JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.TECH. ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE & SYLLABUS (2016 - 17)

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	C edits
1	MA301BS	Mathamatics – IV	4	1	0	4
2	EE302ES	Electromagnetic Fields	4	1	0	4
3	EE303ES	Electrical Machines-I	4	1	0	4
4	EE304ES	Network Theory	3	0	0	3
5	EE305ES	Electronic Circuits	3	0	0	3
6	EE306ES	Electrical Machines Lab - I	0	0	3	2
7	EC306ES	Electronic Devices & Circuits Lab	0	0	3	2
8	EE307ES	Networks Lab	0	0	3	2
9	*MC300ES	Environmental Science and Technology	3	0	0	0
		Total Credits	**21**	**3**	**9**	**24**

II YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	EC401ES	Switching Theory & Logic Design	3	1	0	3
2	EE402ES	Power Systems - I	4		0	4
3	EE403ES	Electrical Machines – II	4	1	0	4
4	EE404ES	Control Systems	4	1	0	4
5	SM405MS	Business Economics and Financial Analysis	3	0	0	3
6	EE406ES	Control Systems Lab	0	0	3	2
7	EE407ES	Electrical Machines Lab - II	0	0	3	2
8	EE408ES	Electronic Circuits Lab	0	0	3	2
9	*MC400HS	Gender Sensitization Lab	0	0	3	0
		Total Credits	**18**	**4**	**12**	**24**

MA301BS: MATHEMATICS - IV
(Complex Variables and Fourier Analysis)

B.Tech. II Year I Sem.   **L T P C 4 1 0 4**

Prerequisites: Foundation course (No Prerequisites)**.**

Course Objectives: To learn

differentiation and integration of complex valued functions

evaluation of integrals using Cauchy's integral formula

Laurent's series expansion of complex functions

evaluation of integrals using Residue theorem

express a periodic function by Fourier series and a non-peri dic functi n by F urier transform

to analyze the displacements of one dimensional wave and distribution of one dimensional heat equation

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

analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem

find the Taylor's and Laurent's series expansion of complex

functions the bilinear transformation

express any periodic function in term of sines and cosines

express a non-periodic function as integral representation

analyze one dimensional wave and heat equation

UNIT – I
Functions of a complex variable: Introduction, Continuity, Differentiability, Analyticity, properties, Cauchy, Riemann equations in Cartesian and polar coordinates**.** Harmonic and conjugate harmonic functions-Milne-Thompson method

UNIT - II
Comp ex integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula, and Genera ized Cauchy's integral formula, Power series: Taylor's series- Laurent series, Singu ar points, isolated singular points, pole of order m – essential singularity, Residue, Cauchy Residue theorem (Without proof).

UNIT – III
Evaluation of Integrals: Types of real integrals:

(a) Improper real integrals $f(x)dx$ (b) $\int_{c}^{c2} f(\cos, \sin)d$

Bilinear transformation- fixed point- cross ratio- properties- invariance of circles.

UNIT – IV

Fourier series and Transforms: Introduction, Periodic functions, Fourier series of periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half range sine and cosine series.

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

UNIT – V

Applications of PDE: Classification of second order partial differential equations, method of separation of variables, Solution of one dimensional wave and heat equations.

TEXT BOOKS:
1. A first course in complex analysis with applications by Dennis G. Zill and Patrick Shanahan, Johns and Bartlett Publishers.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.
3. Advanced engineering Mathematics with MATLAB by Dean G. Duffy

REFERENCES:
1. Fundamentals of Complex Analysis by Saff, E. B. and A. D. Snider, Pearson.
2. Advanced Engineering Mathematics by Louis C. Barrett, McGraw Hill.
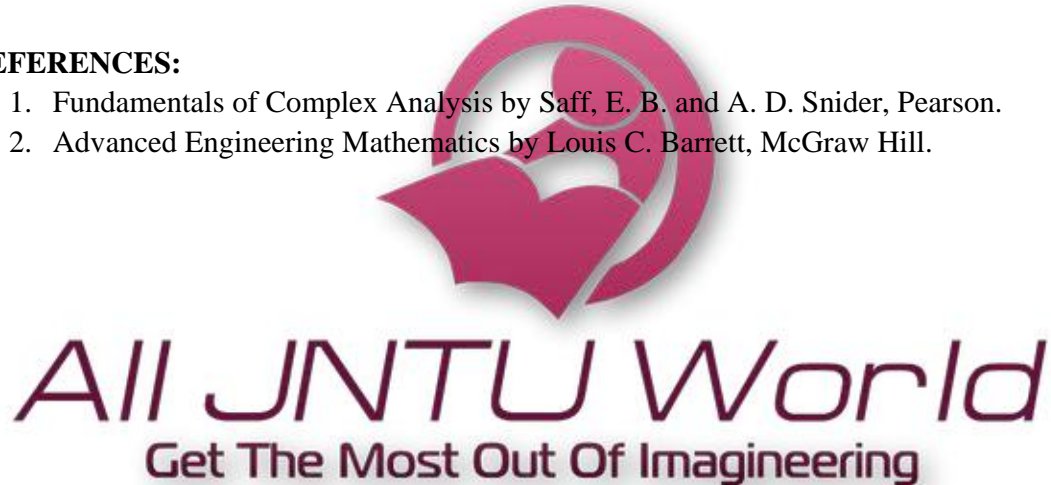
EE302ES: ELECTROMAGNETIC FIELDS

B.Tech. II Year I Sem.   **L T P C 4 1 0 4**

Prerequisite: Mathematics II & Physics II

Course Objectives:

To introduce the concepts of electric field, magnetic field.
Applications of electric and magnetic fields in the development of the theo y for power transmission lines and electrical machines.

