NRI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Permanently Affiliated to JNTUK, Kakinada)
(Accredited by NAAC with "A" Grade and ISO 9001:2015 Certified Institution)
POTHAVARAPPADU (V), (VIA) NUNNA, AGIRIPALLI (M), PIN – 521 212

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE FOR SECOND YEAR B.TECH PROGRAMME

II YEAR I SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A2100202	Complex Variables and Transform Techniques	3	-	-	3	40	60	100	3
2	18A2103302	Thermal and Hydraulic Prime Movers	3	-	-	3	40	60	100	3
3	18A2104301	Basic Electronic Devices and Circuits	3	-	-	3	40	60	100	3
4	18A2102401	Electrical Circuit Analysis- II	3	-	-	3	40	60	100	3
5	18A2102402	Electrical Machines – I	3	-	-	3	40	60	100	3
6	18A2103391	Thermal and Hydro Lab	-	-	3	3	40	60	100	1.5
7	18A2104391	Basic Electronic Devices and Circuits Lab	-	-	3	3	40	60	100	1.5
8	18A2102491	Electrical Circuits Lab	-	-	3	3	40	60	100	1.5
Total			**15**	**-**	**11**	**26**	**360**	**540**	**900**	**19.5**

II YEAR II SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A2200101	Managerial Economics and Financial Analysis	3	-	-	3	40	60	100	3
2	18A2202401	Electro Magnetic Fields	3	-	-	3	40	60	100	3
3	18A2202402	Control Systems	3	-	-	3	40	60	100	3
4	18A2202403	Electrical Machines – II	3	-	-	3	40	60	100	3
5	18A2202404	Power Systems - I	3	-	-	3	40	60	100	3
6	18A2202601 18A2202602	**Open Elective –I** 1) Electrical Materials 2) Control systems	3	-	-	3	40	60	100	3
7	18A2202491	Electrical Machines – I Lab	-	-	3	3	40	60	100	1.5
8	18A2202492	Control Systems lab	-	-	3	3	40	60	100	1.5
9	18A2200801	Professional Ethics and Human Values	2	0	0	2	40	60	100	0
Total			**20**	**-**	**6**	**26**	**360**	**540**	**900**	**21**

L - LECTURE T – TUTORIAL P - PRACTICAL
CIA – Continuous Internal Assessment SEA – Semester End Assessment

18A2100202- COMPLEX VARIABLES AND TRANSFORM TECHNIQUES

(MATHEMATICS-III)

Lecture – Tutorial:	1 – 2	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- To familiarize the techniques in complex variables
- To familiarize the techniques in fourier series.
- To familiarize the techniques in fourier transforms
- To familiarize the techniques in Z-transforms
- To equip the students to solve application problems in their disciplines.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	**Write** an analytic function if either real part or imaginary part is known and by **using** cauchy-riemann equations or **apply** milne-thompson method
CO2	**Evaluate** the integral of complex function over the region bounded by the closed curves by **apply** either cauchy-goursat theorem or cauchy's integral formula or cauchy's residue theorem
CO3	**Write** the infinite series expansion of complex function by **apply** taylor's/maclaurin's/laurent's series
CO4	**Write** a fourier series expansion of a periodic function by **using** euler's formulae
CO5	**Understand** the concept of fourier transform and its properties
CO6	**Solve** the difference equations using z-transforms and inverse z-transforms

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	**3**	**3**	**2**	**2**								
CO2	**3**	**3**	**2**	**2**								
CO3	**3**	**3**	**2**	**2**								
CO4	**3**	**3**	**2**	**2**								
CO5	**3**	**3**	**2**	**2**								
CO6	**3**	**3**	**2**	**2**								

UNIT I

Unit-1: Complex Variable – Differentiation & Integration

Complex function , Real and Imaginary parts of Complex function, Limit**,** Continuity and Derivative of complex function, Cauchy-Riemann equations, Analytic function, entire function, singular point, conjugate function**,** Harmonic functions, Milne-Thomson method**.**

Line integral of a complex function, Cauchy's theorem(only statement) , Cauchy's Integral Formula

UNIT II

Unit-2: Complex Variable- Series expansion, Residue Theorem & Evaluation of Real

Integrals

Absolutely convergent and uniformly convergent of series of complex terms, Radius of convergence**,** Taylor's series, Maclaurin's series expansion, Laurent's series.

Zeros of an analytic function, Singularity, Isolated singularity, Removable singularity, Essential singularity, pole of order m, simple pole, Residues, Residue theorem, Calculation of residues, Residue at a pole of order m**,** Evaluation of real definite integrals: Integration around the unit circle**,** Integration around semi circle.

UNIT III

Unit-3: Fourier Series and Transforms

Introduction, Eulers formula, conditions for Fourier expansion**,** Functions having points of discontinuity, change of interval, Odd and Even function-expansions, Half-range series**.**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties, Inverse transforms – Finite Fourier transforms.

UNIT IV

Unit-4: Z-Transforms .

Definition of Z-transform, elementary properties, linearity property, damping rule, shifting u_n to the right and left, multiplication by n, initial value theorem, final value theorem, Inverse Z-transform, convolution theorem, formation of difference equations, solution of difference equations using Z-transforms.

