structures : A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.**
2. **Fundamentals of Computer Algorithms by Horwitz and Sahni, Galgotia.**
3. **Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2011.**
4. **Reema Thareja, "Data Structures Using C", Oxford Higher Education, First Edition, 2011**

WEB RESOURCES:

[https://www.javatpoint.com /c-programming-language-tutorial](https://www.javatpoint.com/c-programming-language-tutorial)

<https://www.tutorialspoint.com/cprogramming/index.htm>

Course Outcomes:

[illegible]

B.Tech II Year – II Sem

Subject Code: 22PC4EE15

L	T	P	C
3	0	0	3

POWER SYSTEMS-II

Pre-requisite: Power Systems-I and Electro Magnetic Fields

Course Objectives:

1. To analyze the performance of transmission lines.
2. To understand the voltage control and compensation methods.
3. To understand the per unit representation of power systems.
4. To examine the performance of travelling waves.
5. To know the methods of over voltage protection and Insulation coordination of transmission lines
6. To know the symmetrical components and fault calculation analysis

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

1. **CO1-** Analyze transmission line performance.
2. **CO2-** Apply load compensation techniques to control reactive power & understand the application of per unit quantities.
3. **CO3-** Apply various methods of protection for over voltages and insulation coordination
4. **CO4-** Determine the fault currents for symmetrical and unbalanced faults

Module I :

Performance of Lines-I

Representation of Transmission lines, short transmission lines, medium length lines, nominal T and PI- representations.

Performance of Lines-II

Long transmission lines. The equivalent circuit representation of a long Line, A, B, C, D constants, Surge Impedance Loading and its Significance, Ferranti Effect, Power flow through a transmission line.

Module II:

Voltage Control

Introduction – methods of voltage control, shunt and series capacitors ,shunt reactor, tap changing transformers, synchronous phase modifier.

Compensation in Power Systems

Introduction - Concepts of Load compensation – Load ability characteristics of overhead lines – Symmetrical line – Radial line with asynchronous load.

Module III :

Per Unit Representation of Power Systems

The single-line diagram, impedance and reactance diagrams, per unit quantities, changing the base of per unit quantities, advantages of per unit system.

Travelling Waves on Transmission Lines

Production of travelling waves, open circuited line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T-junction line terminated through a capacitance.

Module IV:

Over-voltage Protection

Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods.

Insulation Coordination

Surge absorbers, Insulation coordination, volt-time curves.

Module V:

Symmetrical Components

Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks.

Fault Calculations

Fault calculations, single line to ground fault, line to line fault, double line to ground fault, three phase fault, reactors and their location, short circuit capacity of a bus.

TEXT BOOKS:

1. John J. Grainger & W.D. Stevenson: Power System Analysis – Mc-Graw Hill International 2018.
2. C.L. Wadhwa: Electrical Power Systems – New Age International Pub. Co. Sixth Edition, 2014

REFERENCE BOOKS:

1. Hadi Scadat: Power System Analysis – Tata Mc Graw Hill Pub. Co. 2020
2. W.D. Stevenson: Elements of Power system Analysis – McGraw Hill International Student Edition.
3. D.P. Kothari and I. J. Nagrath, Modern Power System Analysis - Tata Mc Graw Hill Pub. Co. New Delhi, Sixth edition, 2018

E books:

1. [https://www.webprosindia.com/hitam/resources/PS-II%20\(R18\)%20M.CHIRANJIVI%20COURSE%20FILE%202021-22_4396.docx](https://www.webprosindia.com/hitam/resources/PS-II%20(R18)%20M.CHIRANJIVI%20COURSE%20FILE%202021-22_4396.docx)

Equivalent MOOC Courses if any:

1. <https://www.coursera.org/learn/electric-power-systems>
2. <https://www.coursera.org/learn/renewable-power-electricity-systems>

[illegible]

B.Tech II Year–II Sem
Subject Code: 22PC4EE16

L	T	P	C
3	0	0	3

DIGITAL ELECTRONICS

Course Objectives: This course will enable students to:

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

Course Outcomes: Upon completing this course, the students will be able to

1. Explain the numerical information in different forms and Boolean Algebra theorems
2. Solve Boolean expressions using Boolean Theorems-maps
3. Design and analyze combinational and sequential circuits
4. Implement logic families and realization of logic gates

Module - I

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

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

Module - II

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

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using RTL, DTL, TTL and CMOS Logic Families and its Comparison, NAND & NOR Gate using TTL & CMOS.

Module – III

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Parity-bit Generator.

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master

Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Module - IV

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

Synchronous Sequential Logic: Analysis of Clocked Sequential Circuits- Serial Binary Adder, Sequence Detector, Design Synchronous & Asynchronous Modulo N – Counters.

