ACE
ENGINEERING COLLEGE
Ankushapur, Ghatkesar – 501 301

(Autonomous)

B.TECH. FOUR YEAR DEGREE COURSE

ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE

II Year				**I Semester**			
S.No.	**Course type**	**Course Code**	**Course Title**	**Periods per week**			**Credits**
				L	**T**	**P**	
1	ESC	ME301ES	Engineering Mechanics	3	1	0	4
2	PCC	EE302PC	Electrical Circuits	3	1	0	4
3	PCC	EE303PC	Analog Electronics	3	0	0	3
4	PCC	EE304PC	Electrical Machines-I	3	1	0	4
5	PCC	EE305PC	Electromagnetic Fields	3	0	0	3
6	PCC	EE306PC	Electrical Machines Lab-I	0	0	2	1
7	PCC	EE307PC	Analog Electronics Lab	0	0	2	1
8	PCC	EE308PC	Electrical Circuits Lab	0	0	2	1
9	MC	MC309HS	Gender Sensitization Lab	0	0	2	0
10	MC	MC310CS	Fundamentals of Data Structures	3	0	0	0
Total				**18**	**3**	**8**	**21**

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

ME203ES/ME301ES: ENGINEERING MECHANICS

B. TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ME203ES/ME301ES	ESC	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: applied physics

Course Objectives:

1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
5. Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

Course Outcomes:

Upon completing this course, the student will be able to

1. Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system offorces.
2. Solve problem of bodies subjected to friction.
3. Find the location of centroid and calculate moment of inertia of a given section.
4. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
5. Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

Unit-I	INTRODUCTION TO ENGINEERING MECHANICS	No. of Classes: 12

Introduction to Engineering Mechanics - Force Systems :Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

Unit-II	FRICTION, CENTROID AND CENTRE OF GRAVITY	No. of Classes: 12

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack; Centroid and Centre of Gravity-Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

Unit-III	MOMENT OF INERTIA	No. of Classes: 12

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem Mass Moment of Inertia : Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies

Unit-IV	**REVIEW OF PARTICLE DYNAMICS**	**No. of Classes: 12**

Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

Unit-V	**KINETICS OF RIGID BODIES**	**No. of Classes: 12**

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation

TEXT BOOKS:

1. Shames and Rao(2006) , Engineering Mechanics, Pearson Education

2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

REFERENCE BOOKS:.

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition,1983.
2. Andrew Pytel, JaanKiusalaas, "Engineering Mechanics", Cengage Learning,2014.
3. Beer F.P & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH,2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education,2010.

WEB REFERENCES:

1. http://bit.ly/2XHb4VZ
2. http://bit.ly/2XJ2HsH
3. http://bit.ly/2XDo92B

E TEXT BOOKS:

1.https://drive.google.com/file/d/1YMB27ny5xwDPJYScxxSOQlTU1BAS0PJh/view

2.https://drive.google.com/file/d/1hQD4agrMqHEi6KEEFUnJtC6D5JbXE6Al/view

EE302PC: ELECTRICAL CIRCUITS

B.TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE302PC	Core	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: Nil

Course Objectives:

1. To understand the concept of network theorems.
2. To analyze transients in Electrical systems.
3. To evaluate Network parameters of given Electrical network
4. To design basic filter configurations

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

1. Apply network theorems for the analysis of electrical circuits.
2. Identify the transient and steady-state response of electrical circuits.
3. Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
4. Analyze of electrical circuits using Laplace Transform
5. Analyze two port circuit behaviors.

Unit: I	NETWORK THEOREMS	No. of Classes: 12

Node and Mesh Analysis, Thevenin theorem, Norton theorem, Superposition theorem , Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with dependent current and voltage sources. Concept of duality and dual networks

Unit: II	STEADY STATE ANALYSIS	No. of Classes: 12

Analysis of first and second order equations for Series and parallel R-L, R-C, RL-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response for DC and AC Excitations.

Unit: III	TRANSIENT ANALYSIS	No. of Classes: 12

Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer

Unit: IV	Time and Frequency domain Analysis	No. of Classes:12

Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions. Transfer function representation. Poles and Zeros. Frequency response (magnitude and phase plots), series and parallel resonances

Unit: V	TWO PORT NETWORKS	No. of Classes: 12

Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks.