Course Outcomes: upon completion of course, student will be able to

Apply vector calculus to static electric – magnetic fields.
Compute the force, fields & Energy for different charge & current c nfigurati ns & evaluate capacitance and inductance
Analyze Maxwell's equation in different forms (Differential and integral) in Electrostatic, Magnetic time varying fields

UNIT – I

Electrostatics: Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law, div (D)= v – Laplace's and Poison's equations – Solution of Laplace's equation in one variable. Electric dipole – Dipole moment – potential and EFI due to an electric dipole – orque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators

UNIT – II

Dielectrics & Capacitance: Behavior of conductors in an electric field – Conductors and Insulators – Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions – Capacitance – Capacitance of parallel plots – spherical co - axial capacitors – with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity

UNIT – III

Magneto Statics: 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 Law & Applications: 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

Force in Magnetic fields and Magnetic Potential: Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic fie – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipo e moment – a differential current loop as a magnetic dipole – Torque on a cu ent loop p aced in a magnetic field Scalar Magnetic potential and its limitations – vect magnetic p tential

and its properties – vector magnetic potential due to simple configurati ns – vect P iss n's equations.

Self and Mutual inductance – Neumann's formulae – determinati n f self-inductance of a solenoid and toroid and mutual inductance between a straight l ng wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications.

UNIT – V

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 – Statically and Dynamically induced EMFs – Simple problems - Modification of Maxwell's equations for time varying fields – Displacement current

TEXT BOOKS:
1. "William H. Hayt& John. A. Buck", "Engineering Electromagnetics" ,Mc. Graw-Hill Companies, 7th Edition, 2009.
2. "Sadiku", "Electromagnetic Fields", Oxford Publications, 4th Edition, 2009.

REFERE CE BOOKS:
1. "CR Paul and S. A.   asar", "Introduction to Electromagnetic", Mc-Graw Hill Publications, 3rd Edition, 1997.
2. "Nathan Ida", "Engineering Electromagnetic", Springer (India) Pvt. Ltd. 2nd Edition, 2015.
3. "D Griffiths", "Introduction to Electro Dynamics", Prentice-Hall of India Pvt. Ltd, 3 [rd] edition, 1999.
4. D J Griffiths", "Introduction to Electro Dynamics", Pearson New International, 4th edition, 2014.
5. "J. D Kraus", "Electromagnetics", Mc Graw-Hill Inc. 4th edition, 1992.

EE303ES: ELECTRICAL MACHINES –

I B.Tech. II Year I Sem.

L T P C
4 1 0 4

Prerequisite: Basic electrical & Electronics Engineering

Course Objectives:
> To study and understand different types of DC generators, Motors and T ansfo me s, their construction, operation and applications.

> To analyze performance aspects of various testing methods.

Course Outcomes: After this course, the student will be able to
> Identify different parts of a DC machine & understand its perati n

> Carry out different testing methods to predetermine the efficiency f DC machines

> Understand different excitation and starting methods of DC

> machines Control the voltage and speed of a DC machines

UNIT – I
D.C. Generators: Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation.

Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation. Methods of Excitation – separately excited and self excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excite and remedial measures. Load characteristics of shunt, series and compound generators

UNIT – II
D.C Motors: 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) Testing of D.C. machines - Losses – Constant & Variab e osses – calculation of efficiency – condition for maximum efficiency.

UNIT - III
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: 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

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.

Polyphase transformers - Polyphase connections - Y/Y, Y/ , /Y, / and open

TEXT BOOKS:

1. "I.J. Nagrath & D.P. Kothari", "Electric Machines", Tata Mc Graw Hill Publishe s, 3rd edition, 2004.
2. "P.S. Bimbra", "Electrical Machines", Khanna Publishers, 7th Editi n, 2014.

REFERENCE BOOKS:

1. E. Clayton & N. M. Hancock "The Performance and Design Of Direct Current Machines" 3rd Edition Pitman, London 1959.
2. "A. E. Fritzgerald, C. Kingsley and S. Umans", "Electric Machinary", McGraw Hill Companies, 6th edition, 2003.
3. "Abhijith Chakrabarthi & SubithaDebnath", "Electrical Machines", Mc Graw Hill, 2015.

B.Tech. II Year I Sem.   **L   T   P   C**

World**3003**

Course Objectives:

To understand Magnetic Circuits, Network Topologyand Three phase ci cuits.

To analyze transients in Electrical systems.