Module – V

Finite state machine: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs.

Text Books

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

Reference Books

1. Digital Design- Morris Mano, PHI, 4th Edition, 2006
2. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.
3. Switching Theory and Logic Design – A Anand Kumar, PHI, 2013

Web Resources

1. <http://blog.digitalelectronics.co.in/>
2. www.nesoacademy.org/electronics-engineering/digital-electronics/digital
3. <https://www.slideshare.net/JournalsPubwwwjourn/international-journal-of-digital-electronics-vol-2-issue-2>
4. <https://lecturenotes.in/subject/203/switching-theory-and-logic-design-stld>
5. <http://www.infocobuild.com/education/audio-video-courses/electronics/DigitalCircuitsSystems>
6. <https://nptel.ac.in/courses/117105080/>

E-Books

1. <https://www.pdfdrive.com/digital-logic-and-computer-design-by-m-morris-mano-e34332016.html>
2. <https://www.pdfdrive.com/switching-and-finite-automata-theory-third-edition-e17569462.html>

Mooc Courses

1. <https://www.classcentral.com/course/swayam-digital-system-design-619>
2. <https://nptel.ac.in/noc/courses/noc21/SEM2/noc21-ee75/>

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B. Tech II Year–II Sem

Subject Code:

22PC4EE17

L	T	P	C
0	0	2	1

Analog and Digital Electronic Lab

Pre-requisite: Elements of Electrical & Electronics Lab

Course Objectives: This course will enable students to

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
4. To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:

1. Know the characteristics of various components.
2. Postulates of Boolean algebra and to minimize combinational functions
3. Design and analyze combinational and sequential circuits
4. Known about the logic families and realization of logic gates.

Note: Any 14 experiments should be conducted

- 1) PN Junction diode characteristics A) Forward bias B) Reverse bias.
- 2) Half Wave Rectifier with & without filters
- 3) Full Wave Rectifier with & without filters
- 4) Zener diode characteristics and Zener as voltage Regulator
- 5) Input and output characteristics of BJT in CE Configuration
- 6) Input and output characteristics of FET in CS Configuration
- 7) Realization of Boolean Expressions using Gates
- 8) Design and realization logic gates using universal gates
- 9) Generation of clock using NAND / NOR gates
- 10) Design a 4 – bit Adder /Subtractor
- 11) Design and realization of a 4 – bit gray to Binary and Binary to Gray Converter
- 12) Design and realization of 8x1 MUX using 2x1MUX
- 13) Design and realization of 4-bit comparator
- 14) Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
- 15) Design and realization of a Synchronous and Asynchronous counter using flip-

16) Design and realization of Asynchronous counters using flip-flops

- 1) Electrical Technology – Vol .I&II by B. L. Theraja, A. K. Theraja
- 2) Electronic Devices and Circuits, Jacob Millman, McGraw Hill Education
- 3) Digital Design- Morris Mano, PHI, 4th Edition, 2006
- 4) 2. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.

[illegible]

B.Tech II Year – II Sem

Subject Code: 22PC4EE18

L	T	P	C
0	0	2	1

ELECTRICAL MACHINES – II LAB

Pre-requisite: Electrical Machines-I, Electrical Machines-II

Course Objectives:

1. To understand the operation of synchronous machines
2. To understand the analysis of power angle curve of a synchronous machine
3. To understand the equivalent circuit of a single phase transformer and single phase induction motor
4. To understand the circle diagram of an induction motor by conducting a blocked rotor test.

Course Outcomes: After the completion of this laboratory course, the student will be able

1. Assess the performance of different machines using different testing methods
2. To convert the Phase from three phase to two phase and vice versa
3. Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods
4. Control the active and reactive power flows in synchronous machines

List of Experiments:

Any Ten of the following experiments should be conducted

1. Analyze O.C. & S.C. Tests on Single Phase Transformer
2. Predetermination of Efficiency by Sumpner's test on a pair of single phase transformers
3. Determine Equivalent circuit parameters by No-load & Blocked rotor tests on three phase Induction motor
4. Determine Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
5. Plot the V and Inverted V curves of a three—phase synchronous motor.
6. Analyze Equivalent Circuit parameters of a single phase induction motor
7. Determination of X_d and X_q of a salient pole synchronous machine
8. Determination of Efficiency by Load test on three phase Induction Motor
9. Analyze Separation of core losses of a single phase transformer
10. Determination of Efficiency of a three-phase alternator
11. Parallel operation of Single phase Transformers
12. Determine Regulation of a three –phase alternator by ZPF & ASA methods.

Text Books:

[illegible]

B.Tech II Year – II Sem**Subject Code:21MC4HS6**

L	T	P	C
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CONSTITUTION OF INDIA

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

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