ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24
ELECTRICAL ENGINEERING

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE301T	Network Analysis	4	1		4	30	70	100

Course Objectives	Course Outcomes
This course is intended • Basic circuit-solving techniques. • Different techniques for DC and AC single-phase and three-phase circuits. • Behavior of different balanced and unbalanced loads • Various mathematical tools/transformations used in circuit analysis.	Students will be able to • Describe Kirchhoff's laws and simplify the network using reduction techniques and mesh analysis. • Evaluate the electrical network by Nodal Analysis and simplify the network using Duality. • Analyze the circuit using the network simplification theorems and obtain maximum power transferred to load. • Analyze the transient response of series and parallel AC circuits and solve problems in the time domain using the Laplace transform. • Formulate the network transfer function in the s-domain and evaluate Two Port Network Parameters and Phase-balanced and unbalanced parameters.

Unit I Mesh Analysis:	[10 Hrs]
Introduction to Voltage and Current dependent and independent sources, Source transformation, Mesh basis equilibrium equation, Matrix approach for complicated electrical network containing independent sources and reactance.	

Unit II Nodal Analysis and Duality:	[10 Hrs]
Nodal basis equilibrium equation, Matrix approach for a complicated electrical network containing independent sources and reactance, Duality.	

Unit III Network Theorem:	[10 Hrs]
Superposition, Thevenin's, Norton's, Maximum Power Transfer, Reciprocity, Compensation, and Millman's theorem as applied to A.C. & D.C. circuits (electrical network containing independent sources only).	

Unit IV Laplace transform and properties:	[08 Hrs]
Partial fractions, singularity functions, Analysis of RC, RL, and RLC network with and without initial conditions with Laplace transforms, Evaluation of initial condition.	

Unit V Two port network:	[10 Hrs]
Definitions of Driving Point and Transfer Functions, Two Port network parameters and their inter connections, Three phase balanced and unbalanced circuit and power calculations.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Network Analysis	Van Valkenburg	3rd	Pearson Education
2	Linear Network Theory	Kelkar and Pandit	39th	Pratibha Publication
3	Circuit and Network	A. Sudhakar and S. P. Shyam Mohan	2nd	Tata MCGraw-Hill Education Pvt. Ltd.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Network and System	D. P. Roy Choudhary	3rd	New Age International Pvt. Ltd.
2	Electrical circuit	Del Toro		Prentice Hall
3	Electric Circuits & Network	K. Sureshkumar		Pearson Education

		October 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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B. Tech. Scheme of Examination & Syllabus 2023-24

ELECTRICAL ENGINEERING

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE302T	Electrical Measurement and Instrumentation	4			4	30	70	100

Course Objectives	Course Outcomes
This course is intended	**Students will be able to**
• To learn different instruments used for measurement of various electrical quantities.	• use appropriate type of measuring instrument for
• To learn DC & AC Bridges, CT and PT, Power and Energy measurement.	• particular application.
	• calculate the value of unknown resistance, inductance,
	• capacitance.
• To learn different instruments used for measurement of various non-electrical quantities.	• calculate power and energy in electric circuits.
	• explain transducers used for different applications.
	explain measurement of various non-electric quantities.

Unit I	[10Hrs]

Measuring Instruments: - Principle of Galvanometer, Moving Iron (MI), PMMC and Dynamo meter type instruments (Numerical on MI and PMMC). Calibration. Loading effect of instruments, Errors in measurement (Basic Statistical analysis: Mean, Standard deviation, etc.). **Special Instruments:** Single phase Power Factor meter (any one type), Single phase Frequency meter (any one type), Synchroscope (Modified).

Unit II	[10Hrs]

Measurement of RLC Elements: - Measurement of Resistance: classification, Measurement of medium resistance :- Wheatstone Bridge. Low resistance: - Kelvin's Double Bridge. High resistance: - Ohmmeter, Insulation Tester & loss of charge method. Earth resistance: - Earth tester. Balanced condition in AC Bridge, Measurement of inductance using Maxwell's inductance-capacitance bridge, Measurement of Capacitance using Schering´s, Hays bridge.

Unit III	[10Hrs]

Measurement of Power and Energy: - Principle of Measurement of active, reactive and apparent power in single and poly-phase circuits. Principle of Measurement of Energy in single and poly-phase circuits. **Instrument transformers:** General theory & extension of range using CT & PT, errors in instrument transformers, applications of instrument transformers for metering.

Unit IV	[8Hrs]

Digital Instruments and Transducers: - Introduction to digital meters: Measurement of voltage, current, Phase, Time. Piezoelectric transducer, Strain gauges, load cell, Seismic instruments, Accelerometer.