TEXT BOOKS:

1.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

REFERENCE BOOKS:

1. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, Mc-Graw Hill, 2004.
2.N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

E-RESOURCES:

1.www.nptelvideos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)

2.nptel.ac.in/courses/122104017

3.nptel.ac.in/courses/111105035

18A2103302- THERMAL AND HYDRO PRIMEMOVERS

Lecture – Tutorial:	1 – 2	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- To learn the working of Thermal and hydraulic prime movers.
- To understand the engine terminology and working principles of I.C Engines and Gas Turbines.
- To learn main features of Rankine cycle and its performance improvement methods and impulse, reaction turbines.
- To learn the properties of fluids and its measuring devices.
- To know the working of different types of pumps.
- To learn the basics of turbo machinery.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understanding the working of various internal combustion engine components and their working.
CO2	Describe the components and functioning of gas turbines.
CO3	Analyze the performance of steam turbines and gas turbines using principles of thermodynamics.
CO4	Understand the basic fundamentals of fluid mechanics
CO5	Analyze different types of working pumps.
CO6	Design& formulate the working parameters of Hydraulic machines.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO H	PO i	PO j	PO k	PO l
CO1	2	1	1	1		1	1					1
CO2	1	1	1	1		1	1					1
CO3	2	1	1	1		1	1					1
CO4	2	1	1	1		1						1
CO5	1	1	1	1		1						1
CO6	2	1	2	1		1	1					1

UNIT I

INTERNAL COMBUSTION ENGINES: Classification, Working Principles of Spark Ignition and Compression Ignition Engines – 4 Stroke and 2 Stroke Engines, – Valve and Port Timing diagrams– Parameters of Performance ,Engine Performance Evaluation.

GAS TURBINES: Introduction, Classification of Gas Turbines, Simple Gas Turbine Plant-Ideal Cycle, Closed Cycle -Open Cycle - Efficiency, Work Ratio and Optimum Pressure Ratio For Simple Gas Turbine Cycle and Basic Problems. Actual Cycle, Analysis Of Simple Cycles & Cycles With Inter Cooling, Reheating and Regeneration.

UNIT II

VAPOR POWER CYCLES: Properties of Steam And Use of Steam Tables- T-S and H-S Diagrams. Carnot Cycle- Rankine Cycle- Thermodynamic Variables Effecting Efficiency and Output of Rankine Cycle-. Analysis of Simple Rankine Cycle.

STEAM TURBINES: Introduction, Schematic Layout of Steam Power Plant - Classification of Steam Turbines- Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams For Simple Impulse and Reaction Turbines- Work Done & Efficiency.

UNIT III

FUNDAMENTALS OF FLUID MECHANICS: Introduction- Properties of Fluids - Pressure, Density, Specific Weight, Specific Gravity, Viscosity-Types of Fluid Flows.

IMPACT OF JETS AND PUMPS: Impulse Momentum Equation, Impact of Jet on Stationary and Moving Vanes (Flat). PUMPS: Types of Pumps, Centrifugal Pumps: Main Components, Working Principle, Multi Stage Pumps, Performance and Characteristic Curves.

UNIT IV

HYDRAULIC TURBINES: Classification of Turbines; Working Principle, Work done Efficiencies of Pelton Wheel, Francis and Kaplan Turbines; Governing of Pelton Wheel Characteristic Curves of Hydraulic Turbine.

HYDRO POWER: Components of Hydro Electric Power Plant: Pumped Storage Systems, Estimation of Water Power Potential.

TEXT BOOKS:

1. Thermal Engineering by Rajput, Lakshmi publications
2. Thermal engineering by M.L.Mathur and F.S.Mehta, Jain Brothers.
3. “Hydraulics & Fluid Mechanics”, P.N. Modi and S.M. Seth, TEXT BOOKS House, Delhi
4. “Fluid Mechanics & Hydraulic Machinery” A.K.Jain, , Khanna Publishers, Delhi.

REFERENCE BOOKS:

1. R.K.Bansal, ―Fluid Mechanics and Hydraulic Machines‖,laxmi publications.
2. Mahesh M. Rathode, Thermal Engineering, Tata McGraw-Hill, 5th Edition 2010.
3. “Fluid Mechanics & Its Applications”, Vijay Gupta, Santhosh.k.Gupta
4. “Fluid Mechanics & Fluid power Engineering, Dr D.S.Kumar

E-RESOURCES:

1. http://nptel.iitm.ac.in/video.php?subjectId=108102042

18A2104301- BASIC ELECTRONIC DEVICES AND CIRCUITS

Lecture – Tutorial:	1 – 2	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- The basic concepts of semiconductor physics are to be reviewed
- Study the physical phenomena such as conduction, transport mechanism electrical Characteristics of different diodes.
- The applications of diode as rectifiers with their operation and characteristics with and without filters.
- The principle of working and operation of bipolar junction transistors and field effect transistors and their characteristics are explained