To evaluate Network parameters of given Electrical netw rk

To design basic filter configurations

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

Analyze the Electrical Circuits with the concept of Network t p   gy

Apply the concepts of Magnetic circuit & Analyze Magnetic circuits

Determine self and mutually induced EMF's for Magnetically coupled coils

Understand the importance of three phase circuits and Analyze the three phase

circuits with Star & Delta connected balanced and unbalanced loads

Analyze the transient behavior of electrical networks for various

excitations Obtain the various network parameters for the given two port

networks Represent the transfer function for the given network

Determine the parameters for the design of various filters

UNIT – I

Magnetic Circuits: Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit - Analysis of series and parallel magnetic circuits

Network topology: Definitions– Graph – Tree, Basic cutset and Basic Tieset matrices for planar networks – Loop and odal methods of analysis of Networks with dependent & independent voltage and current sources - Duality & Dual networks.

UNIT – II

Three phase circuits: Phase sequence – Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced 3 phase circuits – Measurement of active and reactive power.

UNIT – III

Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series and Parallel combinations) for D.C. and sinusoidal excitations – Initial conditions – Classical method and Laplace transforms methods of solutions.

Transient response of the above circuits for different inputs such as step, ramp, pulse and impulse by using Laplace transforms method.

UNIT – IV

Network Parameters: Network functions driving point and transfer impedance function networks- poles and zeros –necessary conditions for driving point function and for transfer function

Two port network parameters – Z, Y, ABCD and hybrid parameters and their re ations– 2-port network parameters using transformed variables.

UNIT – V

Filters: Introduction to filters –low pass – high pass and band pass – RC, RL, filte s-constant K and m derived filters and composite filter design

TEXT BOOKS

1. "William Hayt and Jack E. Kemmerly", "Engineering circuit analysis", Mc Graw Hill Company, 6th edition, 2016.
2. "D. Roy Chowdary", "Networks and systems", New age international publishers, 2009.
3. "N. C. Jagan & C. Lakshminarayana", "Network Theory", B.S Publications, 2014.
4. "A. Chakrabarthy", Circuit Theory, Dhanpat Rai, 2005.

REFERENCE BOOKS:

1. "Van Valkenburg", "Network Analysis", PHI, 3rd Edition, 2014
2. "Franklin F Kuo," "Network Analysis & Synthesis", Wiley India PVT. Ltd., second Edition, 2006
3. "K.C. A. Smith & R. E. Alley", "Electrical Circuits", Cambridge University Press, 1992
4. "K. Rajeswaran", "Electric Circuit theory", Pearson Education, 2004.
5. "A. Bruce Carlson", "Circuits", Thomson Publishers, 1999
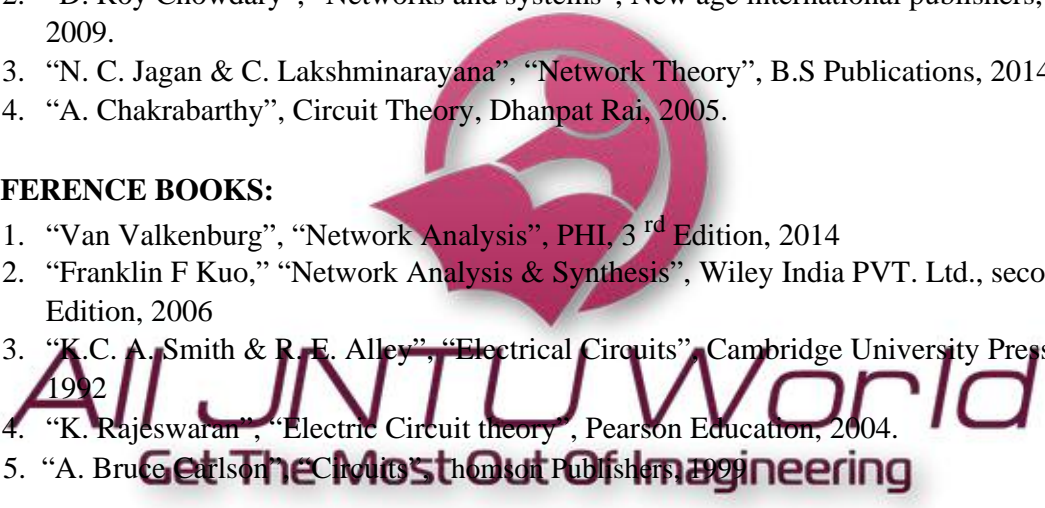
EE305ES: ELECTRONIC CIRCUITS

Course Objectives:

UNIT-I

B.Tech. II Year I Sem.

Basic Electrical and Electronics Engineering

To explain the operation, design and Analysis of single stage amplifie s using BJT and MOSFET.

To analyze feedback amplifiers, large signal and oscillators.

To explain the operation of linear and non linear wave shaping circuits

To understand the switching characteristics of diode and transist

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

Apply the knowledge of BJT to design practical amplifier circuits.

Design electronic sub systems such as feedback amplifiers, oscillators and power amplifiers to meet the required specifications.

Design linear and non linear wave shaping circuits with different inputs.

Analyze multi vibrators using transistors.

Single Stage Amplifiers: Analysis of CE,CB,&CC Amplifiers Classification of Amplifiers Distortion in Amplifiers, Comparison of CE, CB, CC Amplifiers Low frequency Analysis, Low frequency response of BJT Amplifiers ,Low frequency response of FET Amplifiers Miller Effect Capacitance, High Frequency response of BJT amplifiers, Square Wave Testing.