TEXT BOOKS:

1. M. E. Van Valkenburg and T.S. Rathore, "Network Analysis", Prentice Hall, Revised Third Edition, 2019.
2. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 2nd Edition, 2013.

REFERENCE BOOKS:

1. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
2. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, sixth edition, 2019.
3. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 2006.

WEB REFERENCES:

1. https://nptel.ac.in/courses/basic electric circuits
2. https://www.allaboutcircuits.com/textbook/

EE303PC: ANALOG ELECTRONICS

B.TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE303PC	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisite: applied physics

Course Objectives:

To make the student

1. To introduce components such as diodes, BJTs and FETs their switching characteristics, applications.
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.

Course Outcomes:

After completion of this course the student will be able to

1. Know the characteristics, utilization of various components.
2. Understand the biasing techniques.
3. Design and analyze various rectifiers, small signal amplifier circuits.
4. Design sinusoidal and non-sinusoidal oscillators.

Unit: I	DIODE CIRCUITS & INTRODUCTION TO TRANSISTOR BJT	No. of Classes: 09

DIODE CIRCUITS: Diode Circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits.

Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits.

Unit: II	MOSFET CIRCUITS	No. of Classes: 09

MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.

Unit: III	MULTI STATE & POWER AMPLIFIERS	No. of Classes: 09

Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers - Class A, Class B, Class C

Unit: IV	FEEDBACK AMPLIFIERS	No. of Classes:09

Feedback Amplifiers Feedback Amplifiers:Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple Problems.

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge

Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

Unit: V	OSCILLATORS	No. of Classes: 09

Ideal op-amp, Output offset voltage, input bias current, input offset current,

slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular-wave generators.

TEXT BOOKS:

3. Electronic Devices and Circuits- Jacob Millman, McGraw HillEducation
4. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009,Pearson.
5. Micro Electronics By Sedra Mith

REFERENCE BOOKS:

1. The Art of Electronics, Horowitz, 3rd Edition Cambridge UniversityPress
2. Electronic Devices and Circuits, David A. Bell – 5th Edition,Oxford.

WEB REFERENCES:

1. **https://www.youtube.com/watch?v=fSV8dhjuaoM**
2. **https://www.youtube.com/watch?v=0C4uxtS-tlQ**
3. **https://www.youtube.com/watch?v=-bz6u7IF1gM**
4. **https://www.youtube.com/watch?v=MuBiC9yz2fc**
5. **https://www.youtube.com/watch?v=2GijhTUQTbw**
6. **https://www.youtube.com/watch?v=m4sjTt7rhow&t=14s**
7. **https://www.youtube.com/watch?v=M3yI0byaqKc**

E TEXT BOOKS:

1. https://www.e-booksdirectory.com/details.php?ebook=8466
2. https://www.e-booksdirectory.com/details.php?ebook=1109
3. https://www.e-booksdirectory.com/details.php?ebook=5302

EE304PC: ELECTRICAL MACHINES-I

B.TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE304PC	Core	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: BEE

Course Objectives:

1. To study and understand different types of DC generators,
2. To understand the operation of Motors
3. To explain the concepts of Transformers
4. To study the performance aspects of various testing methods.

Course Outcomes:

Upon completing this course, the student will be able to

1. Identify different parts of a DC generators
2. Calculate constant and variable losses of DC motors
3. Identify different testing methods to predetermine the efficiency of DC machines
4. Draw Phasor diagram of single phase Transformer
5. Analyze OC and SC tests

Unit : I	D.C. GENERATORS	No. of Classes: 12

Principles of Electro-Mechanical conversion systems. Principle of operation – Action of commentator – constructional features – armature windings– simplex and multiplex windings, lap and wave windings — use of laminated armature – E. M.F Equation. Armature reaction – Cross magnetizing and de-magnetizing– compensating winding –methods of improving commutation. Methods of Excitation –External and Internal characteristics of DC generator.

Unit : II	D.C MOTORS	No. of Classes: 12

Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Speed control of D.C. Motors - Armature voltage and field flux control methods. Motor starters (3-point and 4-point starters) - Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency.

