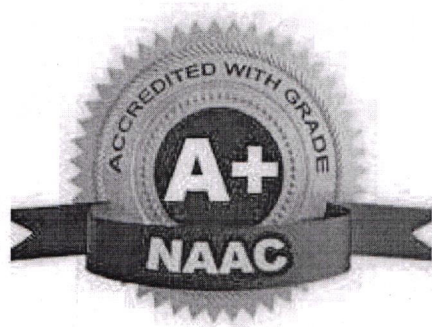


TULSIRAMJI GAIKWAD-PATIL **College of Engineering & Technology**

Mohgaon, Wardha Road, Nagpur - 441 108

An Autonomous Institute



DEPARTMENT OF ELECTRICAL ENGINEERING

B.Tech. Electrical Engineering

Syllabus

From

Academic Year 2022-23

Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)

Programme: Electrical Engineering

Scheme of Instructions: Second Year B.Tech. in Electrical Engineering

Semester – IV

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	PCC	BEE2401	Electromagnetic Field	3	-	-	3	3	15	15	10	60	100
2	ESC	BEE2402	Signal & System	3	-	-	3	3	15	15	10	60	100
3	PCC	BEE2403	AC Machines	3	-	-	3	3	15	15	10	60	100
4	PCC	BEE2404	Microprocessor & Microcontroller	3	-	-	3	3	15	15	10	60	100
5	PCC	BEE2405	Electrical Power System	3	1	-	4	4	15	15	10	60	100
6	PCC	BEE2406	Python Programming Lab	-	-	4	4	2	-	-	50	50	100
7	PCC	BEE2407	AC Machines Lab	-	-	2	2	1	-	-	25	25	50
8	PCC	BEE2408	Microprocessor & Microcontroller Lab	-	-	2	2	1	-	-	25	25	50
9	PCC	BEE2409	Power System Simulation Lab	-	-	2	2	1	-	-	25	25	50
10	PROJ	BEE2410	Micro Project	-	-	2	2	1	-	-	25	25	50
11	MCC	BAU244	Group Reading of Classics	2	-	-	2	Audit	-	-	-	-	-
Total				17	01	12	30	22	75	75	200	450	800

L- Lecture

T-Tutorial

P-Practical

CT1- Class Test 1

TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2

ESE- End Semester Examination (For Laboratory End Semester performance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core Courses)	PEC (Programme Elective Courses)	OEC (Open Elective courses from other discipline)	Project / Seminar /Industrial Training	MCC (Mandatory Courses)
Credits	-	-	03	18	--	--	01	Yes
Cumulative Sum	06	25	21	27	--	--	01	--

PROGRESSIVE TOTAL CREDITS :58+22 = 80

Jhalani
HOD Chairman
Department of Electrical Engineering
Tulsiramji Gaikwad Patil College of
Engineering & Technology, Nagpur

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Second Year (Semester-IV) B.Tech. Electrical Engineering

BEE2401: Electromagnetic Field

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	CT-1	15 Marks
Tutorial	0 Hrs/week	CT-2	15 Marks
Total Credit	3	TA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 03 Hrs 00 Min.	

Course Contents

Unit I	Vector Analysis: Review of Scalars and vectors, Vector Algebra, Rectangular Co-ordinate System, Cylindrical Co-ordinate System, Spherical Co-ordinate System and transformation of Cartesian to Cylindrical, Cartesian to Spherical and vice versa.
Unit II	Coulomb's law, Electrical field intensity and electric flux density, Gauss's law, Divergence: Coulombs Law, Electric field intensity, field due to continuous volume charge distribution, field of point charge, field of line charge, field of sheet charge, Electric Flux density, Gauss's law and Applications of Gauss's law, the divergence theorem.
Unit III	Potential of charge system, Conductors, Dielectric, Capacitance and poisson's and Laplace Equations: Definition of potential difference and potential, the potential field of a point charge, potential gradient. Current Density, Continuity Equation & its point form, the nature of dielectric materials, boundary conditions for perfect dielectric materials, Capacitance of parallel plate capacitor, capacitance of two wire line, Poissons and Laplace Equation.
Unit IV	The steady Magnetic Field and Magnetic forces: Biot Savart's law, Ampere's Circuital law, Stoke's theorem, magnetic flux density, scalar and vector magnetic potentials. Force on moving charge, force between differential current elements, nature of magnetic material, Magnetization and permeability, Inductance and mutual inductance.
Unit V	Boundary conditions, Maxwell's equation and wave propagation: Magnetic boundary conditions, Faraday's law, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Wave propagation, Poynting vector, skin effect.

Text Books

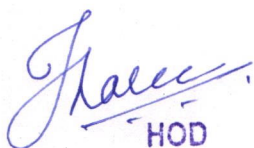
1	M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2	W.H. Hayt, "Engineering Electromagnetics", TMH Publication 2006
3	A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.