UNIT –II
Feedback Amplifiers: Concept 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, Illustrative problems
Osci ators: Conditions for oscillations, Frequency and Amplitude Stability of Oscillators, Genera ized analysis of LC Oscillators, Quartz, Hartley, and Colpitt's Oscillators, RC – phase shift and Wein Bridge oscillators.

UNIT-III
Large Signal Amplifiers: Class A Power Amplifier, Maximum Efficiency of Class –A mplifier, Transformer Coupled Amplifier, Push Pull Amplifier complimentary Symmetry Class-B Power Amplifier, Phase Inverters, Transistor Power Dissipation, Thermal Runway, Heat Sinks

UNIT - IV

Wave Shaping: High Pass, Low Pass RC Circuits, their response for Sinusoidal, Step, Pulse and Ramp Inputs.

Clippers and Clampers: Diode Clippers, Transistor Clippers, Clipping at Two Independent Levels, Transfer Characteristics of Clippers, Comparators, Clamping Operation, Clamping Circuits using Diode with different inputs, Clamping Circuit Theorem, Practical C amping Circuits.

UNIT - V

Switching Characteristics of Devices: Diode as a Switch, Piecewise Linear Diode Characteristics, Transistor as a Switch, Breakdown Voltage C nsiderati n f T ansisto , Design of Transistor Switch, Transistor Switching Times.

Multivibrators: Analysis and Design of Bistable, Monostable, Astable, Multivibrat rs and Schmitt Trigger using Transistors.

TEXT BOOKS:

1. "Robert L Boylestead and Louis Nashelsky", "Electronic Devices and circuit theory", Pearson, Tenth edition 2009
2. "S. Salivahanan, N. Suresh Kumar and A. Vallava Raj", "Electronic Devices and circuits", TMH, 2nd Edition 2008.
3. "David A. Bell", "Solid state Pulse Circuits", PHI ,4 th Edition 2007.

REFERENCE BOOKS:

1. "Robert . Paynter", "Introductory Electronic Devices and Circuits", PEI,7 Edition, 2009.
2. "Anil. K. Maini, Varsha Agarwal", "Electronic Devices and Circuits", Wiley, 1st Edition 2009.
3. "Jacob Millman, Harbert aub and Mothiki S Prakash Rao", "Pulse Digital & Switching Waveforms", TMH, 2nd

I B.Tech. II Year I Sem.

L T P C
0 0 3 2

 Prerequisite: Electrical Machines-I

Course Objectives:
>   To expose the students to the operation of DC Generator
>   To expose the students to the operation of DC Motor.
>   To examine the self excitation in DC generators.

Course Outcomes: After completion of this lab the student is able to
>   Start and control the Different DC Machines.
>   Assess the performance of different machines using different testing meth ds
>   Identify different conditions required to be satisfied for self - excitation of DC
>   Generators.
>   Separate iron losses of DC machines into different components

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.

2. Load test on DC shunt generator. Determination of characteristics.

3. Load test on DC series generator. Determination of characteristics.

4. Load test on DC compound generator. Determination of characteristics.

5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.

6 . Fields test on DC series machines. Determination of efficiency.

7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.

8. Brake test on DC compound motor. Determination of performance curves.

In addition to the above eight experiments, at least any two of the experiments from the fo owing list are required to be conducted:

9. Brake test on DC shunt motor. Determination of performance curves.

10. Retardation test on DC shunt motor. Determination of losses at rated speed.

11. Separation of losses in DC shunt motor.

EC306ES: ELECTRONIC DEVICES AND CIRCUITS LAB

B.Tech. II Year I Sem.

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Course Objectives:

To identify various components and testing of active devices.
    To study and operation of millimeters, function generators ,regulated power supp ies
    and CRO To know the characteristics of various active devices.
To study frequency response amplifier.

Course Outcomes:

After Completion of the course the student is able to Apply vari us devices to eal
    time problems.
Compute frequency response of various amplifiers.

Part A: (Only for viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):
1. Identification, Specification, testing of R,L,C components (color codes), Potentiometers (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Board, PCB's
2. Identification, Specification, testing of Active devices: Diodes, BJT, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of:
    i. Multimeters (Analog and Digital)
    ii. Function Generator
    iii. Regulated Power Supplies
    iv. CRO

Part B: (For Laboratory Examination – Minimum of 12 experiments)

1. Forward and Reverse Bias V-I characteristics of PN junction Diode.
2. Zener diode V-I characteristics and Zener diode as voltage regulator.
3. Half Wave rectifier, with and without filters
4. Fu wave rectifier with and without filters.
5. Input and output Characteristics of a BJT in CE configuration and calculation of h-parameters.
6. Input and output Characteristics of a BJT in CB configuration and calculation of h-parameters.
7. FET characteristics in CS configuration.
8. Design of self bias circuit
9. Frequency response of CE Amplifier.
10. Frequency response of CC Amplifier.
11. Frequency response of CS FET Amplifier.
12. SCR characteristics.
13. UJT characteristics.