Unit V	[10Hrs]

Measurement of Non-electric quantities: - Measurement of Temperature, measurement of torque, measurement of flow, measurement of motion and measurement of pressure.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electrical & Electronics Measurements & Instrumentation	A. K. Sawhney	5th revise	DHANPAT RAI & sons
2	Electronic Instrumentation & Measurement Technique	W. D. Cooper	New	Prentice Hall
3	Mechanical and Industrial Measurements	R. K. Jain	New	Khanna Publishers

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Measurement System Application and Design	E.O. Doeblin	New	Mcgraw-Hill

		September 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24
ELECTRICAL ENGINEERING

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE302P	Electrical Measurement and Instrumentation Lab			2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended	**Students will be able to**
• To learn different instruments used for measurement of various electrical quantities.	• measure unknown resistance using DC Bridges and loss of
	• charge method.
• To learn DC & AC Bridges, CT and PT, Power and Energy measurement.	• measure value of unknown capacitance and inductance
	• using AC bridges.
• To learn different instruments used for measurement of various non-electrical quantities.	• measure electrical power using watt-meter, CT & PT.
	• measure electrical energy using single phase energy
	• meter.
	• measure non-electrical quantity using suitable transducer.

Expt. No. (Any 08)	Title of the experiment (Any 08)
1	Measurement of Low resistance using Kelvin Double Bridge.
2	Measurement of high resistance by loss of charge method.
3	Measurement of medium resistance using Wheatstone Bridge.
4	To determine the Inductance of unknown coil by Maxwell's bridge.
5	To determine the Capacitance of an unknown Capacitor by Schering Bridge.
6	To determine the Inductance of unknown coil by Hay's bridge.
7	To determine electrical power by two watt-meter method.
8	Measurement of electrical power using CT and PT.
9	Study of single phase energy meter.
10	Study of Resistance Temperature Detector.
11	Measurement of displacement using LVDT.
12	Study of measurement of Torque.
13	Measurement of pressure using Bourdon Tube.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electrical & Electronics Measurements & Instrumentation	A. K. Sawhney	5th revise	DHANPAT RAI & sons
2	Electronic Instrumentation & Measurement Technique	W. D. Cooper	New	Prentice Hall
3	Mechanical and Industrial Measurements	R. K. Jain	New	Khanna Publishers

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Measurement System Application and Design	E.O. Doeblin	New	Mcgraw-Hill
2	Instrumentation for Engineering Measurements	Dalley Railey, Mc Conne	New	John Wiley & Sons
3	Electrical Instrumentation	H. S. Kalsi	2nd revised	Tata Mcgraw-Hill education

Chairman - BoS	Dean – Academics	September 2023	1	Applicable for 2023-24
		Date of Release	Version	

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(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24

ELECTRICAL ENGINEERING

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE303T	Electronic Devices & Circuits	4	1		5	30	70	100

Course Objectives	Course Outcomes
This course is intended • To introduce basic semiconductor devices,their characteristics & application • To understand analysis & design of simple semiconductor devices & circuits • To learn to analyze the semiconductor devices behaviour at the circuit level & its role in the various electronic applications	• Explain PN junction diode Characteristics, and its applications • Describe transistor characteristics & compare biasing techniques • Analyze & classify different types of negative feedback amplifiers • Identify different types of oscillators & power amplifiers,frequency of oscillation • Explain FET & MOSFET construction

Unit I	[10Hrs]

Diodes and it's applications

PN Junction Diode & its applications,junction capacitance,Zener regulator,half wave rectifier & full wave bridge rectifier,filter types,ripple factor.

Unit II	[10Hrs]

Bipolar Junction Transistor :

Introduction & operation of transistor,BJT characteristics,loadline BJT biasing methods,stability factors,thermal stabilization,thermal runaway,transistor as an amplifier

Unit III	[10Hrs]

Negative feedback amplifier

Principle of Negative feedback in electronic circuits, Voltage series, Voltage shunt, Current series, Current shunt types of Negative feedback, Typical transistor circuits effects of Negative feedback on Input and Output impedance, Voltage and Current gains, Bandwidth

Unit IV	[9Hrs]

BJT Applications :

Oscillators : Principle of Positive feedback, Barkhausen criteria for oscillation, Principle of operation of RC phase shift oscillator and LC oscillators

Power Amplifiers: Amplifiers Classification, Push-pull amplifiers, Power dissipation in transistors, Harmonic distortion, Cross-over distortion

Unit V	[9Hrs]

Field Effect Transistor and MOSFET:

JFET construction and its characteristics, Pinch off voltage, Drain saturation current, common source FET Biasing, construction of D-MOSFET, E-MOSFET

