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

BoS Chairman

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

BEE2401: Electromagnetic Field

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	0 Hrs/week
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
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 poison's and Laplace Equations:** Definition of potential difference and potential, the potential field of a point charge, potential gradient. Current Density, Continuty 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, Poisons 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 Poison'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	
Lectures	3 Hrs/week
Tutorial	0 Hrs/week
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
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 causalityand 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 Publicatiob, 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	
Lectures	3 Hrs/week
Tutorial	0 Hrs/week
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
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.

Text Books	
1	A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2	M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3	P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011
Reference Books	
1	I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
2	P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.
Useful Links	
1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/
3	https://nptel.ac.in/courses/108105062/

	Course Outcomes:	CL	Class Session
BEE2403.1	**Examine** the steady state characteristics of 3 Phase Induction and its application	**4**	9
BEE2403.2	**Analyze** the performance characteristics of 3 Phase Induction motors by conducting appropriate tests and control the speed by advanced method.	**4**	9
BEE2403.3	**Discriminate** the use of Single phase Induction motor and Linear Induction Motor	**4**	9
BEE2403.4	**Illustrate** the construction of Synchronous Machine and its working principle.	**4**	9
BEE2403.5	**Summaries** Relevant Fractional Horse Power motor for specified application.	**2**	9

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

BEE2404: Microprocessor & Microcontroller

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	0 Hrs/week
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
TA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs 00 Min.	

Course Contents

Unit I	Introduction To Intel Microprocessor 8085A, Architecture of 8085, Block Diagram of 8085, Flag Register, PSW, Addressing Mode, Timing and Control Unit, Linear and Absolute Decoding, Memory and I/O Mapping, salient Features of 8085, Applications of 8085.
Unit II	Complete Instruction Set, Data Transfer Instruction Arithmetic Instruction Logical Instruction Branching Instruction, Machine Control Instruction 8085, Assembly Language Programming of 8085, Timing Diagram, Stack Operation with PUSH and POP Instruction, 8085 Interrupts and ISR (Interrupt service routine), Call and Return Instruction of 8085,
Unit III	Introduction to Intel Microprocessor 8086, Architecture of 8086, Features and Applications 8086, Comparisons of 8085 with 8086,Introduction to IC- 8255 PPI, Architecture, Pin Descriptions, Operating Modes, BSR and I/O Modes, Interfacing of 8255 With 8085.
Unit IV	Architecture of Microcontroller 8051, Features of 8051, Applications of 8051, Pin Diagram and Description of IC-80851, Addressing Mode, Types of Ports, TEMP1,TEMP2, ALU, PROGRAM- COUNTER, PSEN, DPTR, PSW, REGISTER BANK, SFR'S
Unit V	Interrupt of 8051, Timing and Control Panel, 8051 Counter and Timer, TMOD, TCON, PCON Instruction Set of 8051, Assembly Language Programming, Introduction to Arm-7 (Embedded System)

Text Books

1	Ajay Wadhawa, Microprocessor 8085: Architecture, Programming and Interfacing, PHI Publication, 1ST Edition, 2010
2	Ramesh Gaonkar, Fundamentals of Microcontroller and Applications in Embeded System, Thomson Delmar Learning. 2007
3	M.A.Mazidi & J.G.Mazidi, The 8051 Microcontroller & Embeded System Using Assembly and C, Pearson Education, 2006

Reference Books

1	Douglas V Hall, Microprocessors and Interfacing, 3rd Edition , SIE Publication, 2017
2	Ajit Pal, Microprocessors Principals And Application - Tata Mc Graw Hill, 1990

Useful Links	
1	https://www.Tutorialspoint.Com/Microprocessor/Microprocessor_8085
2	. https://www.Amazon.In/8051-Microcontroller-Embedded-Systems-Assembly/...

	Course Outcomes:	CL	Class Session
BEE2404.1	**Demonstrate** INTEL Microprocessor 8085, function of Timing and Control Unit and real time based application	**4**	9
BEE2404.2	**Develop** Assembly language programming of 8085 with the help of 5 types of Instruction Set & function of Interrupt used in 8085.	**6**	9
BEE2404.3	**Demonstrate** INTEL Microprocessor 8086 Architecture, Features & Applications also design the Interfacing of 8255 with 8085 Microprocessor	**4**	9
BEE2404.4	**Describe** Microcontroller 8051, it's Features, real time Applications, Addressing mode & Types of Ports	**4**	9
BEE2404.5	**Develop** Assembly language program for 8051 Microcontroller, Timing and Control Panel of 8051, Counter and Timer panel, & it's Industrial use in embedded system application. (ARM-7)	**6**	9

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

BEE2405: Electrical Power System

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	1 Hrs/week
Total Credit	4

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
TA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03 Hrs 00 Min.	