Unit : III	TESTING OF DC MACHINES	No. of Classes: 12

Methods of Testing – direct, indirect, and regenerative testing – Brake test – Swinburne‟s test – Hopkinson‟s test – Field‟s test - separation of stray losses in a d.c. motor test.

Unit : IV	SINGLE PHASE TRANSFORMERS	No. of Classes:12

Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency & supply voltage on iron losses.

Unit : V	TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS	No. of Classes: 12

OC and SC tests - Sumpner‟s test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers. Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ.

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.

REFERENCE BOOKS:

1. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. Aahfag Husain, Harroon Asgfag, Electric Machines, Dhanpat Rai & Co. (P) Limited 2016

WEB REFERENCES:

1. https://nptel.ac.in/courses/electrical machines-I
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

EE305PC: ELECTROMAGNTIC FIELDS

B.TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE305PC	Core	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: Vector Algebra, Physics

Course Objectives:

1. To provide the basic skills required to understand the applications involving electromagnetic fields.
2. Understand the behavior of electrical materials in the presence of Electric fields
3. Understand the behavior of Magnetic materials in the presence of magnetic fields
4.. Define and derive expressions for the energy both for the electrostatic and magnetostatic fields,
5. Evaluate Maxwell's Equations for time-harmonic fields

Course Outcomes: At the end of the course, students will demonstrate the ability

1 To analyze the basic laws of electromagnetism.
2 To obtain the electric and magnetic fields for simple configurations under static conditions.
3 To analyze time varying electric and magnetic fields.
4 To apply Maxwell‟s equation in different forms and different media.
5 To analyze the propagation of EM waves.

Unit: I	Static Electric Field:	No. of Classes: 12

Review of conversion of a vector from one coordinate system to another coordinate system, Coulomb‟s law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

Unit: II	Conductors, Dielectrics and Capacitance	No. of Classes: 12

Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Capacitance of a two-wire line, Poisson‟s equation, Laplace‟s equation, Solution of Laplace and Poisson‟s equation.

Unit: III	Static Magnetic Fields and Magnetic Forces:	No. of Classes: 12

Static Magnetic Fields and Magnetic Forces: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors. Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions, Magnetic circuits, Self inductances and mutual inductances.

Unit: IV	Time Varying Fields and Maxwell’s Equations:	No. of Classes:12

Faraday‟s law for Electromagnetic induction, Displacement current, Point form of Maxwell‟s equation, Integral form of Maxwell‟s equations, Motional Electromotive forces.

Unit: V	Electromagnetic Waves	No.of Classes: 12

Derivation of Wave Equation, Uniform Plane Waves, Maxwell‟s equation in Phasor form, Wave equation in Phasor form, Plane wave in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors. Poynting theorem.

TEXT BOOKS:

1. "William H. Hayt & John. A. Buck, Engineering Electro magnetics" Mc. Graw-Hill Companies, 7th Editon.2009.
2. Matthew N.O Sadiku and S.V Kulkarni, Principles of Electromagnetics: Sixth Edition, Oxford Publications, 2015

REFERENCE BOOKS:

1. D J Griffiths, Introduction to Electro Dynamics -, Prentice-Hall of India Pvt. Ltd, 4th editon, 2015.
2. J P Tewari , Electricity & Magnetism-, Khanna Publishers, Kindle Edition, 2018.
3. S. Kamakshaiah, Electromagnetic fields - Right Publishers, 2007.
4. Matthew N.O sadiku, Computational Electromagnetics with MATLAB, Fourth Edition Hardcover – 2018

WEB REFERENCES:

1 . https://nptel.ac.in/courses/Electromagnetic Theory

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

EE306PC: ELECTRICAL MACHINES LAB-I

B.TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE306PC	Core	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite: Nil

Course Objectives:

1. The ability to conduct testing and experimental procedures on different types of electrical machines.
2. A chance to practice different types of wiring and devices connections.
3. The capability to analyze the operation of electric machines under different loading conditions
4. The ability to conduct testing and experimental procedures on transformers