Text Books

S.N	Title	Authors	Edition	Publisher
1	"Electronic devices and circuits"	J. Millman and Halkias		TMH
2	Electronic devices and circuits	Salivahanan, Suresh Kumar		TMH
3	Electronic Devices & Circuit Theory	Boylestad & Nashelsky		PHI

Reference Books

S.N	Title	Authors	Edition	Publisher
1	"Integrated Electronics, Analog & Digital Circuits & Systems"	J. Millman and Halkias		TMH
2	"Micro Electronic Circuits"	Sedra & Smith		OUP
3	" Electronics Principles"	Albert Malvino		TMH

		March 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24
ELECTRICAL ENGINEERING
THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE303P	Electronic Devices & Circuits Lab			2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended • To study basic semiconductor devices, characteristics, Application. • To study & design amplifier circuit. • To study performance of various electronic applications of semiconductor devices.	**Students will be able to** • To perform VI characteristics of PN junction diode • To illustrate the application of diode as a rectifier • To analyze characteristics of transistor • To discuss configuration of transistor amplifier • To perform basic oscillators

Expt. No. (Any 08)	Title of the experiment (Any 08)
1	To perform V-I characteristics of PN junction diodes(Si and Ge).
2	To perform HW rectifier circuit with & without capacitor filter.
3	To perform FW bridge rectifier circuit with & without capacitor filter.
4	To perform input & output characteristics of CE configuration of transistor.
5	To perform & verify amplifier circuit using transistor.
6	To perform drain & transfer characteristics of FET.
7	To study & perform RC phase shift oscillator using BJT.
8	To study & perform colpitts oscillator using BJT.
9	To perform zener diode voltage regulator.
10	To perform positive & negative diode clipper.

S.N	Title	Authors	Edition	Publisher
1	Electronics laboratory primer	S.Poornachandra		S.Chand
2	Electronics & communication	B.Sasikala		Vikas

Reference Books

S.N	Title	Authors	Edition	Publisher
1	"Integrated Electronics, Analog & Digital Circuits & Systems"	J. Millman and Halkias		TMH
2	"Micro Electronic Circuits"	Sedra & Smith		OUP
3	" Electronics Principles"	Albert Malvino		TMH

		March 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE304T	Renewable Energy Sources	4			4	30	70	100

Course Objectives	Course Outcomes
This course is intended	**Students will be able to**
To learn the principles of generating Electrical energy from Renewable Energy Sources.	● Explain the fundamentals of solar radiation geometry, its measurement & estimation.
To gain understanding of the working of Off-grid and Grid-connected Renewable Energy Generation Schemes.	● Gain the knowledge of selection of sites for wind farm and their different types of wind generators.
	● Identify renewable energy sources such as geothermal, MHD, biomass, fuel cell, tidal, ocean for generating electricity.

Unit I	[10Hrs]

Solar Radiation & its Measurement: Solar Constant, Solar radiation at earth's surface, solar radiation geometry, solar radiation measurement, estimation of average solar radiation.

Unit II	[10Hrs]

Solar Photovoltaic power generation: Introduction to PV cell, Construction & working, basic PV system for power generation, Characteristic of solar cell, series and parallel connection, types of solar cell, modul manufacturing, partial shading, bypass and blocking diode, different panel selection (Monocrystalline, Polycrystalline etc), Calculation of Solar rooftop setup (rating): stand alone PV system with battery and grid connected PV system with Net Metering, Introduction to MPPT.

Unit III	[10Hrs]

Solar Energy Collectors: Principles of the conversion of solar radiation into heat, flat plate collectors, transitivity of cover systems, energy balance equation, concentrating collectors, comparison of concentrating and flat plate collectors.
Application of Solar Energy: Solar water heating, space heating, space cooling, solar thermal heat conversion, Solar Cooking, Solar pumping, Solar Green Houses, Hydrogen production from Solar Energy.

Unit IV	[10Hrs]

Wind Energy: Basic principles of wind energy conversion, site selection considerations, wind energy conversion system, lift and drag force, classification of wind energy conversion system (WECS), basic components of WEC system, types of wind turbine with advantages and disadvantages.

