Where talent meets opportunity

SRI SATYA SAI UNIVERSITY
OF TECHNOLOGY AND MEDICAL SCIENCES

SYLLABUS REVISION

Name of School-School of Engineering

Department/Program-Electrical Engineering/(BE & M.Tech)

2017-18 TO 2021-22

www.sssutms.co.in

Opp.Oilfed Plant, Bhopal-Indore Road,Sehore (M.P), Pin - 466001

(+91) 07562-292740 | 7562292720

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

Minutes of Board of Studies Committee Meeting Dated : 03.6.2017

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 03.6.2017. Following members were present.

1. Mr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Mr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Dr. N.P. Patidar (External Academic Expert)
8. Mr. Amit Raje (External Industry Expert)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EE-3rd and 4th semester Scheme and Syllabus (CBCS)

Discussion (If any) : Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion : Scheme and Syllabus was prepared as per current demand in industries and was approved for forthcoming 3rd and 4th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Mr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Dr. N.P. Patidar (External Academic Expert)
8. Mr. Amit Raje (External Industry Expert)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - CBCS Pattern

Academic Year 2017– 2018

Branch :Electrical Engineering

Semester - III

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P		
1	MTH - 301	Computational Techniques	60	30	10	-	-	2	1	-	3	100
2	EEC- 302	Electronics Devices & Circuits	60	30	10	30	20	2	1	2	4	150
3	EEC- 303	Digital Circuits	60	30	10	30	20	2	1	2	4	150
4	EEC- 304	Network Analysis and Synthesis	60	30	10	30	20	2	1	2	4	150
5	EEC- 305	Signals & Systems	60	30	10	30	20	2	1	2	4	150
6	EEC- 306	Instrumentation and Measurement	60	30	10	30	20	2	1	2	4	150
TOTAL			**360**	**180**	**60**	**150**	**100**	**12**	**6**	**10**	**23**	**850**

SSSUTMS

w.e.f July 2017

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - CBCS Pattern

Academic Year 2017– 2018

Branch :Electrical Engineering **Semester - IV**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P		
1	EEC- 401	Electromagnetic Fields	60	30	10	-	-	2	1		3	100
2	EEC- 402	Microprocessors and Microcontrollers	60	30	10	30	20	2	1	2	4	150
3	EEC- 403	Power System	60	30	10	30	20	2	1	2	4	150
4	EEC- 404	Analog Communication	60	30	10	30	20	2	1	2	4	150
5	EEC- 405	Electrical Machine-I	60	30	10	30	20	2	1	2	4	150
6	EEC- 406	Electronic Instrumentation	60	30	10	30	20	2	1	2	4	150
TOTAL			**360**	**180**	**60**	**150**	**100**	**12**	**6**	**10**	**23**	**850**

SSSUTMS

w.e.f July 2017

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P)

MTH – 301
COMPUTATIONAL TECHNIQUES

UNIT I MATRICES

Eigenvalues and Eigenvectors of a real matrix , Characteristic equation , Properties of Eigenvalues and eigenvectors , Cayley-Hamilton Theorem , Diagonalization of matrices , Reduction of a quadratic form to canonical form by orthogonal transformation

UNIT II INFINITE SERIES

Sequences , Convergence of series , General properties , Series of positive terms , Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test) , Alternating series , Series of positive and negative terms , Absolute and conditional convergence , Power Series , Convergence of exponential, logarithmic and Binomial Series.

UNIT III FUNCTIONS OF SEVERAL VARIABLES

Limits and Continuity , Partial derivatives , Homogeneous functions and Euler's theorem ,Total derivative ,Differentiation of implicit functions , Change of variables , Partial differentiation of implicit functions , Taylor's series for functions of two variables .
Errors and approximations , Maxima and minima of functions of two variables

UNIT IV IMPROPER INTEGRALS

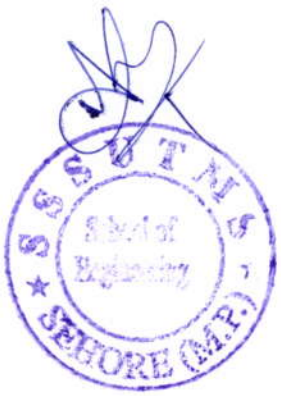
Improper integrals of the first and second kind and their convergence , Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions , Properties , Evaluation of integrals using Beta and Gamma functions , Error functions.