Course Contents

Unit I	**Basic Concepts:** Structure of electrical power system, brief exposure to generation, transmission and distribution aspects, elementary consideration of economic bulk power supply system, use of high voltage general system consideration, idea about substation, concept of real, reactive and complex power. Load and their characteristics, voltage and frequency dependence of loads.
Unit II	**Per Unit System:** Representation of power system elements, models and parameters of generator, transformer and transmission lines, Transmission line parameters calculation (R, L, C), per unit system representation.
Unit III	**Elementary distribution scheme:** Feeders and distributors. LT and HT cables, Dielectric stress in single core cables, Grading of cables. Introduction to distribution automation. Concept of insulator, types of insulators, string efficiency. Method to improve string efficiency
Unit IV	**Representation of Lines:** Short Transmission line, medium –length line, long transmission line Voltage regulation and efficiency of power transmission lines using equivalent pi and T representation
Unit V	**Interconnection of system elements:** Interconnection of system elements to form two bus systems, types of buses, formation of bus admittance matrix. Introduction to load flow studies in multi-bus system, Static load flow equations (Methods of solution not expected).Introduction of frequency and voltage as system state indicators. Concept of Voltage Stability, P-V and V-Q curves

Text Books

1	I. J. Nagrath, D. P. Kothari, Modern Power System Analysis, 3rd Edition, Tata McGraw Hill Publishing Co. Ltd., 2003
2	Electric Power Generation: Transmission and Distribution, S. N. Singh, PHI Learning, New
3	A Text book of Power System Engineering, A Chakrabarti, M. L Soni, P. V. Gupta, U. S. Bhatnagar, Dhanpat Rai Publication

Reference Books

1	B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012
2	A. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999

Useful Links	
1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/
3	https://nptel.ac.in/courses/108105062/

	Course Outcomes:	CL	Class Session
BEE2405.1	**Describe** the basic concepts of electrical power system& functions of protective devices used in substation	**4**	9
BEE2405.2	**Evaluate** per unit values for components of power system & line parameters of transmission line by using per unit system representation.	**3**	9
BEE2405.3	**Discriminate** feeders, distributors, types of insulators& HT LT cables based on their operating voltage levels.	**4**	9
BEE2405.4	**Calculate** the voltage regulation and efficiency of short, medium & Long power transmission lines by using nominal PI method and nominal T method of representation.	**3**	9
BEE2405.5	**Determine** solution of load flow equation for multi-bus system by using static load flow equations.	**3**	9

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

BEE2406: Python Programming Lab

Teaching Scheme	
Practical	4 Hrs/week
Total Credit	2

Examination Scheme	
CA	25 Marks
ESE	25 Marks
Total	50 Marks
Duration of ESE: 02 Hrs 00 Min.	

Sr. No.	List of Experiment	CO
1	Write a Program in Python to take input from user using input method and typecast into integer value using int () method to find: i) Addition of the two numbers ii) Subtraction of two numbers iii) Division of two numbers iv) Multiplication of two numbers v) Modulus of two numbers vi) Exponential power of two numbers	**CO1**
2	Make of the operators in Python to execute the following: i) Python interpreter as Calculator (simple arithmetic operations) ii) Swapping of two numbers iii) convert number in binary, octal and hexadecimal system to decimal number system	**CO1**
3	Use the relational operators to execute the decision making using if, if- else, if –else- if ladder: i) Print a number as Even number ii) Print a number as Even / Odd Number iii) Number is divisible by more than two numbers	**CO2**
4	Demonstrate the use of loop control statement using while, for i) Print a multiplication table from 2 to 10 ii) Print squared value numbers ranging from 1 to 10	**CO2**
5	Using tuples perform the following items in the data structure: i) Delete an item from a tuple ii) Assess an item in tuple iii) assess range of values in a tuple iv) reversing items in the tuple	**CO4**
6	Using list data structure performs the operations of append, insert, extend and modify the items in the data structure.	**CO3**
7	Using dictionary data structure perform the following operations on the items of the data structure: i) Accessing elements of dictionary using key name ii) Printing elements of dictionary using its name iii) Assigning a key that does not exists iv) Add a new entry v) Changing elements in a dictionary vi)Deleting elements from a dictionary	**CO3**