Unit V	[8Hrs]

Other Renewable Energy Sources: Small scale hydro electric power generation, Energy from Biomass, Fuel cell, Geothermal Energy, Magneto hydrodynamic (MHD) power generation,
Energy from Ocean: Ocean thermal electric conversion (OTEC), Claude & Anderson cycles, Energy from Tides.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Non-conventional Energy Sources	G.D Rai	10th reprint 2002	Khanna Publishers, New Delhi
2	Non-conventional Energy Resources	B. H. Khan	2006	Tata Mc Graw hill Publishing Co. Ltd.
3	Solar Photovoltaics Fundamentals, Technologies and Applications	C. S. Solanki	2011	PHI

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Renewable Energy Applications	G. N. Tiwari and M. K. Ghosal	2004	Narosa Publications
2	Grid integration of wind energy conversion systems	H. Siegfried and R. Waddington	2006	John Wiley and Sons Ltd.
3	Energy Technology	Rao and Parulekar	2nd reprint 2002	Khanna Publishers, New Delhi

THIRD SEMESTER

Chairman - BoS	Dean – Academics	October 2023	1	Applicable for 2023-24
		Date of Release	Version	

ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY,NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24

ELECTRICAL ENGINEERING

THIRD SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE304P	Renewable Energy Sources lab			2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended • To learn the principles of generating Heat Energy and Electrical energy from Renewable Energy Sources. • To gain understanding of the working of Off-grid and Grid-connected Renewable Energy Generation Schemes.	**Students will be able to** • Explain V-I characteristics of solar PV module. • Explain V-I characteristics of a series and parallel connected PV modules. • Explain effect of tilt angle on power output of module • Explain effect of shadow on power output of solar PV module • Describe biogas generation plant model set up at SVPCET Campus

Expt. No.	Title of the experiment
1	To study V-I characteristics of solar PV module.
2	To study V-I characteristics of a series connected PV modules
3	To study V-I characteristics of a parallel connected PV modules
4	To study Effect of tilt angle on power output of module.
5	To study Effect of shadow on power output of solar PV module.
6	To study Solar energy based battery charger
7	To study Wind energy based battery charger
8	Design of solar PV system for home

Text Books

S.N	Title	Authors	Edition	Publisher
1	Non-conventional Energy Sources	G.D Rai	10th reprint 2002	Khanna Publishers, New Delhi
2	Non-conventional Energy Resources	B. H. Khan	2006	Tata Mc Graw hill Publishing Co. Ltd.
3	Solar Photovoltaics Fundamentals, Technologies and Applications	C. S. Solanki	2011	PHI

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Renewable Energy Applications	G. N. Tiwari and M. K. Ghosal	2004	Narosa Publications
2	Grid integration of wind energy conversion systems	H. Siegfried and R. Waddington	2006	John Wiley and Sons Ltd.
3	Energy Technology	Rao and Parulekar	2nd reprint 2002	Khanna Publishers, New Delhi

		October 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
H103	Constitution of India	2	-	-	0	–	–	–

Course Objectives	Course Outcomes
To sensitize students to the social, political and economic perspective of Indian Society through the study of the IndianConstitution.	At the end of the course students will be able to: 1. understand the role of constitution in democratic India 2. know their fundamental rights and duties 3. understand multiple perspectives using six hat thinking technique. 4. understand emergency , presidential provisions and electoral politics. 5. understand the roles and responsibilities of the members ofthe parliament.

Unit I	[4Hrs]

1. Constitution - meaning, scope and importance, making of the Indian Constitution
2. Outstanding Features of the Indian Constitution, Unitary and Federal System

Unit II	[4Hrs]

1. Fundamental Rights and duties
2. Directive Principles of State Policy

Unit III	[5Hrs]

1. Liberalization, Privatization, Globalization using Six Hat Thinking Technique.
2. Role of Bureaucracy in Modern Society

Unit IV	[6Hrs]

1. Industrial Democracy
2. Legislative measures for Labour Welfare

Unit V	[5Hrs]

1. Parliamentary Role Play
2. Discussion of regional, national and International Issues in the student Parliament.

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Introduction to Constitution of India	Durga Das Basu	21st edition	LexisNexis
2.	Working in a Democratic Constitution: A History of the Indian Experience	Austin Granville	7th edition	Oxford University Press

Reference Books

S.N	Title	Authors	Edition	Publisher
3.	The Indian Political System	Mahendra Pratap Singh	3rd revised edition	Pearson Education India
4.	A New Look into Social Sciences	Shabbir, Sheikh and Dwadashiwar	3rd edition	S.Chand

		JULY 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
AS307T	Applied Mathematics-III	4	-	-	4	30	70	100

Course Objectives	Course Outcomes
The goal of this paper is to 1. Introduce advanced concepts of Partial Differential Equations & Integral Transforms with their Applications. 2. Understanding of Linear Algebra through Matrices & Complex integration	**Students will be able to** ✦ Identify and solve practical problems and analyze their physical and graphical interpretation by using Laplace Transforms. ✦ Use Fourier series methods to explore real-world time signals and application of Fourier Transform to analyse input-output relationships. ✦ Apply the concept of advanced engineering mathematics to solve various complex engineering problems. ✦ Apply concepts of partial differential equations, Integral Transforms in various practical problems. ✦ Implement concept of Matrices and Eigen value problem and to solve Differential Equations. Form mathematical modal corresponding to engineering problems by using Matrices.

