ACE
ENGINEERING COLLEGE
Ankushapur, Ghatkesar – 501 301

(Autonomous)

B.TECH. FOUR YEAR DEGREE COURSE

ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE

II Year				**II Semester**			
S.No.	**Course type**	**Course Code**	**Course Title**	**Periods per week**			**Credits**
				L	**T**	**P**	
1	BSC	MA401BS	Laplace Transforms, Numerical Methods and Complex Variables	3	1	0	4
2	PCC	EE402PC	Electrical Machines-II	3	1	0	4
3	PCC	EE403PC	Digital Electronics	3	0	0	3
4	PCC	EE404PC	Control Systems	3	0	0	3
5	PCC	EE405PC	Power System-I	3	0	0	3
6	PCC	EE406PC	Power System Lab-I	0	0	2	1
7	PCC	EE407PC	Digital Electronics Lab	0	0	2	1
8	PCC	EE408PC	Electrical Machines Lab-II	0	0	2	1
9	PCC	EE409PC	Control Systems Lab	0	0	2	1
10	MC	MC409HS	Constitution of India	3	0	0	0
11	MC	MC410BS	Numerical Methods Lab	**0**	**0**	**2**	**0**
Total				**18**	**2**	**10**	**21**

Note: *MC = Satisfactory/Unsatisfactory

MA401BS: LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES

B.TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MA401BS	BSC	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques
- Various methods to the find roots of an equation.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy‟s integral formula and Cauchy‟s residue theorem.
- Expansion of complex functions using Taylor‟s and Laurent‟s series.

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

- Use the Laplace transforms techniques for solving ODE‟s
- Find the root of a given equation.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given ODE‟s
- Analyze the complex function with reference to their analyticity, integration using Cauchy‟s integral and residue theorems.
- Taylor‟s and Laurent‟s series expansions of complex Function

UNIT: I	Laplace Transforms	No. of Classes: 09

Laplace Transforms; Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by„t‟. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

UNIT: II	Numerical Methods – I	No. of Classes: 09

Solution of polynomial and transcendental equations – Bisection method, Iteration Method, NewtonRaphson method and Regula-Falsi method. Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton‟s forward and backward difference formulae. Central difference interpolation: Gauss‟s forward and backward formulae; Lagrange‟s method of interpolation

UNIT: III	Numerical Methods – II	No. of Classes: 09

Numerical integration: Trapezoidal rule and Simpson‟s 1/3rd and 3/8 rules. Ordinary differential equations: Taylor‟s series; Picard‟s method; Euler and modified Euler‟s methods; Runge-Kutta method of fourth order.

UNIT: IV	Complex Variables (Differentiation)	No. of Classes: 09

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne-Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT: V	Complex Variables (Integration)	No. of Classes: 09

Line integrals, Cauchy‟s theorem, Cauchy‟s Integral formula, Liouville‟s theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor‟s series, Laurent‟s series; Residues, Cauchy Residue theorem (without proof)

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

Reference Books:

1. M. K. Jain, SRK Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.

2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.

3. Complex Variables with Applications by PonnusamySaminathan, Birkhäuser Publisher.

4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

Web References:

1) **SWAYAM Online Courses** https://storage.googleapis.com/uniquecourses/online.html
2) **Directory of Open Access Journals** https://doaj.org/
3) **Springer Open Journals** https://www.springeropen.com/journals
4) **UG/PG MOOCs** http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php

E-Text Books:

1) **National Digital Library:** https://ndl.iitkgp.ac.in/
2) **NCERT Text Books** http://ncert.nic.in/textbook/textbook.htm
3) **Directory of Open Access Books** https://www.doabooks.org/

EE402PC: ELECTRICAL MACHINES-II

B. TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE402PC	Core	3	1	-	4	30	70	100
Content Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			

Prerequisite: 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:

Upon completing this course, the student will be able to

1. Analyze the concept of rotating magnetic fields.
2. Calculate maximum and starting torque
3. Determine Regulation by synchronous impedance method, M.M.F. method
4. Analyze parallel operation and load sharing of synchronous motor
5. Apply concepts of Motors Step Motors

UNIT: I	Induction Machines	No. of Classes: 12

Constructional details of cage and wound rotor machines production of a rotating magnetic field, Double cage induction motor - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - crawling and cogging.