UNIT V MULTIPLE INTEGRALS

Double integrals , Change of order of integration ,Area enclosed by plane curves , Triple integrals , Volume of Solids , Change of variables in double and triple integrals , Area of a curved surface.

TEXT BOOKS :

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2007.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd.,



EEC-302- Electronics Devices & Circuits

Unit I-Semiconductor: Intrinsic and extrinsic, p-type and n-type, energy band diagrams, majority and minority carrier, charge density in semiconductor, generation and recombination of charges, process of diffusion, diffusion and drift currents, hall effects and its applications. p-n junction, depletion layer, potential barrier, electric field, forward and reverse biased junction, current components in p-n diode, current equation, V-I characteristics, cut in voltages of si and ge diode, transition and diffusion capacitance, power dissipation.

Unit II-Semiconductor Diode: Semiconductor diodes, ideal & practical diode equivalent circuit & frequency response, graphical analysis of diode circuits, signal diodes, power diode, zener diode, varactor diode, schottky diode, pin diode, tunnel diode, photo diode. direct tunneling equivalent circuit, tunnel diode oscillator; solar cell, specification, colours & geometry of LEDs, diffusion and transition capacitance of P-N junction diode, zener regulators.

Unit II- Diode Applications: P-N junction diode as rectifier, clipper and clamper, the diode as a circuit element,the load line concept, Pieceswise linear diode modal, clipping circuits, clipping at two independent levels, comparators, sampling gate, rectifiers, other full wave circuits, capacitor filter additional diodes circuits.

Unit IV- Bipolar junction transistor: Construction, basic operation, current components and equations, CB, CE & CC-configuration, input and output characteristics, early effect, region of operation, active, cutoff and saturation region Ebers-Moll model, power dissipation in transistor, Photo transistor, Uni-junction transistor, principle of operation, characteristics.

Unit V- FET construction: Construction, n channel, p channel, characteristics, parameters, equivalent model, voltage gain, enhancement and depletion MOSFET, its Characteristics, analysis of FET in various configuration.

References:

1. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education
2. Millman and Halkias: Integrated electronics, TMH
3. Graham Bell: Electronic Devices and Circuits, PHI
4. Sendra and Smith: Microelectronics, Oxford Press.
5. Donald A Neamen: Electronic Circuits Analysis and Design, TMH

List of Experiments:

1. V-I characteristics of various Diodes (p-n, Zener, Varactor, Schottky, Tunnel, Photodiode.
2. Characteristics of Transistors (BJT and FET)
3. Design of various clipping and clamping circuits
4. Design of half & full wave rectifier
5. Design & analysis of transistor amplifier in CE, CB & CC configuration.
6. Design & analysis of JFET Amplifier.
7. Design & analysis of MOSFET Amplifier.

EEC- 303 Digital Circuits

Unit I- State Machines & Sequential Systems: Need for state machines, its basic concepts, characterizing equation, synchronous sequential machines, realization of state diagram and state table from verbal description, Mealy and Moore model, machines state table , transition diagram, minimization of the state table of completely and incompletely specified sequential machines.

Unit II Asynchronous Sequential Machine: Fundamental-Mode Model, problems of asynchronous circuits, design principles, analysis and design of asynchronous sequential circuits, reduction of state and flow tables, race-free state assignment, hazards, asynchronous design example.

Unit III Synchronous State Machine Design: Sequential counters, state changes referenced to clock, number of state flip-flops, input forming logic, output forming logic, generation of state diagram from a timing chart, redundant states, general state machine architecture, asynchronous design example.

Unit IV Fault Detection: Fault, reason of fault, types of faults, fault detection using Boolean difference, path sensitization method.

Unit V Designing with Verilog HDL: Basic concepts, design modeling, modeling style, data types, tasks and functions, timing and delays, user-defined primitives, PLI, simulation and synthesis tools.