Unit I Laplace Transform	**[12Hrs]**
Definition, properties, Evaluation of Integrals by Laplace Transform, Inverse Laplace Transform and its properties, Convolution theorem (Statement only), Unit Step Function, Applications of Laplace Transform	
Unit II Fourier Series & Fourier Transform	**[11 Hrs]**
Fourier series: Periodic Functions and their Fourier expansions, Even and Odd functions, Change of interval, Half Range Expansions.Fourier Transform: Definition, properties, Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform.	
Unit III Functions of Complex Variable	**[11Hrs]**
Analytic function, Cauchy-Riemann Conditions, Harmonic Functions, Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (statement only), Residue Theorem (Statement only), Contour integration	
Unit IV Partial Differential Equations	**[7Hrs]**
Partial Differential Equations of First Order First degree i.e. Lagrange's form, Linear Homogeneous Equations of Higher order with constant coefficients, Method of separation of variables, Applications of Partial Differential Equations	
Unit V Matrices	**[7Hrs]**
Linear dependance of vectors, Characteristics equation, Eigen values and Eigen vectors, Reduction to Diagonal form, Sylvester's theorem (without proof), Solution of Second Order Linear Differential Equation with constant Coefficients by Matrix Method.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B.S. Grewal	40th Edition	Khanna Publication
2	.Advanced Engineering Mathematics	Erwin Kreysizig	8th Edition	Wiley India
3	Applied Mathematics for Engineers & Physicist	L.R. Pipes and Harville		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text Book of applied Mathematics-Volume -II	P.N. Wartikar &J.N. Wartikar		Poona Vidyarthi Griha Prakashan

		October 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE401T	Elements of Electromagnetics	3	1		4	30	70	100

Course Objectives	Course Outcomes
1. To introduce to students the theory of Electromagnetic fields and vector algebra. 2. To prepare students to know the characteristics of different types of field sources and effects. 3. To develop students with an understanding of the properties of dielectrics, conductors and magnetic material 4. To prepare students develop understanding of Steady magnetic fields and Maxwell's equation for time variant fields.	**Students will be able to** • Define vectors and 3 dimensional coordinate systems, convert from one form to another and apply matrix algebra. Practice computations with various forms of field sources like point, line and surfaces. • Evaluate Energy and potential related to steady electric fields. • Derive the boundary conditions and formulate the properties of conductors and dielectrics. • Evaluate the magnetic field properties under various operating conditions. • Derive time varying form of fields equations. Make comparison between non-time varying fields and time varying fields.

Unit I	**[8Hrs]**

Vector analysis: Idea of vector & scalars, Vector Algebra, vector addition, vector subtraction, dot product, scalar product in Cartesian coordinates system, Cylindrical coordinates system, conversion of variables from Cartesian to cylindrical system and vice versa. Spherical co-ordinate system, transformation of Cartesian to spherical and vice versa.
Coulomb's law, **Electrical field intensity and electric, flux density**: Coulomb's law, electric field intensity, field of point charges,line charges and surface charges, field due to continuous volume charge distribution, field of line charge, filed of sheet charges, concept of flux density.

Unit II	**[7Hrs]**

Gauss's law, Energy and potential of charge system: Gauss's law, application of gauss law, Divergence theorem, definition of potential difference and potential, potential of a point charges, potential field of system of charge, potential gradient.

Unit III	**[7Hrs]**

Conductors, Dielectric and Capacitance: Poisson's and Laplace's Equations, Uniqueness theorem, Continuity equation, conductor properties, Properties of Dielectric materials, Capacitance of parallel plate capacitor.

Unit IV	**[7Hrs]**

The steady Magnetic Field and Magnetic forces: Biot-Savar'ts law, Ampere's Circuital law, Stokes theorem, Magnetic flux density. Properties of magnetics materials, permeability.