UNIT: II	Induction Motors	No. of Classes: 12

No-load Test and Blocked rotor test –Predetermination of performance Methods of starting and starting current and Torque calculations. Speed Control Methods: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT: III	Alternator	No. of Classes: 12

Constructional Features 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. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics. Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of Xd and Xq (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT: IV	Synchronous Machines	No. of Classes: 12
Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactance‟s. Synchronous Motors: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed .- hunting and its suppression – Methods of starting – synchronous induction motor.		
UNIT: V	**Special Machines**	**No. of Classes: 12**
Special-Purpose Electric Machines: Introduction Permanent-Magnet Motors Step Motors , Switched-Reluctance Motors and Brushless DC Motors. Single phase induction motor – Constructional features-Double revolving field theory – split-phase motors – shaded pole motor.		

Text Books:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2014.
2. D. P. Kothari and I. J. Nagrath “Electric Machines”, McGraw Hill Education, 5Th Edition 2020.

Reference Books:

1. S.K Sahdev, Electrical Machines, Cambridge University Press, 2017
2. P. C. Sen, “Principles of Electric Machines and Power Electronics”, John Wiley & Sons, 2007.
3. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002

Web Reference:

1. https://nptel.ac.in/courses/electrical machines-II
2. https://shodhganga.inflibnet.ac.in/bitstream/10603/17295/13/13_chapter3.pdf
3. https://onlinelibrary.wiley.com/doi/pdf/10.1002/0470846119.fmatter_indsub
4. https://ieeexplore.ieee.org/iel5/2224/21343/00990185.pdf

EE403PC: DIGITAL ELECTRONICS

B.TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE403PC	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisite: Analog Electronics

Course Objectives:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To design combinational logic circuits, sequential logic circuits.
3. To understand the basic concepts of logic families.
4. To learn techniques in converting from Analog to Digital and Digital to Analog.
5. To understand about the memories

Course Outcomes:

Upon completing this course, the student will be able to

1. Design and implement Combinational and Sequential logic circuits.
2. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
3. Known about the logic families and realization of logic gates
4. Known about semiconductor memories

UNIT: I	FUNDAMENTALS OF DIGITAL SYSTEMS	No. of Classes: 09

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

UNIT: II	COMBINATIONAL DIGITAL CIRCUITS	No. of Classes: 09

Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don‟t care conditions, Encoders, priority encoders, decoders , drivers for display devices, Multiplexer, De-Multiplexer, Adders, Subtractors, BCD arithmetic, carry look ahead adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, Q-Mmethod of function realization.

UNIT: III	SEQUENTIAL CIRCUITS AND SYSTEMS	No. of Classes: 09

A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J, K, T and D types flip-flops, applications of flip-flops, shift registers, applications of shift registers, ring counter using shift register, serial to parallel converter, parallel to serial converter, serial ladder, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC‟s, asynchronous sequential counters, applications of counters.

UNIT: IV	A/D AND D/A CONVERTERS	No. of Classes: 09

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs

UNIT: V	SEMICONDUCTOR MEMORIES & LOGIC FAMILIES	No. of Classes: 09

Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential lmemory, read only memory (ROM), read and write memory(RAM), charge de coupled device memory(CCD), commonly used memory chips

Introduction to logic families: RTL, DTL, TTL, CMOS, comparison of various logic families, CMOS transmission gate.