References:

1. Kohavi: Switching & Finite Automata Theory, TMH.
2. Lee: Digital Circuits and Logic Design, PHI Learning..
3. Roth Jr.: Fundamentals of Logic Design, Jaico Publishing House.
4. Parag K. Lala: Fault Tolerant and Fault Testable Hardware Design, BS Publication.
5. Verilog HDL A Guide To Digital Design And Synthesis, Edition: 2 by Samir Palnitkar.
6. A Verilog HDL Primer, Third Edition, by J. Bhasker

List of Experiments:

1. Designing and Simulation of Logic Gates with Verilog HDL
2. Designing and Simulation of Adders with Verilog HDL
3. Designing and Simulation of Subtractors with Verilog HDL
4. Designing and Simulation of Multiplexers with Verilog HDL
5. Designing and Simulation of Demultiplexers with Verilog HDL
6. Designing and Simulation of Decoders with Verilog HDL
7. Designing and Simulation of encoders & Priority encoder with Verilog HDL

EEC 304-Network Analysis and Synthesis

Unit I- Graph Theory : Graph of a network, definitions, tree, co tree, link, basic loop and basic cut set, incidence matrix, cut set matrix, tie set matrix duality, loop and node methods of analysis.

Unit II - Network Theorems: Super-position theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem. Millman's theorem, Compensation theorem, Tellegen's theorem.

Unit II- Circuit Analysis : Natural response and forced response, transient response and steady state response for arbitrary inputs (DC and AC), evaluation of time response both through classical and laplace methods.

Unit IV - Network function & Two port networks : Concept of complex frequency, network & transfer functions for one port & two ports, poles and zeros, necessary condition for driving point & transfer function. two port parameters – Z, Y, ABCD, hybrid parameters, their inverse & image parameters, relationship between parameters, interconnection of two ports networks, terminated two port.

Unit V - Network Synthesis: Positive real function, definition and properties, properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

References:

1. 1 M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India
2. 2 A.Chakrabarti, "Circuit Theory" Dhanpat Rai & Co.
3. 3 C.L Wadhwa, "Network Analysis and Synthesis" New Age International Publishers, 2007.
4. 4 D.Roy Choudhary, "Networks and Systems" Wiley Eastern Ltd.
5. 5 Donald E. Scott: "An Introduction to Circuit analysis: A System Approach" McGraw Hill

List of Experiments:

1. Study of various commands of PSPICE.
2. To determine node voltages and branch currents in a resistive network.
3. To obtain Thevenin's equivalent circuit of a resistive network.
4. To obtain transient response of a series R-L-C circuit for step voltage input.
5. To verify Thevenin Theorem.
6. To verify Superposition Theorem.
7. To verify Reciprocity Theorem.
8. To verify Maximum Power Transfer Theorem.
9. To verify Millman's Theorem.
10. To determine Open Circuit parameters of a Two Port Network.

EEC- 305 Signals & Systems

Unit I- Introduction to Signal & Systems: Signals, classification of signals, basic continuous time and discrete time signals, continuous LTI, discrete LTI systems , impulse and step functions, impulse response stability, linearity, stability, time invariance, eigen values, eigen functions, discrete convolution, properties of discrete and continuous LTI system, systems described by difference and differential equations.

Unit II- Fourier Analysis of Continuous Time Signals and Systems: Fourier series, fourier series representation of continuous periodic signal & its properties, fourier transform and its properties, parseval's theorem, frequency response of LTI systems.

Unit III- Fourier Analysis of Discrete Time Signals & Systems: Discrete-time fourier series, discrete-time fourier transform (including DFT) and properties, frequency response of discrete time LTI systems, continuous time fourier transform for periodic and non-periodic signals, properties of CTFT.

Unit IV- Laplace & Z-Transform Transform: Laplace transform and its inverse, existence conditions, region of convergence and properties, application of laplace transform for the analysis of continuous time LTI system, Z-Transform, properties of Z-transform, inversion of Z-transform, two dimensional Z-transform, convergence of Z-transform, region of convergence and properties, application of Z-transform for the analysis of discrete time LTI systems, Z transform problems.