PART C: Equipment required for Laboratory:

1. Regulated Power supplies (RPS) : 0-30 V
2. CRO's   : 0-20 MHz.
3. Function Generators   : 0-1 MHz.
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)   : 0-20 µA, 0-50µA, 0-100µA, 0-200µA,10 mA.
8. Voltmeters (Analog or Digital)   : 0-50V, 0-100V, 0-250V
9. Electronic Components: Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, Diodes-Ge & Si type, Transistors – NPN, PNP type

B.Tech. II Year I Sem.   **L T P C 0 0 3 2**

Prerequisite: Basic Electrical and Electronics Engineering, Network Theory & Mathematics - II

Course Objectives:
    To design electrical systems
        To analyze a given network by applying various Network
        Theorems To measure three phase Active and Reactive power.
    To understand the locus diagrams

Course Outcomes: After Completion of this lab the student is able to
    Analyze complex DC and AC linear circuits
        Apply concepts of electrical circuits across engineering
        Evaluate response in a given network by using theorems

The following experiments are required to be conducted as compulsory experiments

1. Verification of Thevenin's and Norton's Theorems
2. Verification of Superposition ,Reciprocity and Maximum Power Transfer theorems
3. Locus Diagrams of RL and RC Series Circuits
4. Series and Parallel Resonance
5. Time response of first order RC / RL network for periodic non – sinusoidal inputs – Time constant and Steady state error determination.
6. Two port network parameters – Z – Y parameters, Analytical verification.
7. Two port network parameters – A, B, C, D & Hybrid parameters, Analytical verification
8. Separation of Self and Mutual inductance in a Coupled Circuit. Determination of Co-efficient of Coupling.

In addition to the above eight experiments, at least any two of the experiments from the fo owing ist are required to be conducted

9. Verification of compensation & Milliman's theorems
10. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency spectrum.
11. Determination of form factor for non-sinusoidal waveform
12. Measurement of Active Power for Star and Delta connected balanced loads
13. Measurement of Reactive Power for Star and Delta connected balanced loads

MC300ES: ENVIRONMENTAL SCIENCE AND TECHNOLOGY

B.Tech. II Year I Sem.

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Course Objectives:

Understanding the importance of ecological balance for sustainable development. Understanding the impacts of developmental activities and mitigation measures. Understanding the environmental policies and regulations

Course Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and envir nmental regulations which in turn helps in sustainable development

UNIT - I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies

UNIT - III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics

of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protoco , and Montréal Protocol.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal s lid waste management and handling rules, biomedical waste management   and handling rules, haza us waste management and handling rules. EIA: EIA structure, methods   f baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **T wards**

Sustainable Future: Concept of Sustainable   Development, Population and its explosion, Crazy Consumerism, Environmental Education,   Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS: World

1   Textbook of Environmental Studies for   ndergraduate Courses by Erach Bharucha
     for University Grants Commission.
  2   Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:
  1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. ew Delhi
  2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
  3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
  4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international pub ishers.
  5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Pub ications.

10.   **B.Tech. II Year**

7.   **Course**

This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.

To understand common forms of number representation in digital elect onic ci cuits and to be able to convert between different representations.

To implement simple logical operations using combinational gic circuits

To design combinational logic circuits, sequential logic circuits.

To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.

To implement synchronous state machines using flip - flops.

Course Outcomes: Upon completion of the course, students should possess the following skills:

Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray and BCD.
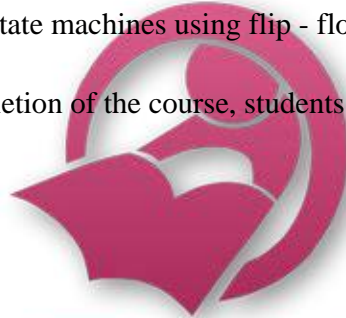
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Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
Be able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

UNIT – I
Number System and Boolean algebra And Switching Functions: Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.
Boo ean A gebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT - II
Minimization and Design of Combinational Circuits: Introduction, The Minimization of switching function using theorem, The Karnaugh Map Method-Up to Five Variable Maps, Don't Care Map Entries, Tabular Method, Design of Combinational Logic: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Decoders, Encoders and Code converters, Hazards and Hazard Free Relations.

UNIT - III

Sequential Machines Fundamentals and Applications: Introduction: Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, Latches, Flip Flops: SR, JK, Race Around Condition in JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Design of a Clocked Flip-Flop, Timing and Triggering Consideration, Clock Skew, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers, Data Transmission in Shift Registers, Operation of Shift Registers, Shift Register Configuration, Bidirectional Shift Registers, App ications of Shift Registers, Design and Operation of Ring and Twisted Ring Counte , Ope ation Of Asynchronous And Synchronous Counters.

UNIT - IV

Sequential Circuits - I: Introduction, State Diagram, Analysis f Synchr n us Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Parity-bit Generator, Design of Asynchronous Counters, Design of Synchronous Modulo N – Counters.

UNIT - V

Sequential Circuits - II: Finite state machine - capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques, and Merger chart methods - concept of minimal cover table.

TEXT BOOKS:
1. Switching and Finite Automata heory- Zvi Kohavi & Niraj K. Jha, 3rdEdition, Cambridge.
2. Digital Design- Morris Mano, 5rd Edition, Pearson.