Text Books:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

Reference Books:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

Web References:

https://nptel.ac.in/courses/117/105/117105080/

https://nptel.ac.in/courses/106/105/106105185/

https://nptel.ac.in/courses/117/106/117106086/

E-Text Books:

1. https://libgen.is/

2. https://bookzzz.website/

EE404PC: CONTROL SYSTEMS

B.TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE404PC	Core	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: : Linear Algebra and Calculus, Ordinary Differential Equations and Multivariable Calculus Laplace Transforms , Numerical Methods and Complex variables

Course Objectives:

1. To understand the different ways of system representations such as Transfer function representation and state space representations.
2. To study the characteristics of closed loop control system.
3. To assess the system performance using time domain analysis and methods for improving it
4. To assess the system performance using frequency domain analysis and techniques for improving the performance.

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

1. Analyze closed-loop control systems for stability and steady-state performance.
2. Develop the modelling of linear-time-invariant systems using transfer function and state space Representations.
3. Evaluate transfer function for a given control system problems.
4. Formulate different types of analysis in frequency domain to explain the nature of the system.
5. Identify the needs of different types of controllers and compensators to ascertain the required dynamic response.

UNIT: I	MODELLING OF PHYSICAL SYSTEMS	No. of Classes: 12

Basic Components of a control Systems, Classification of control systems-Linear &Non-Linear, Time-Variant &Invariant, Continuous & Discrete, Dynamic &Static, andOpen-Loop &Closed-loop systems. Examples and Characteristics of Open Loop and closed Loop Control Systems. Mathematical models of physical systems- Transfer function -Electrical and Mechanical Systems. Block diagram representation and reduction techniques-Signal Flow Graphs

UNIT: II	TIME RESPONSE ANALYSIS	No. of Classes: 12

Time response of first and second order systems for standard test inputs. Application of initial and final value theorem, Design specifications for second-order systems based on the time-response. Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems

UNIT: III	STABILITY ANALYSIS	No. of Classes: 12

Concept of Stability. Routh-Hurwitz Criteria. Relative and Conditional stability analysis – limitations of Routh‟s stability.
The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT: IV	FREQUENCY RESPONSE ANALYSIS	No. of Classes:12
Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Closed-loop frequency response		
UNIT: V	**STATE VARIABLS ANALYSIS**	**No. of Classes: 12**
State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observability. Effect of Lag, lead and lag-lead compensation on frequency response-Design of Lag, lead and lag & lead compensator using bode plots		

TEXT BOOKS:

1. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 1997.
2. B. C. Kuo, "Automatic Control System", Prentice Hall, 1995.

REFERENCE BOOKS:.

1. K. Ogata, "Modern Control Engineering", Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009.

WEB REFERENCES:

https://en.wikibooks.org/wiki/Control_Systems/Resources

E TEXT BOOKS:

1. https://www.pdfdrive.com/the-control-systems-handbook-control-system-advanced-methods-second-edition-electrical-engineering-handbook-d175616386.html
2. https://www.pdfdrive.com/linear-control-system-analysis-and-design-with-matlab-sixth-edition-automation-and-control-engineering-book-53-d187590194.html

EE405PC: POWER SYSTEM-I

B. TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE405PC	Core	3	0	0	3	30	70	100

Content Classes: 45	Tutorial Classes: 15	Practical Classes: Nil	Total Classes: 60

Prerequisite: Basic Electrical Engineering, Electrical Machines-I

Course Objectives:

The Student will able to

1. Identify the Significance of Electrical Power Generation.
2. Evaluate the load factor and diversity factors.
3. Compare overhead line insulators and insulated cables.
4. Identify the concept of corona.

Course Outcomes:

The Student will be able to

1. Identify Working of Hydro, Thermal, and Nuclear power stations.
2. Apply different the power tariff methods.
3. Operate the string Efficiency of Suspension Insulators.
4 Analyze the Concept of Corona.
5. Calculate Voltage drops in A.C and D.C Distributors.

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UNIT: I	Generation of Electric Power	No. of Classes: 12

Block Diagram and operation of Hydro Power Station, Thermal Power Plant, Nuclear Power Plant andGas Turbine Plant.