Unit V- State Space Analysis: Concept of state, state space representation, discrete time LTI systems, state space representation of continuous time LTI systems, solutions of state equation for discrete time LTI systems, solutions of state equation for continuous time LTI systems.
Sampling: Sampling theorem, ideal & real sampling, reconstruction of signal from its samples, aliasing sampling in frequency domain, sampling of discrete-time signals.

References:

1. Alan V. Oppenheim, Alan S. Willsky and H. Nawab, Signals and Systems, Prentice Hall, 1997
2. Simon Haykin, Communication Systems, 3rd Edition, John Wiley, 1995.
3. Signals & Systems, 2nd Edition, by Alan Oppenheim, Alan Wilsky, S. Nawab. Prentice Hall, 1997.
4. Signals and Systems, by Simon Haykin and Barry Van Veen. Wiley, 1999.

List of Experiments (Extendable):

1. Demonstration of diff. Signals and their properties.
2. Demonstration of sampling /reconstruction of signals and spectral analysis using dft.
3. Analysis of Fourier properties of signals.
4. Convolution and correlation of signals.
5. Demonstration of salient properties of signals.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EE-306 Instrumentation and Measurement

Unit I-Philosophy of Measurement: Methods of measurement, measurement system, classification of instrument systems, characteristics of instruments & measurement systems, Accuracy and precision, sensitivity resolution, errors in measurement & its analysis, standards, operating force, types of supports, damping, controlling.

Analog Measurement of Electrical Quantities: PMMC, MI, electrodynamic, thermocouple, electrostatic & rectifier type ammeters & voltmeters, electrodynamic type wattmeter, three phase wattmeter, power in three phase systems, low power factor & UPF wattmeter, errors & remedies in wattmeter, energy meter, D'arsonal galvanometer.

Unit II- Instrument Transformers: CT and PT; their errors, applications of CT and PT in the extension of instrument range, measurement of speed, frequency and power factor.

Unit III- Measurement of Parameters: Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q meter, Megger.

Unit IV- AC Potentiometers: Polar type & Co-ordinate type AC potentiometers, application of AC Potentiometers in electrical measurement.

Magnetic Measurement- Ballistic galvanometer, flux meter, determination of hysteresis loop, measurement of iron losses, Lloyd Fischer square for measurement of power loss.

Unit V- Digital Measurement of Electrical Quantities: Concept of digital measurement, block diagram, analog & digital instruments, digital voltmeter, frequency meter, spectrum analyzer, electronic multimeter.

Cathode Ray Oscilloscope: CRO block diagram, Cathode Ray Tube & its components, applications of CRO, lissajous pattern, dual trace & dual beam oscilloscopes.

References:

1. E. W. Golding & F. C. Widdis, "Electrical Measurement &Measuring Instrument", A. W. Wheeler & Co. Pvt. Ltd. India
2. A. K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India
3. Purkait, "Electrical & Electronics Measurement & Instrumentation", TMH
4. Forest K. Harris, "Electrical Measurement", Willey Eastern Pvt. Ltd. India
5. M. B. Stout , "Basic Electrical Measurement", Prentice Hall of India
6. W. D. Cooper, "Electronic Instrument & Measurement Technique", Prentice Hall International
7. J. B. Gupta, "Electrical Measurement & Measuring Instrument", S. K. Kataria & Sons

List of Experiments:

1. Measurement of low resistance using Kelvin's Double bridge.
2. Measurement of medium resistance using Wheatstone's bridge.
3. Measurement of high resistance by loss of charge method.
4. Measurement of Insulation resistance using Megger.
5. Measurement of power in a single phase ac circuit by 3 voltmeter/ 3 Ammeter method
6. Calibration of a induction type single phase energy meter
7. Calibration of a dynamometer type of wattmeter by Phantom Loading method.
8. Measurements using Instrument Transformers.
9. Study of various types of Indicating Instruments.
10. Measurement of Power in three phase circuit by one, two & three wattmeters.