REFERE CE BOOKS:
1. Modern Digital electronics RP Jain 4th Edition, McGraw Hill
2. Switching Theory and Logic Design – A Anand Kumar, 3rd Edition, PHI, 2013.

B.Tech. II Year II Sem.   **L   T P C 1**
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Prerequisite: Network theory

Course Objectives:

To understand the hydro, thermal, nuclear and gas generating
stations. To examine A.C. and D.C. distribution systems.
To understand and compare air insulated and gas insulated substations.
To illustrate the economic aspects of power generation and tariff meth ds.

Course Outcomes: After Completion of this course the student is able to

Draw the layout of hydro power plant, thermal power stati n, Nuclear p wer plant
and gas power plant and explain its operation
Describe A.C. and D.C. distribution systems and its voltage drop calculations
Illustrate various economic aspects of the power plant erection, operation and
different tariff methods
Understand power factor improvement methods and determine economical power
factor

UNIT- I

Thermal Power Stations: Line diagram of Thermal Power Station (TPS) showing paths of
coal, steam, water, air, ash and flue gasses. - Brief description of TPS components:
Economizers, Boilers, Super heaters, urbines, Condensers, Chimney and cooling towers **Gas
and Nuclear Power Stations:** Nuclear Power Stations: Nuclear Fission and Chain reaction. -
uclear fuels. - Principle of operation of Nuclear reactor- Reactor Components: Moderators,
Control rods, Reflectors and Coolants. - Radiation hazards: Shielding and Safety precautions. -
Types of uclear reactors and brief description of PWR, BWR and FBR.
Gas Power Stations: Principle of Operation and Components (Block Diagram Approach
Only)

UNIT - II

Hydroe ectric Power Stations: Elements of hydro electric power station-types-concept of
pumped storage plants-storage requirements, mass curve (explanation only) estimation of
power deve oped from a given catchment area; heads and efficiencies.
Hydraulic Turbines: Classification of turbines, impulse and reaction turbines, Pelton
wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies ,
hydraulic design - draft tube- theory- functions and efficiency.

UNIT - III

D.C. Distribution Systems: 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.

A.C. Distribution Systems: 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.

UNIT-IV

Substations: Classification of substations

Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.

Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus ba , sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

Gas insulated substations (GIS) – Advantages of Gas insulated substati ns, different types of gas insulated substations, single line diagram of gas insulated substati ns, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations .

UNIT-V

Economic Aspects of Power Generation: Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors-Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a ariff Method.-Tariff Methods: Flat Rate, Block-Rate, two-part, three -part, and power factor tariff methods and Numerical Problems

TEXT BOOKS:

1. "C. L. Wadhawa", "Generation and utilization of Electrical Energy", New age International (P) Limited, Publishers 1997.
2. "C. L. Wadhawa", "Electrical Power Systems", New age International (P) Limited, Publishers 1997.
3. "M. L. Soni, P. V. Gupta, . S. Bhatnagar and A. Chakraborti", "A Text Book on Power System Engineering", Dhanpat Rai and Co. Pvt. Ltd, 1999.

REFERENCE BOOKS:

1. "M.V. Deshpande", "Elements of Power Station design and practice" , Wheeler Pub ishing, 3rd Edition 1999. JNTU
2. "S. N. Singh", "Electrical Power Generation, Transmission and Distribution", PHI, 2003.
3. "V.K Mehta and Rohit Mehta", "Principles of Power Systems", S. Chand& Company Ltd, New Delhi, 2004.

EE403ES: ELECTRICAL MACHINES – II

B.Tech. II Year II Sem.   **L T P C 4 1 0 4**

Prerequisite: Electrical Machines-I

Course Objectives:
To deal with the detailed analysis of polyphase induction moto s & Synch onous generators and motors
To understand operation, construction and types of single phase moto s and their applications in house hold appliances and control systems.
To introduce the concept of parallel operation of synchron us generat

rs. To introduce the concept of regulation and its calculations.

Course Outcomes: After this course, the student
Identify different parts of transformers and induction motors and specify their functions
Understand the operation of transformers and induction motors
Carry out different testing methods and assess the performance of transformers and induction motors
Start and control the induction motor

UNIT – I
Polyphase Induction Motors: Constructional details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor at standstill and during operation.

UNIT - II
Characteristics of Induction Motors: 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 -.No-load Test and Blocked rotor test – Predetermination of performance-Methods of starting and starting current and Torque ca cu ations.
Speed Control Methods: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-princip e of operation.

UNIT – II
Construction, Principle of operation, Characteristics & Regulation of Synchronous
Generator: 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 – experimentalWorlddetermination-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 X and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT - IV

Parallel Operation of Synchronous Generator: Synchronizing alternat s with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect f change of excitation and mechanical power input. Analysis of short circuit current wave f rm – determination of sub-transient, transient and steady state reactances.

Synchronous Motors – Principle of Operation: Theory of operati n – phas 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 - VJNTU

:Single phase induction motor – Constructional **Single Phase Motors & Special Motors:**

features-Double revolving field theory – split-phase motors – shaded pole motor.