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

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

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. Magnetization characteristics of DC shunt generator.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. test on DC compound generator.
5. Speed control of DC shunt motor.
6. Brake test on DC shunt motor.
7. Brake test on DC compound motor.
8. Swinburne‟s test on DC shunt machine
9. Hopkinson‟s tests on DC shunt machines.
10. Fields test on DC series machines.
11. Separation of losses in DC shunt motor.
12. Retardation test on DC shunt motor.
13. O.C. & S.C. Tests on Single phase Transformer
14. Sumpner‟s test on a pair of single phase transformers
15. Parallel operation of Single phase Transformers

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

1. Central control panel with 16 channels
2. Rectifier AC I/p 3 phase 440 V DC o/p 220V 100A, with boost and buck press button
3. D.C. Shunt Motor – Shunt Generator Set
4. DC Shunt Motor
5. D.C. shunt motor -D.C series generator Set
6. D.C. shunt motor -D.C compound generator Set
7. D. C compound motor
8. D.C Series Motor-D.C Series Generator Set
9. DC Shunt Motor -3-Φ Alternator Set
10. AC 3 phase Squirrel Cage Induction Motor
11. AC 3 phase Slipring Induction Motor
12. DC Shunt Motor- 3Φ Synchronous Motor
13. Single Phase Induction Motor
14. Three phase auto transformer 5KVA closed type
15. Transformer single phase 2 KVA i/p 220 V o/p 220 V --- 3 No‟s
16. Transformer single phase 3 KVA i/p 220 V o/p 220 V ---- 7 No‟s
17. Transformer single phase 1 KVA i/p 220 V o/p 220 V ----- 2 No‟s
18. Single phase auto transformer
19. Single phase auto transformer 8 A
20. Booster Transformer230V/0-50V, 15A
21. Single phase auto transformer 10 Amps
22. Rheostats
23. Voltmeters
24. Ammeters
25 Wattmeter‟s
26. Tachometers

E307PC: ANALOG ELECTRONICS LAB

B.TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE307PC	Core	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

Prerequisite: Semi-Conductor Physics

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

1. To understand know the characteristics, utilization of various components.
2. Design and analyze various rectifiers, small signal amplifier circuits.
3. To introduce components such as diodes, BJTs and FETs their switching characteristics, Applications.
4. To understand the biasing techniques.
5. To learn the concepts of high frequency analysis of transistors.
6. To give understanding of various types of basic and feedback amplifier circuits.
7. To design sinusoidal and non-sinusoidal oscillators.

List of Experiments: Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Common Emitter Amplifier Characteristics
4. Common Base Amplifier Characteristics
5. Common Source amplifier Characteristics
6. Measurement of h-parameters of transistor in CB, CE, CC configurations
7. Two stage RC coupled amplifier
8. Current Shunt Feedback amplifier
9. Voltage series feedback amplifier
10. RC Phase shift Oscillator
11. Wien bridge oscillator
12. Hartley & Colpitt's Oscillators
13. Class A power amplifier
14. Class B Complementary symmetry amplifier.

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

1. Regulated Power Suppliers,0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multi-metres
5. Electronic Components.

EE308PC: ELECTRICAL CIRCUITS LAB

B. TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
EE308PC	Core	0	0	2	1	30	70	100
Content Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			

Prerequisite: Basic Electrical Engineering, Electrical Circuits

Course Objectives:

The Student will

1. Understand the various network theorems
2. Understand the concept of RC/RL networks
3. Measure three phase powers.
4. Understand the verification of Transmission and Hybrid parameters in a Two -Port Network

Course Outcomes:

The Student will be able to

1. Apply mesh and nodal concepts.
2. Measure active power for star-delta connected balanced and unbalanced loads
3. Verfiy response of RC/RL networks.
4. Determine coefficient of coupling in a coupled circuit
5. Identify the Impedance and Admittance parameters in a Two -Port Network

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

1. Verification of Thevenin‟s and Norton‟s Theorem
2. Verification of Superposition
3. Verification of Reciprocity Theorem.
4. Verification of Maximum power Transform Theorem.
5. Verification of Compensation Theorem.
6. Time Response of first orders RC /RL network for periodic non-sinusoidal inputs -Time constant and steady state error determination.
7. Measurement of Active Powers for Star and Delta Connected Balanced and unbalanced Loads.
8. Measurement of Reactive Powers for Star and Delta Connected Balanced and unbalanced Loads.
9. Resonant frequency, Band width and Q-factor Calculation in Series and parallel Resonant Circuits.
10. Separation of Self, Mutual Inductance and Determine coefficient of coupling in a coupled circuit.
11. Analytical verification of Impedance and Admittance parameters in a Two -Port Network.
12. Analytical verification of Transmission and Hybrid parameters in a Two -Port Network.