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the basic concepts of semiconductor physics
CO2	Understand the formation of p-n junction and how it can be used as diode in different modes of operation
CO3	Know the construction ,working principles of rectifiers
CO4	Understands the working principles of rectifiers with and without filters
CO5	Understand the construction, principle of operation of BJT and their V-I characteristics.
CO6	Understand the construction, principle of operation of FET and their V-I characteristics.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO H	PO i	PO j	PO k	PO l
CO1	✓	✓	✓									
CO2		✓	✓		✓							
CO3	✓	✓			✓							
CO4		✓	✓	✓	✓							
CO5	✓	✓		✓	✓							
CO6	✓	✓	✓									

UNIT I

SEMICONDUCTOR PHYSICS:

Classification of materials using energy band diagrams, mobility and conductivity, intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, Hall effect, continuity equation, Fermi level in intrinsic and extrinsic semiconductors

PN JUNCTION DIODE:

P-N junction diode, biasing in PN junction Diode, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance

UNIT II

SPECIAL SEMICONDUCTOR DIODES:

Zener Diode, Zener breakdown and Avalanche breakdown mechanisms, LED, Photo diode, Tunnel Diode, Varactor diode, SCR, UJT.

UNIT III

RECTIFIERS:

Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, Analysis of rectifiers, comparison of rectifiers

FILTERS:

Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L- section and Multiple Π section filter , comparison of various filter circuits in terms of ripple factors.

UNIT IV

BIPOLAR JUNTCION TRANSISTOR:

Junction transistor, transistor current components, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through, Photo transistor.

FIELD EFFECT TRANSISTOR:

FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

TEXT BOOKS:

1) Jacob Millman, Christos C.HalkiasAnd SatyabrataJit, Electronic Devices And Circuits, McGraw Hill, 3rdEdition , 2010.
2) S. Salivahanan, N. Kumar And A. Vallavaraj, Electronic Devices And Circuits, McGraw Hill, 2rd Edition , 2007**.**

REFERENCE BOOKS:

1) R.L.BoylestadAndLouis Nashelsky, Electronic Devices And Circuits, Pearson/Prentice Hall Publishers.
2) David A.Bell, Electronic Devices And Circuits, Oxford University Press, 5th Edition, 2008.
3) Micro Electronic Circuits, Sedra Smith, Oxford Press, India(5/E), Oxford, 2004
4) Electronic Devices And Circuits- K.SatyaPrasad , VgsBooklinks

E-RESOURCES:

1. http://nptel.iitm.ac.in/video.php?subjectId=108102042

2. http://freevideolectures.com/Course/2350/Networks-Signals-and-Systems/33

18A2102401- ELECTRICAL CIRCUIT ANALYSIS-II

Lecture – Tutorial:	3-1 Hours	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:

None

Course Objectives:

- To study the concepts of balanced three-phase circuits.
- To analyze 3-phase circuits with unbalanced loading.
- To determine the transient response of R-L, R-C, R-L-C Series circuits with ac and dc excitation
- To determine the solution using differential equations and Laplace transforms
- To calculate the parameters for a given two port network.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the basic concepts of three phase electrical circuits
CO2	Measure the power in balanced three phase circuits.
CO3	Understand the basic concepts of three phase electrical circuits
CO4	Measure the power in Unbalanced three phase circuits.
CO5	Determine the transient response of R-L, R-C, R-L-C Series circuits with ac and dc excitation
CO6	Calculate the parameters for a given two port network

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	**3**	**2**	**2**									
CO2	**2**	**2**										
CO3	**3**	**3**	**2**									
CO4	**2**	**3**										
CO5	**3**	**2**										
CO6	**3**	**2**										

UNIT I

Balanced Three Phase Circuits :

Generation of 3-phase alternating emf, Phase sequence, star and delta connection, Relation between line and phase voltages and currents in balanced systems, Analysis of balanced three phase circuits, Measurement of Active and Reactive power in balanced three phase systems, Two Wattmeter method of measurement of three phase power.

UNIT II

Unbalanced Three Phase Circuits:

Analysis of Three phase unbalanced circuits-Loop Method-Application of Millman's Theorem-

Star Delta transformation Technique-Measurement of Active and Reactive power in unbalanced three phase systems.

UNIT III

Transient Analysis for DC Excitation:
Transient response of R-L, R-C, R-L-C series circuits for DC Excitation, initial conditions-solution method using differential equation and Laplace transforms.

Transient Analysis for AC Excitation :
Transient response of R-L, R-C, R-L-C series circuits for sinusoidal Excitation, initial conditions-solution method using differential equation and Laplace transforms.

UNIT IV

Two Port Networks :
Two port network parameters-Z,Y,ABCD and hybrid parameters and their relations, connection of Two Port Networks-series, parallel and cascaded connections.

TEXT BOOKS:

1. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
2. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill
3. Electric Circuits by N.Sreenivasulu, REEM Publications Pvt. Ltd., 201
4. Network Analysis 3rd Edition, M.E Van Valkenberg, PHI.