TEXT BOOKS:

1. "I . Nagrath & D. P. Kothari", "Electric Machines", Tata Mc Graw Hill, 7th Edition, 2009
2. "PS Bhimbra", "Electrical machines", Khanna Publishers, 2014

REFERE CE BOOKS:

1. "M. G. Say", "Performance and Design of AC Machines", CBS Publishers, 3rd Edition, 2002.
2. "A.E. Fitzgerald, C. Kingsley and S. Umans", "Electric machinery", Mc Graw Hill Companies, 7th edition, 2013
3. "Langsdorf", "Theory of Alternating Current Machinery", Tata McGraw-Hill Companies, 2nd edition, 1984.
4. "M.V Deshpande", "Electrical Machines", Wheeler Publishing, 2011

EE404ES: CONTROL SYSTEMS

B.Tech. II Year II Sem.

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Prerequisite: Ordinary Differential Equations & Laplace Transform, Mathematics I

Course objectives:

To understand the different ways of system representations such as T ansfer function representation and state space representations and to assess the system dynamic response

To assess the system performance using time domain analysis and meth ds for improving it

To assess the system performance using frequency domain analysis and techniques for improving the performance

To design various controllers and compensators to improve system performance

Course outcomes: After completion of this course the student is able to

Improve the system performance by selecting a suitable controller and/or a compensator for a specific application

Apply various time domain and frequency domain techniques to assess the system performance

Apply various control strategies to different applications (example: Power systems, electrical drives etc…)

Test system Controllability and Observability using state space representation and applications of state space representation to various systems.

UNIT – I

Introduction: 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 functions - Translational and Rotational mechanical systems.

Transfer Function Representation: Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal f ow graph - Reduction 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 – Effects of proportional derivative, proportional integral systems.

UNIT – III

Stability Analysis: The concept of stability - Routh stability criterion – qualitative stability and conditional stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of a ing poles and zeros to G(s) H(s) on the root loci.

Frequency Response Analysis: Introduction, Frequency domain specifications-Bo e diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT - IV

Stability Analysis In Frequency Domain: Polar Plots, Nyquist Pl ts and applicati ns of Nyquist criterion to find the stability - Effects of adding poles and zer s to G(s)H(s) n the shape of the Nyquist diagrams.

Classical Control Design Techniques: Compensation techniques – Lag, Lead, and Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT – V

State Space Analysis of Continuous Systems : Concepts of state, state variables and state model, derivationJNTUofstatemodelsfromblockdiagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties.

TEXT BOOKS:
1. "I. . Nagrath and M. Gopal", "Control Systems Engineering", New Age International (P) Limited, Publishers, 5th edition, 2009
2. "B. C. Kuo", "Automatic Control Systems", John wiley and sons, 8th edition, 2003.

REFERE CE BOOKS:
1. "N. K. Sinha", "Control Systems", New Age International (P) Limited Publishers, 3rd Edition, 1998.
2. "NISE", "Control Systems Engineering", John wiley, 6th Edition, 2011.
3. "Katsuhiko Ogata", "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3 rd edition, 1998.

SM405ES: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. II Year II Sem.

      L T P C
      3 0 0 3

Course Objective: To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcome: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, P oduction, Cost, Market Structure, Pricing aspects are learnt. The Students can study the fi m's financial position by analysing the Financial Statements of a Company.

UNIT – I
Introduction to Business and Economics:
Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.
Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II
Demand and Supply Analysis:
Elasticity of Demand: Elasticity, ypes of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. **Supply Analysis:** Determinants of Supply, Supply Function & Law of Supply.

UNIT- III
Production, Cost, Market Structures & Pricing:
Production Analysis: Factors of Production, Production Function, Production Function with one variab e input, two variable inputs, Returns to Scale, Different Types of Production Functions.
Cost ana ysis : Types of Costs, Short run and Long run Cost Functions.
Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, O igopoly, and Monopolistic Competition.
Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT - IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple p ob ems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:
1. D. D. Chaturvedi, S. L. Gupta, Business Economics - The ry and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCES:
1. PareshJNTUShah,FinancialAccountingforManagement 2e, Oxford Press, 2015.
2. S. . Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.`

B.Tech. II Year II Sem.
       L T P C
       0 0 3 2

Prerequisite: Control Systems

Course Objectives:
>   To understand the different ways of system representations such as T ansfer function representation and state space representations and to assess the system dynamic response
>   To assess the system performance using time domain analysis and meth ds for improving it
>   To assess the system performance using frequency domain analysis and techniques for improving the performance

To design various controllers and compensators to improve system performance

Course Outcomes: After completion of this lab the student is able to
>   How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
>   Apply various time domain and frequency domain techniques to assess the system performance
>   Apply various control strategies to different applications(example: Power systems, electrical drives etc)
>   Test system controllability and observability using state space representation and applications of state space representation to various systems

The following experiments are required to be conducted compulsory experiments:
1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions, and application of speed control of motor.
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

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted

9. Effect of P, PD, PI, PID Controller on a second order systems
10. Lag and lead compensation – Magnitude and phase plot
11. (a) Simulation of P, PI, PID Controller.

b) Linear system analysis (Time domain analysis, Error analysis) using suitable software
12. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using suitable software
13. State space model for classical transfer function using suitable software -Verification.
14. Design of Lead-Lag compensator for the given system and with specification using suitable software

REFERENCE BOOKS

Manuals of related software.