Unit V	**[7Hrs]**

Maxwell's equations in time varying form. DerivatiomElementary idea of Electromagnetic waves, Uniform plane wave.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Engineering Electromagnetics	W. Hayt	7th edition	Tata Macgraw-hill
2	Principles of Electromagnetics	Mathew N. O. Sadiku	4th edition	Oxford university press
3	Schaum's Outline Series: Theory and problems in Electromagnetics	Joseph Edminister	2nd edition	Tata Macgraw-hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Electromagnetics	Plonus		Tata Macgraw-hill
2	Electromagnetics	Kraus		Tata Macgraw-hill
3	Fundamentals of Electromagnetics with MATLAB	Karl E. Lonngren, Sava V. Savov, Randy J. Jost		PHI learning

		October 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE402T	Electrical Power System	3			3	30	70	100

Course Objectives	Course Outcomes
Students will develop the ability to:	**Students will be able to:**
- model & represent the power system components, - understand & calculate the transmission line parameters, - understand the concepts of load flow analysis.	- Explain generation, transmission and distribution of power. - Calculate transmission line parameters of a power system & represent it in per unit. - Classify various distribution schemes, LT & HT cables and Insulators. - Evaluate performance of transmission lines by interpretation of equations and analytical solution in system design. - Describe basic concepts of load flow analysis.

Unit I	[6Hrs]

Structure of electrical power systems: - Brief exposure of generation, transmission & distribution aspect; Elementary consideration of economic bulk power supply system; Use of high voltage; General system consideration, Concept of real, reactive and complex power; Power Transfer in AC circuits and Reactive Power. Load and their characteristic; Voltage & Frequency dependence of loads.

Unit II	[6Hrs]

Representation of power system components, Inductance & Capacitance of transmission lines, Per Unit (PU) system representation.

Unit III	[7Hrs]

Elementary distribution schemes & Cables: - Feeders and Distributors; LT & HT cables, Concept of insulator, types of insulators, String efficiency.

Unit IV	[7Hrs]

Performance of transmission lines: - Voltage regulation & efficiency of power transmission line using simple series equivalent representation, T- representation, pi- representation.

Unit V	[8Hrs]

Load flow studies: - Introduction to load flow studies, Classification of buses, Formation of bus admittance matrix, Static load flow equations.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Modern Power System Analysis	Nagrath & Kothari	3	Tata Mc-Graw Hill
2	Power System Analysis	C. L. Wadhawa,	6	New Age International
3	Power System Analysis	Ashfaq Hussain	5	CBS

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Elements of Power System Analysis	W. D. Stevenson	4	Mc-Graw Hill
2	Electric Energy System Theory	O. E. Elgerd	2	Mc-Graw Hill

		October 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE403T	**Electrical Machines**	3	**1**		4	**30**	**70**	**100**

Course Objectives	Course Outcomes
This course is intended • To understand construction of Single Phase and Three Phase Transformer with Phasor diagram and Connection. • To develop familiarity with Construction, Principle and Applications of D.C.Machines. • To understand Construction, Principle and Applications of Three Phase Induction Motor. • To develop familiarity with Construction, Principle and Applications of Three Phase Synchronous Machines. • To understand Construction, Principle and Applications of Single Phase Machines.	Students will be able to • Determine Equivalent Circuit parameter, Efficiency and Regulation of Single Phase Transformer and to Explain the Phasor groups of Three Phase Transformer. • Analyze different characteristics of D. C. Motor and Speed Control of D.C. Motor. • Explain different types of Three Phase Induction Motor and Analyze the characteristics at different Value of Slip. • Know Voltage Regulation of Three Phase Synchronous Generator and Behavior of Synchronous Motor with Different Excitations • Understand and explain Single Phase Machines

Unit I	[10Hrs]

Single Phase Transformer
Revision of Single Phase Transformer, Phasor Diagram Under Different Load Conditions, Losses, Equivalent Circuit, Open Circuit and Short Circuit Test, Voltage Regulation, Efficiency, Condition of Maximum Efficiency, All Day Efficiency, Single phase Auto-Transformer, Working, Merits and Demerits.
Three Phase Transformer: -Principle and Operation, Connection, Conditions of Parallel Operation.

Unit II	[8Hrs]

D.C. Machines
Basic Principle and Operation of D.C. Motor and D.C. Generator, Emf Equation and Torque equation, Types of D.C. Machines, Characteristics and Speed Control of D.C. Shunt and D.C. Series Motor, Losses and Efficiency. Necessity of Starter. Armature Reaction in D. C. Machines.

Unit III	[8Hrs]

Three Phase Induction Motor
Construction Details, Types, Principle, Production of Torque, Torque Equation and Condition of Maximum and Starting Torque, Losses and Efficiency, Torque-Slip Characteristics, No Load Test and Blocked Rotor Test.

Unit IV	[10Hrs]

Synchronous Machines
Three Phase Synchronous Generator : -Introduction, Constructional features of Salient Pole and Cylindrical Pole Rotor Machines, Introduction to Armature Winding and Field Winding, Winding Factors and EMF Equation, Armature Reaction, Phasor Diagram Under Load Condition, Regulation and Synchronous Impedance Method to Find Voltage Regulation.
Three Phase Synchronous Motor: - Construction and Principle, Starting of Synchronous Motor, Motor on Load, Effect of Changing Field Excitation at Constant Load, V and Inverted-V Curves.