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

1. RPS
2.Multimeter
3.Bread Broads
4.Trainer Kits
5. Mutual Inductance kit

MC309HS: GENDER SENSITIZATION LAB

B.TECH. II YEAR I SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MC309HS	MC	0	0	2	0	30	70	100
Contact Classes: 30	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 30		

COURSE DESCRIPTION:

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender- based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:

1. To develop students‟ sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

Course Outcomes:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit : I	UNDERSTANDING GENDER	No. of Classes: 06

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit : II	GENDER ROLES AND RELATIONS	No. of Classes: 06

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary.

Unit : III	GENDER AND LABOUR	No. of Classes: 06

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn"t Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human RightsGender and Mainstreaming

Unit : IV	GENDER - BASED VIOLENCE	No. of Classes:06

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit : V	GENDER AND CULTURE	No. of Classes: 06

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature-Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa ParksThe Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

- Classes will consist of a combination of activities: dialogue-based lectures,¬ discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".
- ESSENTIAL READING: The Textbook, "Towards a World of Equals: A Bilingual Textbook onX Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

MC310CS: FUNDAMENTALS OF DATA STRUCTURES

B.Tech. II Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MC310CS	MC	3	0	0	0	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: Mathematical Knowledge at pre-university level

Course Objectives: The course should enable the students to:

1. Learn the basic techniques of algorithm analysis.
2. Demonstrate searching and sorting algorithms and analyze their time complexities.
3. Implement linear data structures viz. stack, queue and linked list.
4. Demonstrate non-linear data structures viz. tree and graph traversal algorithms.

Course Outcomes:

1. Able to understand concepts of data structures.
2. To Implement the queues using Arrays
3. To analyze single linked list
4. Able to apply basic concepts of binary tree
5. To analyze M-Way search trees

Unit: I	INTRODUCTION TO DATA STRUCTURES, SEARCHING AND SORTING	No. of Classes: 09

Basic concepts: Introduction to data structures, classification of data structures, operations on data structures; Searching techniques: Linear search and Binary search; Sorting techniques: Bubble sort, selection sort, insertion sort and comparison of sorting algorithms.

Unit: II	LINEAR DATA STRUCTURES	No. of Classes: 09

Stacks: Primitive operations, implementation of stacks using arrays, applications of stacks arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Arrays, applications of linear queue, circular queue and double ended queue (deque).

Unit:: III	LINKED LISTS	No. of Classes: 09

Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation. Types of linked lists: Circular linked lists, doubly linked lists; Linked list representation and operations of Stack and Queue.

Unit:: IV	NON LINEAR DATA STRUCTURES	No. of Classes: 09

Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary tree variants, application of trees; Graphs: Basic concept, graph terminology, graph implementation, graph traversals, Application of graphs.

Unit:: V	BINARY TREES AND HASHING	No. of Classes: 09

Binary search trees: Binary search trees, properties and operations; Balanced search trees: AVL trees; Introduction to M-Way search trees, B trees; Hashing and collision: Introduction, hash tables, hash functions, collisions, applications of hashing.

Text Books:

1. Rance D. Necaise, "Data Structures and Algorithms using Python", Wiley, John Wiley & Sons, INC., 2011.
2. Benjamin Baka, David Julian, "Python Data Structures and Algorithms", Packt Publishing Ltd., 2017.

Reference Books:

1. S. Lipschutz, "Data Structures", Tata McGraw Hill Education, 1st Edition, 2008.
2. D. Samanta, "Classic Data Structures", PHI Learning, 2nd Edition, 2004.

Web References:

1. https://www.tutorialspoint.com/data_structures_algorithms/algorithms_basics.htm
2. https://www.codechef.com/certification/data-structures-and-algorithms/prepare
3. https://www.cs.auckland.ac.nz/software/AlgAnim/dsToC.html
4. https://online-learning.harvard.edu/course/data-structures-and-algorithms

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.