EE407ES: ELECTRICAL MACHINES LAB – II

B.Tech. II Year II Sem.   **L T P C 0 0 3 2**

Prerequisite: Electrical Machines – I & Electrical Machines - II

Course Objectives:
   To understand the operation of synchronous machines
   To understand the analysis of power angle curve of a synchronous machine
      To understand the equivalent circuit of a single phase transformer and single phase induction motor
      To understand the circle diagram of an induction motor by c nducting a bl cked rotor test.

Course Outcomes: After the completion of this laboratory course, the student will be able
   Assess the performance of different machines using different testing methods
   To convert the Phase from three phase to two phase and vice versa
      Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods
      Control the active and reactive power flows in synchronous machines
      Start different machines and control the speed and power factor

The following experiments are required to be conducted as compulsory experiments
   1. O.C. & S.C. Tests on Single phase ransformer
   2. Sumpner's test on a pair of single phase transformers
   3. No-load & Blocked rotor tests on three phase Induction motor
   4. Regulation of a three–phase alternator by synchronous impedance &m.m.f. methods
   5. V and Inverted V curves of a three—phase synchronous motor.
   6. Equivalent Circuit of a single phase induction motor
   7. Determination of Xd and Xq of a salient pole synchronous machine
   8. Load test on three phase Induction Motor

In addition to the above experiments, at least any two of the following experiments are required to be conducted from the following list
   1. Separation of core losses of a single phase transformer
   2. Efficiency of a three-phase alternator
   3. Parallel operation of Single phase Transformers
   4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
   5. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
   6. Measurement of sequence impedance of a three-phase alternator.
   7. Vector grouping of Three Transformer
   8. Scott Connection of transformer

EE408ES: ELECTRONIC CIRCUITS LAB

B.Tech. II Year II Sem.
        L T P C
        0 0 3 2

Prerequisite: Electronic Circuits& Switching theory and Logic Design

Course Objectives:
    To design and simulate various BJT and FET Voltage and Power amplifie s.
    To design and simulate various BJT Feedback amplifiers.
    To design and simulate various BJT Oscillators.
    To design and simulate linear and non linear wave shaping circuits

Course Outcomes: After completion of this lab the student is able to
    Apply the concepts of amplifiers in the design of Public Addressing
    System Generate Sinusoidal wave forms
    Design stable system using feedback concepts.
    Design multi vibrator using transistor

The following experiments are required to be conducted compulsory experiments:

1. CE amplifier.

2. CC amplifier (Emitter Follower).

3. FET amplifier (Common Source).

4. Wien bridge and RC Phase shift Oscillator.

5. Current series and Voltage series Feedback Amplifier.

6. Colpitt and Hartley Oscillator.

7. Double stage RC coupled amplifier.

8. Clippers and Clampers

In addition to the above eight experiments, at least any two of the experiments from the fo owing ist are required to be conducted:

9. Transistor as a switch

10. Study of Logic gates & some applications

11. Study of Flip-Flops and some applications.

12. Monostable &A stable multivibrators.

13. Bistable multivibrator & Schmitt trigger**.**

B.Tech. II Year II Sem. L T P C 0 0 3 0

Course Objectives:

To develop students' sensibility with regard to issues of gender in contemporary India.

To provide a critical perspective on the socialization of men and women.

To introduce students to information about some key biological aspects of gende s. To expose the students to debates on the politics and economics of wo k.

To help students reflect critically on gender violence.

To expose students to more egalitarian interactions between men and w men.

Course Outcomes:

Students will have developed a better understanding of imp rtant issues related to gender in contemporary India.

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.

Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

Students will acquire insight into the gendered division of labour and its relation to politics and economics.

Men and women students and professionals will be better equipped to work and live together as equals.

Students will develop a sense of appreciation of women in all walks of life.

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
UNDERSTA DI G GE DER
Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1)
Socia ization: Making Women, Making Men (*Towards a World of Equals*: Unit -2)
Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Mascu inities.

UNIT - II
GENDER AND BIOLOGY:
Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit - 4) Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10)
Two or Many? Struggles with Discrimination.

UNIT - III
GENDER AND LABOUR
Housework: the Invisible Labour (*Towards a World of Equals*: Unit -3)

"My Mother doesn't Work." "Share the Load."   *World*

Women's Work: Its Politics and Economics (*Towards a World of Equals*: Unit -7)

Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT-IV
ISSUES OF VIOLENCE

Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Fu ther Reading: "*Chupulu*".

Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additi nal Reading: New Forums for Justice.

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)

Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of

Violence.**UNIT-VGENDER: CO - EXISTENCEJustRelationships:**BeingTogether as Equals (*Towards a*   *of Equals*: Unit -12)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks- he Brave Heart

TEXTBOOK

All the five Units in the extbook**, " *owards a World of Equals: A Bilingual Textbook on Gender"* written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by **Telugu Akademi, Hyderabad**,Telangana State in the year **2015**.

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

REFERENCE BOOKS:
1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "*I Fought For My Life…and Won*."Available online at:
   http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/