Reference Books

1	N.N.Rao Electromagnetic Engg. V Edition, Prentice Hall. 2005.
2	Krauss Electromagnetic Engg. IV Edition, Tata Mc Graw Hill. 2003
3	Shevgaonkar Electromagnetic Waves, Tata Mc Graw Hill 2002

Useful Links	
1	https://onlinecourses.nptel.ac.in/noc21_ee83/preview
2	https://www.digimat.in/nptel/courses/video/108106073/L01.html
3	https://nptel.ac.in/courses/115101005



	Course Outcomes:	CL	Class Session
BEE2401.1	Determine the unit vector, magnitude & angles in the specified criteria by using vector algebra.	3	9
BEE2401.2	Evaluate the physical quantities of electromagnetic fields by using Coulomb's law, Gauss's law and Divergence theorem.	3	9
BEE2401.3	Calculate the potential of charge and current density of boundary conditions for dielectric materials using Poisson's and Laplace Equations.	3	9
BEE2401.4	Find the magnetic Field Intensity and Density of magnetic material with the help of Biot Savart's law, Ampere's Circuital law and Stoke's theorem	3	9
BEE2401.5	Discriminate magnetic boundary conditions, Point form & Integral form of Maxwell's equation.	4	9


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Second Year (Semester-IV) B.Tech. Electrical Engineering			
BEE2402: Signal & System			
Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	CT-1	15 Marks
Tutorial	0 Hrs/week	CT-2	15 Marks
Total Credit	3	TA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 03 Hrs 00 Min.	
Course Contents			
Unit I	Introduction to Signals and Systems Classification of Signals: Periodic and Aperiodic signals, continuous and discrete time signals, continuous and discrete amplitude signals; Linear and nonlinear signals, Causal and non-causal signals, Even and odd signals, Energy and power signals; System properties: linearity, shift-invariance, causality, stability, Realizability. (Problems)		
Unit II	Linear-Shift Invariant Systems; Impulse response and step response; Convolution, Input-output behavior with Aperiodic convergent inputs; Characterization of causality and stability of LSI systems; System representation through differential equations and difference equations; Periodic inputs to an LSI system; Notion of frequency response and its relation to the impulse response. (Problems)		
Unit III	Introduction to Z Transform, Region of Convergence (RoC), various signals and their RoC, Different properties of Z Transform, one sided and two sided Z transform, Z transform of various signals, Solution to difference equation using Z transform, Inverse Z transform, methods for obtaining Inverse Z transform. (Problems)		
Unit IV	Continuous-Time Analysis of Signals and Systems Fourier Series; Fourier Transform; Magnitude and phase response; Properties of Fourier Transform: Convolution/Multiplication, Duality, Time-shifting, Frequency-shifting, Time-scaling, Integration and differentiation in time-domain; Review of Laplace Transform for continuous-time signals and systems; Notion of Eigen functions of LSI systems; System transfer function and poles-zeros analysis; Solution to differential equations and system behavior. (Problems)		
Unit V	Discrete-Time Analysis of Signals and Systems Sampling Theorem and its proof; Spectra of sampled signals; Aliasing and its effects; Reconstruction and its implications; Probability: Mean, median, mode and standard deviation; combinatorial probability, probability distribution functions. Discrete-Time Fourier Transform (DTFT); Discrete Fourier Transform and its Inverse; Parseval's Theorem. (Problems)		

Text Books	
1	I J Nagrath, S N Sharan, R Ranjan S Kumar, Signals and Systems, Tata McGraw Hill, 2016
2	N.G,Palan, Digital Signal Processing, Tech-Max Publications,2013
3	B.P. Lathi, Signal Processing and Linear Systems, Oxford University Press, 2009
Reference Books	
1	Allan V. Oppenheim, S. Wilsky and S. H. Nawab, Signals and Systems, Prentice Hall Publication, 1996
2	S Poornachandra, B Sasikala, Signals and Systems, Tata McGraw Hill,2009
3	Robert A. Gabel, Richard A. Roberts, Signals and Linear Systems, John Wiley and Sons, 1987
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc21_ee28/preview
2	https://onlinecourses.nptel.ac.in/noc22_ee04/preview
3	https://archive.nptel.ac.in/courses/108/106/108106163/

	Course Outcomes:	CL	Class Session
BEE2402.1	Apply fundamental knowledge to identify the types of systems in given conditions.	3	9
BEE2402.2	Examine the linear time invariant systems with respect to specified inputs.	4	9
BEE2402.3	Analyze types of system in frequency domain by using Z transform.	4	9
BEE2402.4	Obtain the Fourier Transform and Laplace Transform of system by using properties.	3	9
BEE2402.5	Evaluate Discrete Fourier Transform and its Inverse for the given system.	3	9



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Second Year (Semester-IV) B.Tech. Electrical Engineering

BEE2403: AC Machines

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	CT-1	15 Marks
Tutorial	0 Hrs/week	CT-2	15 Marks
Total Credit	3	TA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE: 03 Hrs 00 Min.	

Course Contents

Unit I	Three Phase Induction Motor: Working Principal, Production of rotating magnetic field, synchronous speed, rotor speed and slip. Construction detail of 3 phase squirrel cage induction motor and slip ring induction motor. Rotor Quantities: Frequency, Induced EMF, power factor at starting and running condition. Characteristics of torque verses slip (speed), Torque: starting, full load and maximum with relation among them. Losses and efficiency.
Unit II	Starting and Controlling of Induction Motor: Starting of 3-phase IM (No numerical) 1) Direct ON Line starter 2) Stator resistance starter 3) Star-Delta starter 4) Auto transformer starter 5) Rotor resistance starter Speed control of three phase induction motor by a) Pole changing method b) Frequency control method c) By stator voltage control d) Rotor resistance control , Applications of three phase induction motor
Unit III	Single Phase Induction Motor :- 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.
Unit IV	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. Applications.
Unit V	Fractional Horse Power motor (FHP)- Construction and working : Synchronous reluctance motor, Switched reluctance motor, BLDC, permanent magnet synchronous motor, stepper motor, AC and DC Servomotors. Application.