Unit V	[4Hrs]

Single-phase induction motors :
Principle and Operation, Double Field Revolving Theory. Principle and Working of Shaded Pole Induction Motor , Split Phase Induction Motor and Capacitor Start Capacitor Run Motor. Applications.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Electrical Machinery	Dr. P.K. Mukherjee & S. Chakraborty		Danpat Rai publication
2	Electrical Machinery	Dr. P.S. Bimbhra		Khanna publisher
3	Electrical Machines	I.S. Nagrath & Dr. D.P. Kothari		McGraw Hill

Chairman - BoS	Dean – Academics	October 2023 Date of Release	1 Version	Applicable for 2023-24

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE403P	Electrical Machines – 1 Lab			2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended • To study performance of 3-phase Transformer. • To study performance of DC Machines. • To study performance of Synchronous Mchines.	Students will be able to • To identify the tests performed on 3-phase Transformer • To discuss characteristics of DC Machines • To illustrate the tests performed 3-phase alternator • To discuss characteristics of Synchronous motor

Expt. No. (Any 08)	Title of the experiment (Any 08)
1	To Perform open circuit and short circuit test on 3-Phase Transformer
2	To plot magnetization characteristics of DC Generator.
3	To Perform speed control of DC shunt motor.
4	To perform Load test on DC Generator.
5	To perform Load test on DC Motor
6	No Load And Blocked Rotor Test On An Induction Motor
7	To Perform Load Test On An Induction Motor.
8	Determination Of Regulation Of Three Phase Alternator By Direct Loading .
9	Determination Of Regulation Of Three Phase Alternator By Open Circuit And Short Circuit Test.
10	To plot V and inverted V characteristics of Synchronous motor.
11	To perform direct loading test on single phase transformer.
12	To convert single phase transformer into auto transormer

Text Books

S.N	Title	Authors	Edition	Publisher
1	Laboratory Courses in Electrical Engineering	R.L. Kharbanda and S. G. Tarnekar		
2	Laboratory manual of Electrical Machines	D.P.Kothari and B.S. Umre		
3	Electrical Technology Volume II	B. L. Thareja		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Electrical Machinery	Dr. P.K. Mukherjee & S. Chakraborty		Danpat Rai publication
2	Electrical Machinery	Dr. P.S. Bimbhra		Khanna publisher
3	Electrical Machines	I.S. Nagrath & Dr. D.P. Kothari		McGraw Hill

		October 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE404T	Programming in Electrical Engineering	3			3	30	70	100

Course Objectives	Course Outcomes
• To learn the concept of programming and its related topics using C and C++ and apply it in the field of engineering and technology especially electrical engineering • To apply programming to solve searching , sorting problems and design programs for applications related to electrical engineering	• To describe function, recursion and arrays in C • To analyse the importance of Pointers and Structures in C • To explain concepts related to C++ • To develop program in MATLAB using M-File • To evaluate programs related to MATLAB programming

Unit I :- Function, Recursion and Arrays in C	[8Hrs]

Function and Recursion
Arrays [1 Dimensional and 2 Dimensional], Search [Linear and Binary] , Sort [Bubble and Selection]

Unit II :- Pointers and Structures in C	[6Hrs]

Pointers in "C', Call by Value and Call by Reference using Pointers.
Structures in C , Array of Structure and Nested Structure

Unit III :- Introduction to C++ Concepts	[6Hrs]

Introduction to C++ concepts like Data Hiding and Encapsulation, Data Abstraction, Polymorphism, Inheritance, Object and classes etc.

Unit IV :- MATLAB Fundamentals	[8Hrs]

Variables and Constant, Import/export data,Program and run simple scripts (M- files).Conditional and Iterative statements, use of graphic tools for applications in Electrical Engineering.