REFERENCE BOOKS:

1. Circuit Theory by A.Chakrabarti Danapat Rai & Co publisher.
2. Network Analysis by N.C.Jagan, C.Lakshmi Narayana BS publications 2nd edition

3000 Solved Problems in Electrical Circuit by Schaum's solved problem series Tata McGraw-Hill.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

18A2102402- ELECTRICAL MACHINES - I

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:

None

Course Objectives:

- To teach principles of magnetic circuits and electromechanical energy conversion
- To make students to learn construction and operation of dc machines
- To train students to conduct tests on dc machines to determine performance by direct and indirect methods
- To train students to find the performance of transformers from the results of practical tests

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Analyze the basic operation of DC generators, their armature reaction.
CO2	Analyze the conditions required for analyzing the performance of dc generators
CO3	Analyze the operation of dc motors & the necessity of starters.
CO4	Determine the performance of testing of dc motors.
CO5	Determine the voltage regulation and efficiency of single phase transformer from test results
CO6	Determine the operation of a poly phase transformers and their parallel operation.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	**3**	**2**										
CO2	**2**	**3**										
CO3	**3**	**3**										
CO4	**2**	**3**										
CO5	**3**	**3**										
CO6	**3**	**3**										

UNIT I

DC Generators :

Constructional details of dc machine, armature windings and its types, Emf equation, armature reaction, effect of brush lead, demagnetizing and cross magnetizing ampere turns, compensating windings, commutation, EMF induced in a coil undergoing commutation, time of commutation, methods of improving commutation, OCC and load characteristics of different types of generators, Parallel operation of DC shunt and series Generators, equalizing connections

UNIT II

DC Motors

Force on current carrying conductor-Torque and power developed by armature, speed control of dc motors, starting of dc motors, constructional details of 3-point and 4-point starters, load characteristics of dc motors, Losses in dc machine, condition for maximum efficiency

Testing of dc machines: Swinburne's Test, Brake Test, Hopkinson's Test, Field's Test, Retardation Test, Separation of iron and frictional losses

UNIT III

Transformers

Principle, construction and operation of single-phase transformer, phasor diagram, equivalent circuit, voltage regulation, losses and efficiency Testing-open circuit and short ciruit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses

UNIT IV

Parallel Operation of Transformers: Parallel operation of single-phase transformers, Auto transformers-construction, principle, applications and comparison withtwo winding transformer.

Three-phase transformer-construction, types of connection and their comparative features, Phase conversion-Scott connection, three-phase to six-phase conversion.

TEXT BOOKS:

I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
4. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering- /

18A2103391-THERMAL AND HYDRO LAB

Lecture – Tutorial:	3-0	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

List of experiments

Minimum Of 12 Experiments By Conducting A Minimum Of Six From Each Section.

SECTION: A - THERMAL ENGINEERING LAB

1. I.C. Engines Valve & Port Timing Diagrams.
2. Performance Test on single cylinder 4 -Stroke Diesel Engine.
3. I.C. Engines performance test on 2-stroke petrol engine.
4. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine
5. Heat Balance of 4 stroke single cylinder diesel engine.
6. Economical speed test of an IC engine
7. Study of boilers

SECTION: B – HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Reciprocating Pump.
7. Calibration of Venturimeter.
8. Calibration of Orifice meter.

18A2104391 -BASIC ELECTRONIC DEVICES AND CIRCUITS LAB

Lecture – Tutorial:	3-0	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

List of experiments

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

Electronic Workshop Practice:

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Study and operation of Ammeters, Voltmeters, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. P-N Junction Diode Characteristics
   - Part A: Germanium Diode (Forward bias& Reverse bias)
   - Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
   - Part A: V-I Characteristics
   - Part B: Zener Diode as Voltage Regulator
3. Half-wave Rectifier (without and with c-filter)
4. Full-wave Rectifier (without and with c-filter)
5. BJT Characteristics(CB Configuration)
   - Part A: Input Characteristics
   - Part B: Output Characteristics
6. BJT Characteristics(CE Configuration)
   - Part A: Input Characteristics
   - Part B: Output Characteristics
7. BJT Characteristics(CC Configuration)
   - Part A: Input Characteristics
   - Part B: Output Characteristics
8. FET Characteristics(CS Configuration)
   - Part A: Drain Characteristics
   - Part B: Transfer Characteristics
9. SCR Characteristics
10. UJT Characteristics
11. Transistor Biasing
12. CRO Operation and its Measurements

Equipment required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

18A2102491- ELECTRICAL CIRCUITS LAB

Lecture – Tutorial:	3-0	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

List of experiments

1. Verification of Superposition & Reciprocity Theorems.
2. Verification of Thevenin's and Norton's Theorems.
3. Verification of Maximum Power Transfer Theorem.
4. Verification of Compensation & Millman's Theorems.
5. Z and Y Parameters.
6. Transmission and hybrid parameters.
7. Verification of KCL & KVL.
8. Determination of Self, Mutual Inductances and Coefficient of coupling.
9. Measurement of Active Power for Star connected balanced loads
10. Measurement of Reactive Power for Star connected balanced loads.