Renewable sources: Solar Energy, Wind Energy, Fuel Cells, Wave Energy, Tidal Energy, Ocean Energy and. Cogeneration and Energy conservation and storage. (Elementary Treatment only)

UNIT: II	**Economics of Generation**	No. of Classes: 12

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff or charge to customer .Types of Tariffs -Two-part tariff, Three-part Tariff and Power factor Tariff. [added topic]

UNIT: III	**Overhead Line Insulators & Insulated Cables**	No. of Classes: 12

Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators. Introduction, insulation, insulating materials, Extra high voltage cables, grading of cables, insulation resistance of a cable, Capacitance of a single core and three core cables, Overhead lines versus underground cables, types of cables.

UNIT: IV	**Inductance & Capacitance Calculations of Transmission Lines**	No. of Classes: 12

Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and effect of earth on capacitance.
Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and Communication lines.

UNIT: V	**A.C. Distribution & DC Distribution**	No. of Classes: 12

A.C. Distribution: Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the

following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.
DC Distribution: Classification of Distribution Systems. - Comparison of DC vs. AC and Under-Ground vs. Over-Head Distribution Systems. - Requirements and Design features of Distribution Systems. -Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases:
Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

Text Books:

1. C.L. Wadhwa –Generation, Distribution and Utilization of Electrical Energy, Second Edition, New Age International, 2009.

2 . S.N. Singh ,Electrical Power Generation, Transmission and Distribution by., PHI, 2003

Reference Books:

1. C.L. Wadhwa –Electrical Power Systems, Fifth Edition, New Age International, 2009
2. J.B Gupta, Transmission & Distribution of Electrical Power, S.K. Kataria & Sons, 2013
3. Daniel S. Kirschen, Goran Strbac, Fundamentals of Power System Economics, Wiley, 2004

Web Reference:

1. https://swayam.gov.in/power system engineering.
2. https://www.smartzworld.com/notes/power-systems-i-notes-pdf-ps-i-notes-pdf/
3. https://lecturenotes.in/download/note/43034-note-for-power-system-1-ps-1-by-nikhil-sharma
4. https://lecturenotes.in/subject/471/power-system-1-ps-1

EE406PC : POWER SYSTEM LAB-I

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE406PC	Core	0	0	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite: Nil

Course Objectives:

1. To introduce the concepts of characteristics of solar panel
2. To understand Voltage distribution across insulator string
3. To study the concepts of Corona.
4. To understand the concepts of insulators and cables.

Course Outcomes:

1. To identify the characteristics of solar panel
2. To analyze the Voltage distribution across insulator string
3. To determine the string efficiency
4. Able to analyze Transmission line parameters.
5. To determine the corona loss

List of Experiments:

1. I-V characteristics of solar panel
2. Voltage distribution across insulator string
3. String efficiency calculation with and without guard ring
4. Simulation of string of insulators for determination of voltage distribution
5. Simulation of string of insulators for determination of string efficiency with guard ring
6. Simulation of string of insulators for determination of string efficiency without guard ring
7. Find the insulation resistance of a single core cable
8. Find the capacitance of a single core cable
9. Find the capacitance of a three core cable
10. Computation of Transmission line parameters
11. Modelling of transmission lines
12. Calculation of corona power loss

EE407PC: DIGITAL ELECTRONICS LAB

B.TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE407PC	Core	-	-	2	1	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		

Prerequisite: Digital Electronics, Analog Electronics

Course Objectives:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits and to be able to

convert between different representations.

3. To implement simple logical operations using combinational logic circuits
4. To design combinational logic circuits, sequential logic circuits.
5. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
6. To implement synchronous state machines using flip-flops.

List of Experiments:

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4 bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8 bit parallel load and serial out shift register using flip-flops.
8. Design and realization a Synchronous and Asynchronous counters using flip-flops
9. Design and realization of Asynchronous counters using flip-flops

10. Design and realization 8x1 using 2x1 mux

11. Design and realization 2 bit comparator

12. Verification of truth tables and excitation tables

13. Realization of logic gates using DTL, TTL, ECL, etc.,

14. State machines

List of Equipment/Software(with Specifications or Range) Required:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.

2. 20 MHz Oscilloscope with Dual Channel.