EEC- 401 Electromagnetic Fields

Unit I- Co-ordinate Systems: Co-ordinate systems, vector & scaler fields, gradient, divergence & curl, divergence theorem, Stokes's theorem, electrostatic fields, coulomb's law, electric field intensity due to different charge distribution ie.. line charge, sheet charge, volume charge, equipotential surfaces, line of force, Gauss law, applications of gauss law, gauss law in point form, method of images.

Unit II - Laplace's & Poisson's equations: Laplace's & Poisson's equations, electric dipole, dipole moment, potential & electric field intensity due to dipole, conductor & insulator, polarization, boundary value conditions for electric field, capacitances of various types of capacitors, energy stored and energy density in static electric field, current density, conduction & convection current density ohms law in point form, equation of continuity.

Unit III- Magnetic Fields: Magnetic Fields, Biot-Savart's law, magnetic field intensity due to straight current carrying filament, circular, square and solenoid current carrying wire, magnetic flux, flux density & magnetic field intensity, magnetic boundary conditions, ampere's circuital law and its applications, magnetic force, lorentz force on straight and long current carrying conductors in magnetic field, force between two long & parallel current carrying conductors, magnetic dipole & dipole moment, torque on a current carrying loop in magnetic field.

Unit IV - Magnetic Potential: Scalar magnetic potential and its limitations, vector magnetic potential and its properties, self and mutual inductances, self inductance of solenoid, toroid coils, mutual inductance between a straight long wire & a square loop, energy stored in magnetic field & energy density, faraday's law, displacement current, maxwell's equations for different types- free space, harmonically varying field.

Unit V - Electro Magnetic Waves : Electro magnetic waves, uniform plane wave in time domain in free space, sinusoidally time varying uniform plane wave in free space, wave equation, pointing vector theorem, power loss in a plane conductor, reflection by conductors and dielectric – normal & oblique incidence, reflection at surface of a conducting medium, transmission line analogy.

References:

1. P.V. Gupta; Electromagnetic Fields; Dhanpat Rai
2. Mathew N.O Sadiku; Elements of Electromagnetic; Oxford
3. S.P. Seth; Electromagnetic Field ;Dhanpa Rai & Son
4. Sandeep wali ; Elements of Electromagnetic; Oxford
5. N.N. Rao; Element of Engineering Electromagnetic; PHI.
6. John D. Kraus; Electromagnetic; TMH.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 402- Microprocessors and Microcontrollers

Unit-I History of Computers: Timing and control, memory devices: semiconductor memory organization, 8-bit microprocessor (8085): Architecture, types of instructions, instruction set, addressing modes, flag register of 8085, and memory segmentation.

Unit-II 16-bit Microprocessors (8086/8088): Architecture, physical address, flag registers, memory organization, bus cycle, addressing modes, instruction set difference between 8086 and 8088, introduction to 80186 and 80286, assembly language programming of 8086/8088

Unit –III Data Transfer Schemes: Introduction, types of transmission, 8257 (DMA), 8255 (PPI), serial data transfer (USART 8251), keyboard-display controller (8279), Programmable Priority Controller (8259)

Unit-IV Programmable Interval Timer/ Counter (8253/8254): Introduction, modes, interfacing of 8253, applications, ADC and DAC: Introduction, DAC converters, ADC converters, DAC and ADC interfacing and applications.

Unit -V Microcontroller (8051): Introduction, architecture, instruction set, addressing modes, registers, memory organization, timers/counters, interrupts, addressing modes, 8051 instruction set , applications of microcontrollers.

List of Experiment (Extendable):

1. To study 8085 based microprocessor system.
2. To study 8086 based microprocessor system.
3. Write an Assembly Language Program to add two 16 bit numbers.
4. Write an Assembly Language Program to subtract two 16 bit numbers.
5. To perform multiplication/division of given numbers.
6. To perform computation of square root of a given number.
7. To obtain interfacing of RAM chip to 8085/8086 based system
8. To develop and run a program for finding out the largest/smallest number from a given set of numbers.