Unit V :- MATLAB Programming	[6Hrs]

Functions in MATLAB, Solving Equations, Matrix Operations

Text Books

S.N	Title	Authors	Edition	Publisher
1	C in Depth	S.K.Srivastava	III	BPB
2	Let us C	Yashvant Kanetker	V	BPB
3	Getting started with MATLAB	Rudra Pratap	II	Oxford

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Programming Languages C & C++	Kakade & Deshpande	II	Dreamtech Press
2	MATLAB for Engineers	William J Palm	I	Tata Mc-Graw Hill

Chairman - BoS	Dean – Academics	Date of Release	Version	Applicable for
		October 2023	1	2023-24

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(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24
ELECTRICAL ENGINEERING

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE404P	**Programming in Electrical Engineering Lab**			**2**	**1**	**25**	**25**	**50**

Course Objectives	Course Outcomes
● Understand the need for high-level programming languages like C and MATLAB. ● Familiarize with program-development environment in C and MATLAB	● Analyze the necessity and evolution of the computer language and selection of programming paradigms ● Perform algorithm development, its representation using flow-charts and analysis of solution for problems using C programming ● Develop and analyze simple programs/functions and their integration in larger problem solving ● Formulate programs in MATLAB Software for applications in Electrical Engineering

Expt. No.	Title of the experiment
1	Write a C program using functions to find sum of two integer variables
2	Write a C program to find factorial of a integer number entered by the user using recursion.
3	Write a C program to swap contents of two integer numbers using pointers i) Call by Value and ii) Call by Reference
4	Write a C program to store and display information of 5 students. Information should be name,class,marks and percentage using Structures
5	Write a MATLAB program to find the Largest of the given three numbers (10,20,30) using if – else if –else structure.
6	To find transpose, inverse , determinant and rank of a 3 x 3 matrix using MATLAB Software
7	To plot sine waveform using MATLAB Software
8	To solve simultaneous equations of the form [A] [X] =[B] using MATLAB Software
9	To plot a unit circle using MATLAB.

Text Books

S.N	Title	Authors	Edition	Publisher
1	C in Depth	S.K.Srivastava	III	BPB
2	Let us C	Yashvant Kanetker	V	BPB
3	Getting started with MATLAB	Rudra Pratap	II	Oxford

Reference Books

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Chairman - BoS	Dean – Academics	Date of Release	Version	

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
H102	Universal Human Values II	3			3	15	35	50

Course Objectives	Course Outcomes
• Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. • Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence • Strengthening of self-reflection. • Development of commitment and courage to act.	By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Unit I [6Hrs]

Purpose and motivation for the course, recapitulation from Universal Human Values-I ,Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations , Right understanding, Relationship and Physical Facility- 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.

Unit II [6Hrs]

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' , Understanding the needs of Self ('I') and 'Body' - happiness and physical facility , 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 Health; correct appraisal of Physical needs, meaning of Prosperity in detail , Programs to ensure Sanyam and Health.

Unit III [6Hrs]

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship , Understanding the meaning of Trust; Difference between intention and competence , Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship , Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals , Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Unit IV [6Hrs]

Understanding the harmony in the Nature , Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature , Understanding Existence as Co-existence of mutually interacting units in all-pervasive space ,Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit V [6Hrs]

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 , Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations ,Sum up

Text Books

S.N	Title	Authors	Edition	Publisher
1	Human Values and Professional Ethics	Gaur, Sangal, Bagaria	2010	Excel Books, New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Jeevan Vidya: Ek Parichaya	A Nagaraj	1999	Jeevan Vidya Prakashan, Amarkantak.
2	Human Values	A.N. Tripathi	2004	New Age Intl. Publishers, New Delhi
3	The Story of My Experiments with Truth	M. K Gandhi		

Chairman - BoS	Dean – Academics	October 2023 Date of Release	1 Version	Applicable for 2023-24

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ELECTRICAL ENGINEERING

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
EE405P	Technical Skill Development-I	-	-	2	2	25	25	50

Course Objectives	Course Outcomes
This course is intended to • To enable the students to study MS Office and to enrich the practical knowledge in MS Office. • To enable students to use AI in MS Word	• **Students will be able to** • Perform documentation and presenting skills. • Proficient in using Windows, Word Processing Applications, Spreadsheet Applications, • Create stunning power point presentation using animations • Incorporate AI in Microsoft word & ppt.

Expt. No.	Title of the experiment
1	To design the application form of a firm using MS word.
2	To Insert the information of excel file into word using Mail Merge.
3	To Prepare a graph of progress of a company in last 10 years using MS excel.
4	To explore the different formulae in MS excel datasheet
5	To design & animate a bicycle in Power Point.
6	To design & animate info graphic slide in Power Point.
7	To design & animate hill climbing car in Power Point.
8	To incorporate different AI tool in Word
9	To create Power Point Presentation using AI.

Text Books

S.N	Title	Authors	Edition	Publisher
1	PC Software for Windows 98 Made Simple	R K Taxali	2015	McGraw Hill Education Pvt. Ltd.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Inside Microsoft Office Professional	Jodi Davenport, Critch Greaves, Michael Groh and Eruce Hall berg	1994	New Riders Publications.

Chairman - BoS	Dean – Academics	March 2023	1	Applicable for 2023-24
		Date of Release	Version	