The following experiments are to be conducted beyond the syllabus:

11. Measurement of Power Factor by using PF Meter.
12. Dielectric Oil Testing using HT Testing kit.

18A2200101- MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- To enhance the knowledge of the students regarding importance of management and Managerial problems with optimum solutions and demand forecasting methods.
- To develop the concepts viz., consumer behavior and demand concept.
- To provide the knowledge regarding production and cost and break even analysis.
- To share the concepts like market structures and business organization.
- To provide awareness regarding capital budgeting decisions & give an idea of practicing technique of ratio analysis.
- To introduce the concepts- Financial Accounting.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Use the theory of managerial economics, demand, production analysis and forecasting theories.
CO2	Analyse of production markets and pricing strategies. Functions and cost-price functions to manage markets & break-even point.
CO3	Develop ability to identify, formulate and solve engineering problem by applying the knowledge of managerial economics.
CO4	Theorize about characteristics features and types of industrial organization, concept of changing business environment in post-liberalization scenario.
CO5	Enhance their capabilities in the interpretation of b/s that are followed in industries, organizational and industries.
CO6	Apply financial analysis, capital budgeting techniques in evaluating various investment opportunities.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	**PO b**	**PO c**	**PO d**	**PO e**	**PO f**	**PO g**	**PO h**	**PO i**	**PO j**	**PO k**	**PO l**
CO1	**1**											
CO2		**1**										
CO3	**2**	**2**	**1**									
CO4			**1**				1					
CO5	**1**		**1**			**2**						
CO6	**1**				1						1	

UNIT I

Introduction to Managerial Economics and Demand Analysis

Nature and scope of managerial economics & its relationship with other subjects concept of demand, Determinants of demand-law of demand &its limitations Elasticity of demand Types of measurements-Demand forecasting and methods.

UNIT II

Cost Analysis & Introduction to Markets

Different cost concepts: Opportunity costs, Explicit & Implicit costs, Fixed & Variable costs Average & Marginal, Short run & Long run costs, Break Even Analysis(Simple Problems), market-nature and

types-monopolistic competition and oligopoly.

UNIT III

Types of Business Organization & Business Cycles

Features and Evaluation of sole Trader, Partnership, Joint Stock company & Co-operative Societies. Business Cycles: Meaning & features of Business cycles-Phases & control of Business cycles-concept of money and money supply, Functions of Commercial banks and RBI credit control methods of RBI

UNIT IV

Introduction to Accounting and Financial Analysis

Introduction to Double entry system, Journal, Ledger, Trial balance & Final Accounts

Financial Analysis

Ratio Analysis-Need & significance(Simple Problems) Capital budgeting Meaning & importance-Methods of Capital Budgeting: payback period, ARR(Accounting Rate of Return), NPV(Net Present Value)(Simple Problems)

Text book:

1. Dr. A.R. Aryasri-Managerial Economics and Financial Analysis TMH 2011.
2. Dr. N. Appa Rao, Dr. P. Vijay Kumar: Managerial Economics and Financial Analysis carigage publications, New Delhi-2011.
3. Prof J.V. Prabhakara Rao, Prof. P. Venkat Rao, Managerial Economics and Financial Analysis.

References:

1.V. Maheswari Managerial Economics Sultan Chand. 2014.
2. Dr. B. Kuberudu and Dr. T. V. Ramana:managerial economics and Financial Analysis, Himalaya publishing House, 2014.
3. Suma Damodaran: Managerial Economics, Oxford, 2011.
4. Maheswari:Financial Accounting, Vikas Publications.
5. Shailaja, Gajjala and Usha Munipalle, Universities press, 2015
6. Banking Law and Practise, Gordan and Mithani, Himalaya Publications

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering- /

18A2202401-ELECTRO MAGNETIC FIELDS

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- Understand the laws concerning Static Electric Fields, Equations concerned with static electric fields.
- Explain the behavior and comparison of conductors and dielectrics.
- Understand the laws of magnetic fields, Ampere's law and Maxwell's Equations.
- Calculate the MFI for a current carrying wire.
- Determine the Self and Mutual Inductance of a Solenoid and Toroid.
- Solve the energy stored and energy density in static electric and magnetic fields, Electric Dipole, Dipole Moment.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the concerned laws of Electro Statics.
CO2	Understanding and analyzing the behavior of conductors and dielectrics.
CO3	Understand the concerned laws of Magneto Statics and basic concepts of Magnetic Fields.
CO4	Solve the MFI for a current carrying wire.
CO5	Identify the need of Self and Mutual Inductance.
CO6	Understand the time varying fields.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	**3**	**2**										
CO2	**3**	**2**										
CO3	**3**	**2**										
CO4	**3**	**3**										
CO5	**3**	**2**										
CO6	**3**	**2**	**2**	**2**								

UNIT I

ELECTROSTATICS -I

Review of vector calculus, Cartesian, cylindrical and spherical co-ordinate systems. Coulomb's law - Electric field due to different charge distributions - Electric flux and flux density - Gauss's Law - Applications of Gauss's Law - Divergence - Maxwell's first Law, Laplace's and Poison's equations - Solution of Laplace's equation in one variable, Electric Dipole - Dipole Moment - Potential and Electric Field due to Dipole - Torque on an Electric Dipole in an Electric field

UNIT II

CONDUCTORS AND DIELECTRICS: Behavior of conductors in an electric field, Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity, concept of Polarization, Electric field inside dielectric material, Capacitance - Capacitance of parallel plate – Spherical - Co-axial capacitors with Composite Dielectric.