References:

1. Hall Douglas V.,Microprocessor and interfacing, Revised second edition 2006, Macmillan, McGraw Hill .
2. A.K. Ray & K.M.Bhurchandi, Advanced Microprocessors and peripherals- Architecture, Programming and Interfacing, Tata McGraw – Hill, 2009 TMH reprint.
3. Kenneth J. Ayala, The 8086 microprocessor: programming and interfacing the PC, Indian - edition, CENGAGE Learning.
4. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson education, 2005.
5. Kenneth J. Ayala, The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
6. Microprocessor Architecture, Programming and Applications with the 8085 6/e October 2013, Ramesh Gaonkar.

EEC- 403 Power System

Unit I - Introduction: Typical layout of an electrical power system–present power scenario in india, generation of electric power: conventional sources (qualitative):hydro station, steam power plant, nuclear power plant and gas turbine plant, non conventional sources (qualitative): ocean energy, tidal energy, wave energy, wind energy, fuel cells, and solar energy, cogeneration and energy conservation and storage.

Unit II - Economics of Generation: Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

Unit III - Transmission Systems: Various system of transmission & their comparison, HVDC transmission Converter, inverter, filters & substation layout. Voltage and Reactive Power control.

Unit IV - Distribution Systems: Primary and secondary distribution systems, concentrated & uniformly distributed loads on distributors fed at one and both ends, ring distribution, sub mains and tapered mains, voltage drop and power loss calculations, voltage regulators, Feeders Kelvin's law and modified Kelvin's law for feeder conductor size and its limitations.

Unit V- Overhead Transmission Lines: Types of Conductors, Line Parameters: calculation of inductance and capacitance of single and double circuit transmission lines, three phase lines with stranded and bundle conductors, generalized ABCD constants and equivalent circuits of short ,medium & long lines. Line Performance: circle diagram, regulation and efficiency of short, medium and long lines.

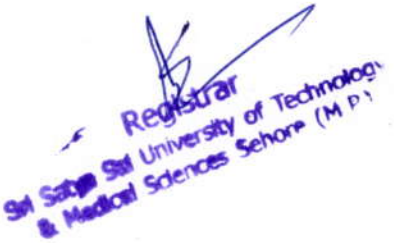
List of Experiment (Extendable):

1. To study and draw typical layout of an Electrical Power System.
2. To study AC distribution for Single phase, 3-phase and 3 phase 4 wire system.
3. To study different types of electrical cable.
4. To study different types of insulator.
5. To study and draw the lay out of substation.
6. To study different types of towers and supports for overhead transmission lines.
7. Study of power flow diagram.
8. To study the Electrical Design of Overhead Lines.
9. To study various transmission lines.
10. To study and draw the various power plant .

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

References:-

1. Electrical Machines by Ashfaque hussain , CBS Publication
2. C.L. Wadhwa –Generation, Distribution and Utilization of Electrical Energy, Second Edition, New Age International, 2009
3. C.L. Wadhwa –Electrical Power Systems, Fifth Edition, New Age International, 2009
4. M.V. Deshpande, Elements of Electrical Power Station Design, 3rd Edition, WheelerPub. 1998
5. V.K. Mehta principal of electrical power system, S Chand Publication
6. J.B. Gupta electrical power system, kataria and sons publication.



EEC- 404 Analog Communications

Unit - 1 Introduction: Introduction to communication system, need for modulation, amplitude modulation, time domain and frequency domain description, power relations in AM waves, generation of AM waves, square law modulator, switching modulator, detection of AM waves; square law detector, envelope detector.

Unit - 2 Modulation: Double side band suppressed carrier modulation (DSBSC): time-domain description, frequency-domain representation, generation of DSBSC waves: balanced modulator, ring modulator, coherent detection of DSBSC modulated waves, costas loop, single side-band modulation (SSB): quadrature carrier multiplexing, hilbert transform, properties of hilbert transform, pre envelope, canonical representation of band pass signals, single side-band modulation, frequency-domain description of SSB wave, time-domain description, phase discrimination method for generating an SSB modulated wave, time-domain description, phase discrimination method for generating an SSB modulated wave ,demodulation of SSB waves.