3. Bread board and components/ Trainer Kit.

4. Multimeter.

EE408PC: ELECTRICAL MACHINES LAB- II

B.TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE408PC	Core	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite: ELECTRICAL MACHINES

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 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
5. Start different machines and control the speed and power factor

List of Experiments: The following 1-12experiments are to be conducted compulsorily.

1. Brake test on three phase squirrel cage induction motor.
2. No-load & blocked rotor tests on three phase Slip ring Induction motor.
3. Equivalent circuit of single phase induction motor.
4. Regulation of three phase alternator by EMF & MMF) method.
5. Regulation of three phase alternator by MMF method.
6. Regulation of a three phase alternator by ZPF & ASA method.
7. Efficiency of a three phase alternator.
8. Measurement of sequence Impedance of a 3-phase alternator
9. Separation of core losses of a single phase transformer with the help of salient pole alternator
10. Slip test on salient pole synchronous machine.
11. V and inverted V curves of three - phase Synchronous motor.
12. Parallel operation of Alternators.

List of Equipment/Software(with Specifications or Range) Required:

1.D.C. Shunt Motor – Shunt Generator Set
2.DC Shunt Motor
3.D.C. shunt motor -D.C series generator Set
4.D.C. shunt motor -D.C compound generator Set
5.D. C compound motor
6.D.C Series Motor-D.C Series Generator Set
7.DC Shunt Motor -3-Φ Alternator Set
8.AC 3 phase Squirrel Cage Induction Motor
9.AC 3 phase Slipring Induction Motor
10.DC Shunt Motor- 3Φ Synchronous Motor
11.Single Phase Induction Motor
12. Three phase auto transformer 5KVA closed type
13. Transformer single phase 2 KVA i/p 220 V o/p 220 V-----3 No‟s
14. Transformer single phase 3 KVA i/p 220 V o/p 220 V-----7 No‟s
15. Transformer single phase 1 KVA i/p 220 V o/p 220 V------2 No‟s
16. Single phase auto transformer
17.Single phase auto transformer 8 A
18.Booster Transformer230V/0-50V, 15A
19.Single phase auto transformer 10 Amps
20.Rheostats
21.Voltmeters
22.Ammeters
23.Wattmeter‟s
26.Tachometers

EE409PC: CONTROL SYSTEMS LAB

B.TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE409PC	Core	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite: Nil

COURSE OBJECTIVES:

1. To understand the different ways of system representations such as Transfer function representation and state space representation
2. To understand the concepts of stability and Root Locus.
3. To assess the system performance using time domain analysis and methods for improving it
4. To assess the system performance using frequency domain analysis and techniques for improving the performance.

COURSE OUTCOMES: Students will be able to:

1. Formulate transfer function for a given control system problems.
2. Plot Root Locus and Bode plots for given control system model.
3. Design PID controller for given control system models.
4. Apply various time domain and frequency domain techniques to assess the system Performance.
5. Execute time response analysis of a second order control system using suitable software

List of Experiments:

The following 1-10 experiments are to be conducted compulsorily. And required to conduct at least any two from remaining experiments.

1. Time response of Second order system
2. Characteristics of Synchros
3. To Study the Magnetic Amplifier and Plot Its Load Current V/S Control Current Characteristic for Series and Parallel Mode.
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Transfer function of DC generator
7. Temperature controller using PID
8. Characteristics of AC servo motor.
9. Effect of P, PD, PI, PID Controller on a second order systems
10. Stability analysis (Bode, Root Locus) of Linear Time Invariant system using suitable software
11. Lag and lead compensation – Magnitude and phase plot
12. Simulation of P, PI, PID Controller.
13. Linear system analysis (Time domain analysis, Error analysis) using suitable software
14. State space model for classical transfer function using suitable software -Verification.