UNIT III

MAGNETOSTATICS :Static magnetic fields - Biot-Savart's law -Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0. Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc.

UNIT IV

INDUCTANCE AND TIME VARYING FIELDS: Self and Mutual inductance – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

TIME VARYING FIELDS :Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-∂B/∂t – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem

Text books:

1. "Engineering Electromagnetics" by William H. Hayt& John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.
2. Electro Magnetic Fields and Transmission Lines by G.S.N. Raju

References:

1. "Principles of Electro Magnetics" by Sadiku, Oxford Publications,4th edition
2. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd edition
3. "Electromagnetic Field Theory" by Yaduvir Singh,Pearson.
4. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher Education.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering- /

18A2202402-CONTROL SYSTEMS

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:
Learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function
Study the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers
Study the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.
Present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.
Learn basic aspects of design of linear control systems using Bode plots.
Study state models & analyze the systems and to present the concepts of Controllability & Observability

Course Outcomes:	
Upon successful completion of the course, the student will be able to:	
CO1	Understand Closed/Open Loop Control Systems, derive the transfer function of physical systems and determine overall transfer function using block diagram algebra & signal flow graph reduction techniques
CO2	Study different types of standard test signals, find the output response of first and second order systems, determine time response specifications of second order systems and determine steady state error along with error constants
CO3	Acquire the skill to analyze absolute and relative stability of LTI systems using Routh-Hurwitz stability criterion and the Root Locus Plot
CO4	Analyze the stability of LTI systems using frequency response methods using Bode plots & Polar Plots.
CO5	Analyze the stability of LTI systems using frequency response methods using Nyquist Plots
CO6	Represent physical systems by State Transition Matrices based state space modeling and determine the output response by understanding the concepts of controllability and observability

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	3	2										
CO2	3	2										
CO3	2	2										
CO4	3	3		2								
CO5	3	2	2	2								
CO6	2			3								

UNIT I

Introduction to Control Systems Components

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer function.

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering -Block diagram algebra – Representation by Signal flow graph - Reduction is using Mason's gain formula.

UNIT II

Time Response Analysis

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Introduction to P, PI, PD and PID controllers.

UNIT III

Stability Analysis in S-Domain

The concept of stability – Routh's stability , limitations ,Routh-Hurwitz criterion – qualitative stability and conditional stability.

Root Locus Technique: 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

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram- Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots- Nyquist Plots- Stability Analysis.

State Space Analysis of Continuous Systems

Concept of state, state variables and state model, derivation of state models from physical systems (Electrical), solving the Time invariant state Equations- State Transition Matrix and its Properties – Concepts of Controllability and Observability.

Text books:

1. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India,2nd Edition.

References:

1.Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2.Control Systems, ManikDhanesh N, Cengage publications.
3.Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition.
4. Control Systems Engineering, S.Palani,TataMcGraw Hill Publications.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering- /

18A2202403-ELECTRICAL MACHINES -II

(AC Machines**)**

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- Understand the principle of operation and performance of induction machines.
- Quantify the starting methods of induction machines
- To understand the torque producing mechanism of a single phase induction motor.
- To understand the construction and principle of synchronous generators.
- To understand the construction and operation of synchronous motor.
- To analyze the performance of synchronous motor.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the constructional details and principle of operation of induction machines
CO2	Understand the starting methods of induction machines
CO3	Understand the operation of constructional features and principle of operation of single phase induction motors.
CO4	Understand the constructional details and principle of operation of synchronous generators.
CO5	Analyze the construction and principle of operation of synchronous motor.
CO6	Analyze the performance of the synchronous motor and its operation

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	**1**	**3**	**3**		**3**		**3**					
CO2	**2**	**3**			**3**		**3**					
CO3	**2**	**3**	**3**		**3**		**3**					
CO4	**1**	**3**	**3**		**3**		**3**					
CO5	**2**	**3**					**3**					
CO6	**2**	**3**	**3**		**3**							

UNIT I

Induction Machines

Construction, principle of operation, Types (squirrel cage and slip-ring), Torque Slip Characteristics, Starting and Maximum Torque. Equivalent circuit. Phasor Diagram, Losses and Efficiency. Effect of parameter variation on torque speed characteristics (variation of rotor and stator resistances, stator voltage, frequency).

UNIT II

Starting methods of Induction machines

Methods of starting, braking and speed control for induction motors. Generator operation. Self-excitation. Doubly-Fed Induction Machines.