8	Find the factorial of a range of numbers input by the user using user defined function.	**CO4**
9	Use the math function in Python to find: i) maximum and minimum out of the list ii) sum and average of numbers in a list iii) calculate average using mean method in statistics library iv) Round a number to a given precision in decimal digits	**CO4**
10	A Python program to store students marks into an array and finding total marks and percentage of marks	**CO5**
11	Use pandas to work on relational and labelled data from websites using csv files.	**CO5**

Text Books	
1	Programming And Problem Solving With Python by Ashok Namdev Kamthane and Amit Ashok Kamthane, McGraw Hill, 2018.
2	Let Us Python, Yashwant Kanetkar and Aditya Kanetkar, 2nd Edition, bpb Press,2020
3	Python Crash Course, 2Nd Edition: A Hands-On, Project-Based Introduction To Programming, Eric Matthes , No Starch Press, 2016
Reference Books	
1	Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
2	Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford Higher Education,2018
3	Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc22_cs32/preview
2	https://nptel.ac.in/courses/106106145

	Course Outcomes:	**CL**	**Lab Session**
BEE2406.1	**Demonstrate** the use of data types and operators in Python to build simple programs to solve the specified tasks by the user.	**4**	2
BEE2406.2	**Make use** of decision making and control statement in Python to execute the real life problems.	**3**	2
BEE2406.3	**Demonstrate** the mutable and immutable data structures in Python Programming.	**4**	2
BEE2406.4	**Solve** the problems by using object oriented programming concepts by using functions.	**3**	2
BEE2406.5	**Design** the programs by using arrays, data and file handling in Python.	**6**	2

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BEE2307: AC Machines Lab

Teaching Scheme	
Practical	2Hrs/week
Total Credit	1

Examination Scheme	
CA	25 Marks
ESE	25 Marks
Total	50 Marks
Duration of ESE: 02 Hrs 00 Min.	

Sr. No.	List of Experiment	CO
1	Perform the block rotor test on 3 Phase Induction Motor.	CO1
2	Load test on 3phase Induction Motor Coupled with DC Generator	CO1
3	Rotor resistance starter for slip ring induction motor.	CO2
4	Speed control of 3 phase Slip ring Induction motor by Rotor resistance Control	CO2
5	Star-delta starter for squirrel cage induction motor.	CO2
6	Speed control of slip ring Induction Motor by Virtual Lab	CO3
7	Examine the Equivalent circuit of single phase induction motor.	CO3
8	Demonstrate synchronization test on two Alternator	CO4
9	Direct Torque control of Induction Motor Drive using Digital Simulation	CO4
10	Control the speed of Brushless DC Motor using digital Simulation	CO5
11	Reframe the different components of Brush Less Motor	CO5
12	Design Electronically Speed Control for BLDC Motor	CO5

Text Books

1	A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2	A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3	M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002

Reference Books

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

Useful Links

1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/

	Course Outcomes	CL	Lab Session
BEE2407.1	**Calculate the Efficiency of** Induction Motor by using blocked test and load test.	4	2
BEE2407.2	**Analyze** starting methods and speed control methods of AC Machine	3	2
BEE2407.3	**Monitor** the internal parameters of 1 Phase Induction Motor	4	2
BEE2407.4	**Demonstrate** Synchronization test of Alternator and check the performance by using Digital Simulation	3	2
BEE2407.5	**Reconstruct** and Examine components and Electronically Speed Control for BLDC Motor	6	2

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NAAC Accredited (A+ Grade)
An Autonomous Institute affiliated to RTMNU Nagpur

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

BEE2408: Microprocessor & Microcontroller

Teaching Scheme	
Practical	2 Hrs/week
Total Credit	1

Examination Scheme	
CA	25 Marks
ESE	25 Marks
Total	50 Marks
Duration of ESE: 02 Hrs 00 Min.	

Sr. No.	List of Experiment	CO
1	Write Assembly langaguge program to add 8 bit data.	CO1
2	Write Assembly langaguge program to subtract 8 bit data.	CO1
3	Write Assembly langaguge program to add 16 bit data.	CO1
4	Write an Assembly langaguge program to separate even and odd number from given array	CO2
5	Write Assembly langaguge program to find 1's compliment of 8 bit number.	CO2
6	Write Assembly langaguge program to add two hexadecimal and decimal number	CO3
7	Write an Assembly langaguge program to subtract two hexadecimal and decimal number	CO3
8	Write the Assembly langaguge program for square wave generator by using 8255	CO4
9	Write Assembly langaguge program to subtraction of two 8- bit data using Keil software (Micro vision -5)	CO5
10	Write Assembly langaguge program to addition of two 8- bit data using Keil software (Micro vision -5)	CO5