List of Equipment/Software (with Specifications or Range) Required:

1. time Response of Second order system Instruments required: CRO Function generator Decade resistance box Decade inductance box Decade capacitance box

2. Second order system with P,PI,PD,PID Controller Kit

3. Programmable logic controller Kit

4. Magnetic amplier kit Instruments required: Bulb or Rheostat

5. Transfer function of AC Servomotor kit with loading arrangement

6. DC Servomotor kit

7. DC motor kit

8. Transfer function of DC Generator kit

9. Temperature Controller using PID kit

10. Synchros Synchro transmitter & reciever Instruments required: 3-Voltmeters

11. Lag and Lead compensation kit Instruments required: CRO

12. Processor: Minimum i3 processor E7500(2.93GHZ) RAM:4GB Hard Disk:500 GB Micro Soft licensed Operating System.

13. Licensed Software Package MATLAB, PSPICE & required OS for above Systems.

MC409HS: CONSTITUTION OF INDIA

B.TECH. II YEAR II SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MC409HS	MC	3	0	0	0	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

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".

Municipalities : Definition, constitution of Municipalities, composition of municipalities, constitution and composition of wards and committees, Reservation of seats, Duration of Municipalities, Disqualifications for membership, powers, authorities and responsibilities, membership, power to impose taxes, funds of the municipalities, Finance Commission. Election to the Municipalities, Application to the union territories.

Course content

1. Meaning of the constitution law and constitutionalism

2. Historical perspective of the Constitution of India

3. Salient features and characteristics of the Constitution of India

4. Scheme of the fundamental rights

5. The scheme of the Fundamental Duties and its legal status

6. The Directive Principles of State Policy – Its importance and implementation

7. Federal structure and distribution of legislative and financial powers between the Union and the States

8. Parliamentary Form of Government in India – The constitution powers and status of the President of India

9. Amendment of the Constitutional Powers and Procedure

10. The historical perspectives of the constitutional amendments in India

11. Emergency Provisions: National Emergency, President Rule, Financial Emergency

12. Local Self Government – Constitutional Scheme in India

13. Scheme of the Fundamental Right to Equality

14. Scheme of the Fundamental Right to certain Freedom under Article 19

15. Scope of the Right to Life and Personal Liberty under Article.

16. Role of Municipalities in Urbanisation.

References :

1) Constitution of India - P.M. Bakshi, Universal law of Publishing, 14th edition.

2) The Oxford Handbook of the Indian Constitution, Sujit choudary, Madhav Khosla.

Oxford University Press.1st edition.

MC410BS: NUMERICAL METHODS LAB

B.Tech. II Year II Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MC410BS	Core	0	0	2	0	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course Objectives:

1. To demonstrate the flow charts and design an algorithm for the given method.
2. To Write the computer programmes and solve the differential equations by numerical technique
3. To Write Lagrange‟s Interpolation programmes.
4. To Understand program to find the roots of a given equation using Newton Raphson method

Course Outcomes:

At the end of the course, the student can able to

1. find the roots of a given equation using Newton Raphson method
2. Define Runge-kutta fourth order method.
3. find the solution of given system of linear equations using L-U decomposition method
4. find the solution of two- dimensional Laplace equation
5. solve a given initial value problem of O.D.E using Taylor‟s series method

List of Experiments:

1. Program to find the addition, subtraction, multiplication of matrices. Then find the trace of the two matrices.
2. Program to find the trace of the two matrices.
3. Program to find the solution of given system of linear equations using L-U decomposition method.
4. Write a programme to solve a given initial value problem of O.D.E using Taylor‟s series method.
5. Write a program to find the value of the solution of one dimensional Heat equation.
6. Write a program to find the value of the solution of two- dimensional Laplace equation.
7. Define Lagrange‟s Interpolation. If two arrays of x and y of same size are given, write a program to determine y for a given x.
8. Write a program to find the roots of a given equation using Newton Raphson method.
9. Define Runge-kutta fourth order method. Program to solve a differential equation.
10. Write a program to evaluate definite Integral by Trapezoidal, Simpson‟s 1/3 and 3/8 rules.
11. Write a program to find a line of best fit by the method of Least Squares for a given set of data points.
12. Write a program to fit a curve of the form $y=ae^{bx}$ for a given set of data points.