Single-phase induction motors

Constructional features, double revolving field theory, cross field theory, equivalent circuit,

determination of parameters. Split-phase starting methods and applications

UNIT III

Synchronous generators

Constructional features, principle of operation, types (Salient &Non-salient) synchronous machine – generated EMF, Effects of Harmonics of generated EMF-phasor diagram, armature reaction, synchronous impedance, voltage regulation. Salient pole machine – two reaction theory, analysis of phasor diagram, power angle characteristics. Parallel operation of alternators – synchronization

UNIT IV

Synchronous motors Principle of operation, methods of starting , Phasor diagram of synchronous motor, variation of current and power factor with excitation , Predetermination of V and inverted V curves, Hunting and use of damper bars, Synchronous condenser and power factor correction, Excitation and power circles.

Text books:

1. I.J.Nagrath and D.P. Kothari, — Electric Machines||, Tata McGrawHill Education Private Limited Publishing Company Ltd, 4th Edition, 2010.
2. AshfaqHusain, ||Electric Machines", Dhanpat Rai & Co.(Pvt.) Ltd, 2nd Edition, 2009

References:

1. Dr.P.S.Bhimbra, —Electrical Machinery", Khanna Publications, 7th Edition, 2007.
2. A.E Fitzgerald and Charles Kinsley, ‗Electric Machinery', Tata McGraw- Hill Education Publications, 6th Edition, 2002.
3. Alexander S.Langsdorf, —Theory of Alternating- Current Machinery" Tata McGraw- Hill Publications, 2001.
4. J.B Gupta, —Theory & Performance of Electrical Machines", S.K.Kataria & Sons, 15th Edition,2015

E-RESOURCES:

1. http://nptel.ac.in/courses/108105017
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering- /

18A2202404-POWER SYSTEMS-I

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:
Study the principle of operation and different components of a thermal power stations.
Study the principle of operation and different components of a Nuclear power stations.
Study the principle of operation and different components of hydel power stations and their classification.
Study the principle of operation and different components of gas power stations.
Study the constructional and operation of different components of substations and their classification.
Learn different types of load curves and tariffs applicable to consumers.

Course Outcomes:	
Upon successful completion of the course, the student will be able to:	
CO1	Identify the different components of thermal power plants and principle of operation.
CO2	Identify the different components of nuclear Power plants and their principle of operation.
CO3	Identify the different components of hydel power plants and their classification and principle of operation
CO4	Identify the components of gas power station and their principle of operation.
CO5	Identify different components of substation and their classification.
CO6	Calculate the different tariffs applicable to consumers.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	3		3			2						
CO2	3		3			2						
CO3	3		1			2						
CO4	3		1			2						
CO5	2		2			1						
CO6	3	2				1						

UNIT I

Thermal Power Stations

Single line diagram of Thermal Power Station showing paths of coal, steam, water, air, ash and flue gasses-Brief description of TPS components: Economizers, Boilers, super heaters, Turbines, condensers, chimney and cooling towers

Nuclear Power Stations:

Working principle, Nuclear fuels. Nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding

UNIT II

Hydel and Gas Power Stations

Selection of site, block diagram approach of hydro electric power plant and classification of hydro electric power plants. Gas power stations: principle of operation and components (block diagram approach only)

UNIT III

Substations

Classification of substations, Indoor & Outdoor substations, Substations layout showing the location of all the substation equipment- Bus bar arrangements in the Sub-Stations and their classification. Advantages of Gas insulated substations.

UNIT IV

Economic Aspects of Power Generation:

Load curve, load duration and integrated load duration curves, Discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor, utilization factor, plant use factors- Numerical Problems. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs.

Tariff Methods

Desirable Characteristics of a Tariff Method. Tariff Methods: Simple rate, Flat 0Rate, Block-Rate, two-part, three –part, and power factor tariff methods.

Text book:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagarand A. Chakrabarti, DhanpatRai& Co. Pvt. Ltd.
2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers.

References:

1.Electrical Power Distribution Systems by - V. Kamaraju, TataMcGraw Hill, New Delhi.
2. Elements of Electrical Power Station Design by – M V Deshpande, PHI, New Delhi.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering- /

OPEN ELECTIVE-I

18A2202602-CONTROL SYSTEMS

Lecture – Tutorial:	3 – 0	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:
Learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function
Study the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers
Study the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.
Present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.
Learn basic aspects of design of linear control systems using Bode plots.
Study state models & analyze the systems and to present the concepts of Controllability & Observability

Course Outcomes:	
Upon successful completion of the course, the student will be able to:	
CO1	Understand Closed/Open Loop Control Systems, derive the transfer function of physical systems and determine overall transfer function using block diagram algebra & signal flow graph reduction techniques
CO2	Study different types of standard test signals, find the output response of first and second order systems, determine time response specifications of second order systems and determine steady state error along with error constants
CO3	Acquire the skill to analyze absolute and relative stability of LTI systems using Routh-Hurwitz stability criterion and the Root Locus Plot
CO4	Analyze the stability of LTI systems using frequency response methods using Bode plots & Polar Plots.
CO5	Analyze the stability of LTI systems using frequency response methods using Nyquist Plots
CO6	Represent physical systems by State Transition Matrices based state space modeling and determine the output response by understanding the concepts of controllability and observability

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	**PO b**	**PO c**	**PO d**	**PO e**	**PO f**	**PO g**	**PO h**	**PO i**	**PO j**	**PO k**	**PO l**
CO1	**3**	**2**										
CO2	**3**	**2**										
CO3	**2**	**2**										
CO4	**3**	**3**		**2**								
CO5	**3**	**2**	**2**	**2**								
CO6	**2**			**3**								

UNIT I

Introduction to Control Systems Components

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer function.