Text Books

1	Ajay Wadhawa, Microprocessor 8085: Architecture, Programming and Interfacing, PHI Publication, 1ST Edition, 2010
2	Ramesh Gaonkar, Fundamentals of Microcontroller and Applications in Embeded System, Thomson Delmar Learning. 2007
3	M.A.Mazidi & J.G.Mazidi, The 8051 Microcontroller & Embeded System Using Assembly and C, Pearson Education, 2006

Reference Books

1	Douglas V Hall, Microprocessors and Interfacing, 3rd Edition , SIE Publication, 2017
2	Ajit Pal, Microprocessors Principals And Application - Tata Mc Graw Hill, 1990

	Course Outcomes	CL	Lab Session
BEE2408.1	**Develop** the assembly langaguge program for addition and subtraction of two 8/16 bit data	6	2
BEE2408.2	**Built** program to separate even and odd number from given array and find 1's compliment of 8 bit number	6	2
BEE2408.3	**Built** assembly langaguge program to add and subtract hexadecimal and decimal number	6	2
BEE2408.4	**Develop** assembly langaguge the program for generate square wave by using 8255	6	2
BEE2408.5	**Develop** the program for addition and subtraction of two 8- bit data using Keil software (Micro vision -5)	6	2

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BEE2409: Power System Simulation Lab

Teaching Scheme	
Practical	2 Hrs/week
Total Credit	1

Examination Scheme	
CA	25 Marks
ESE	25 Marks
Total	50 Marks
Duration of ESE: 02 Hrs 00 Min.	

Sr. No.	List of Experiment	CO
1	Introduction to MATLAB and its basic commands.	CO1
2	Simulation of Load Transfer from one Feeder to other during Transformer Maintenance	CO1
3	Formation of Y Bus for Power Systems with and without Mutual Coupling, by Singular Transformation and Inspection Method.	CO2
4	Design the MATLAB program to model transmission lines	CO2
5	Simulation of monitoring the feeder parameter from workstation	CO3
6	Design the MATLAB program to simulate Ferranti effect	CO3
7	Design the SIMULINK model for two area load frequency control	CO4
8	Formation for symmetric π /T configuration for Verification of AD−BC=1, Determination of Efficiency and Regulation.	CO4
9	Design the MATLAB program to solve load flow equations by Newton-Raphson method	CO5
10	Determination of Bus Currents, Bus Power and Line Flow for a Specified System Voltage (Bus) Profile.	CO5

Text Books

1	I. J. Nagrath, D. P. Kothari, Modern Power System Analysis, 3rd Edition, Tata McGraw Hill Publishing Co. Ltd., 2003
2	Electric Power Generation: Transmission and Distribution, S. N. Singh, PHI Learning, 2012
3	A Chakrabarti, M. L Soni, P. V. Gupta, U. S. Bhatnagar, "A Text book of Power System Engineering" , Dhanpat Rai Publication, 2016

Reference Books

1	B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012
2	A. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999

Useful Links

1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/
3	https://nptel.ac.in/courses/108105062/

	Course Outcomes:	CL	Lab Session
BEE2409.1	**Describe** the basic concepts of electrical power system& functions of protective devices used in substation	**4**	2
BEE2409.2	**Evaluate** per unit values for components of power system & line parameters of transmission line by using per unit system representation.	**3**	2
BEE2409.3	**Discriminate** feeders, distributors, types of insulators & HT LT cables based on their operating voltage levels.	**4**	2
BEE2409.4	**Calculate** the voltage regulation and efficiency of short, medium & Long power transmission lines by using nominal PI method and nominal T method of representation.	**3**	2
BEE2409.5	**Discriminate** magnetic boundary conditions, Point form & Integral form of Maxwell's equation.	**3**	2

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BAU2404: Group Reading of Classics

Teaching Scheme		Examination Scheme	
Practical	2 Hrs/week	**CA**	-
Total Credit	0	**ESE**	-
		Total	-
		Duration of ESE: -	

Activity

This will make group to read one or two books during a semester.

Process

An hour may be fixed for a small group for a particular classic. Group sits and each person reads aloud (if possible with proper modulation) taking turns. This if done properly for an hour one may complete 30-40 pages in an hour. A normal classic can be finished in 15 to 20 days. If serious books on philosophy etc. are taken up a discussion can be held after every idea is complete.

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