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering -Block diagram algebra – Representation by Signal flow graph - Reduction is using Mason's gain formula.

UNIT II

Time Response Analysis

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Introduction to P, PI, PD and PID controllers.

UNIT III

Stability Analysis in S-Domain

The concept of stability – Routh's stability , limitations ,Routh-Hurwitz criterion – qualitative stability and conditional stability.

Root Locus Technique: 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

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram- Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots- Nyquist Plots- Stability Analysis.

State Space Analysis of Continuous Systems

Concept of state, state variables and state model, derivation of state models from physical systems (Electrical), solving the Time invariant state Equations- State Transition Matrix and its Properties – Concepts of Controllability and Observability.

Text books:

1. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India,2nd Edition.

References:

1.Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2.Control Systems, ManikDhanesh N, Cengage publications.
3.Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition.
4. Control Systems Engineering, S.Palani,TataMcGraw Hill Publications.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering- /

18A2202491- ELECTRICAL MACHINES-I LAB

Lecture – Tutorial:	3-0	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

LIST OF EXPERIMENTS

The following experiments are to be conducted as compulsory:

1. Swinburne's test and Predetermination of efficiencies as Generator and Motor.
2. Brake test on DC shunt motor. Determination of performance curves.
3. Speed control of DC shunt motor by Field and armature Control.
4. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. OC & SC Tests on Single Phase Transformer.
7. Sumpner's Test on a pair of Single Phase Transformers.
8. Scott Connection of Transformers.
9. Parallel Operation of Single Phase Transformers.
10. Separation of core losses of a Single Phase Transformer.

The following experiments are to be conducted beyond the syllabus:

11. Separation of losses in DC Shunt Motor.
12. Load test on DC Series motor.

18A2202492-CONTROL SYSTEMS LAB

Lecture – Tutorial:	3-0	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

LIST OF EXPERIMENTS

Any 10 of the following experiments are to be conducted:

1. Time response of Second order system

2. Characteristics of Synchros

3. Programmable logic controller – characteristics of stepper motor

4. Effect of feedback on DC servo motor

5. Effect of P, PD, PI, PID Controller on a second order systems

6. Lag and lead compensation – Magnitude and phase plot

7. DC position control system

8. Transfer function of DC motor

9. Temperature controller using PID

10. Characteristics of magnetic amplifiers

11. Characteristics of AC servo motor

12. Characteristics of DC servo motor

13. Potentiometer as an error detector

18A2200801- PROFESSIONAL ETHICS AND HUMAN VALUES

Lecture – Tutorial:	2 – 0	**Internal Marks:**	40
Credits:	0	**External Marks:**	60

Course Objectives:

- To create awareness on engineering ethics and human values.
- To understand social responsibility of an engineer.
- To instill moral and social values and loyalty.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Grooms themselves as ethical, responsible and societal beings.
CO2	Discuss ethics in society and apply the ethical issues related to engineering.
CO3	Exhibit the understanding of ethical theories in professional environment.
CO4	Recognize their role as social experimenters (engineers) and comprehend codes of ethics.
CO5	Identify the risks likely to come across in the professional world, analyzing them and find solutions.
CO6	Realize the responsibilities and rights of engineers in the society.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1						**1**	**1**	**2**				**1**
CO2						**1**	**1**	**2**				**1**
CO3						**1**	**1**	**2**				**1**
CO4						**1**	**1**	**2**				**1**
CO5						**1**	**1**	**2**				**1**
CO6						**1**	**1**	**2**				**1**

UNIT I

Human Values: Objectives, Morals, Values, Ethics, Integrity, Work ethics, Service learning , Virtues, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time,Cooperation, Commitment, Empathy, Self-confidence, Challenges in the work place.

UNIT II

Engineering ethics :Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III

Engineering as Social Experimentation: Engineering as experimentation, Engineers as responsible experimenters, Codes of ethics, Industrial standards, A balanced outlook on law,

Case study: The challenger.

UNIT IV

Safety, Responsibilities and Rights: Safety and risk, types of risks, Assessment of safety and risk, Safe exit, Risk-benefit analysis, safety lessons from 'the challenger' , Case study: Power plants, Collegiality and loyalty, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, whistle blowing, Intellectual property rights, professional rights.

Text books:

- A Text book on Professional Ethics and Human Values by R.S Naagarazan- New Age International Publishers.
- " Engineering Ethics includes Human Values" by M. Govindarajan, S. Natarajan and V. S. Senthil Kumar- PHI Learning Pvt. Ltd-2009

References:

"Professional Ethics and Human Values" by A. Alavudeen, R. Kalil Rahman and M. Jayakumaran- Laxmi Publications.

E-RESOURCES:

- www.onlineethics.org
- www.nspe.org
- www.globalethics.org
- www.ethics.org