Unit - 3 Radio Transmitter and Receiver: Frequency – domain description, generation of VSB modulated wave, time - domain description, envelop detection of VSB wave plus carrier, comparison of amplitude modulation techniques, frequency translation, frequency division multiplexing, application, radio broadcasting, AM radio, pulse modulation, types of pulse modulation, PAM, generation and demodulation of PWM, generation and demodulation of PPM

Unit – 4 Angle Modulation (FM)-I: FM, narrow band FM, wide band FM, transmission bandwidth of FM waves, generation of FM waves: indirect FM and direct FM, angle modulation (FM)-II: demodulation of FM waves, FM stereo multiplexing, phase-locked loop, nonlinear model of the phase – locked loop, linear model of the phase – locked loop, nonlinear effects in FM systems.

Unit - 5 Noise: Shot noise, thermal noise, white noise, noise equivalent bandwidth, narrow bandwidth, noise figure, equivalent noise temperature, cascade connection of two-port networks. noise in continuous wave modulation systems: introduction, receiver model, noise in DSB-SC receivers, noise in SSB receivers, noise in AM receivers, threshold effect, noise in FM receivers, FM threshold effect, pre-emphasis and de-emphasis in FM.

References :

1. Communication Systems, Simon Haykins, 5th Edition, John Willey, India Pvt. Ltd, 2009. 2. An Introduction to Analog and Digital Communication, Simon Haykins, John Wiley India Pvt. Ltd., 2008
2. Modern digital and analog Communication systems B. P. Lathi, Oxford University Press., 4th ed, 2010,
3. Communication Systems, Harold P.E, Stern Samy and AMahmond, Pearson Edn, 2004.
4. Communication Systems: Singh and Sapre: Analog and digital TMH 2nd , Ed 2007.

Registrar
Sri Sathya Sai University of Technology & Medical Sciences Sehore (M.P.)

List of Experiments (Extendable):

1. To generate the amplitude modulated signal(AM wave) by using given message signal and carrier signals in MATLAB software
2. To generate the AM-DSBSC modulated signal(DSBSC wave) by using given message signal and carrier signals in MATLAB software
3. To demodulate the DSBSC wave using synchronous detector
4. To generate frequency modulated signal and observe the characteristics of FM wave using MATLAB software.
5. To demodulate a Frequency Modulated signal using MATLAB software
6. To generate amplitude modulated wave using simulink and demodulate the modulated wave.
7. To generate DSB-SC Modulated wave using simulink and demodulate the modulated signal
8. To generate frequency modulated signal using communication block set of SIMULINK
9. To generate amplitude modulated wave and determine the percentage modulation.
10. To Demodulate the modulated wave using envelope detector.
11. To demodulate the modulated wave and to observe the characteristics of diode detector.
12. To generate frequency modulated signal and determine the modulation index and bandwidth for various values of amplitude and frequency of modulating signal.
13. To generate the SSB modulated wave.
14. To observe the spectrum of AM and FM signals and obtain the power levels in DBM of fundamental frequency components by using spectrum Analyzer.
15. To write a MATLAB program to simulate the PWM waveform the given message signal

EEC- 405 Electrical Machines-I

Unit I - Transformer: 3-ϕ transformer construction, working principal, connections & applications, Scott connection, polarity test, parallel operation of 1-ϕ & 3-ϕ transformer, condition for maximum efficiency & regulation, cooling methods, harmonics in 3-ϕ transformers, dry type transformer, auto-transformers.

Unit II - DC Machines: Construction & working principle of dc machine (motor and generator), classification of dc machine, characteristics of dc machines, emf eq. of dc machine, lap & wave windings, torque eq. of dc motor, starting of dc motor, speed control of dc motor, losses & efficiency of dc machines, applications.

Unit III - Induction Motor-I: Construction, working principle & classification of 3-ϕ induction motor, phasor diagram ,equivalent circuit, developed torque, power flow diagram, speed /torque & torque/slip characteristics, rotational losses & applications.

Unit IV - Induction Motor-II: Starting of 3-ϕ induction motor, no load and blocked rotor test, cogging & crawling, circle diagram, speed control of induction motor, power factor control, Induction generator.

Unit V - Single Phase Motors: 1-ϕ induction motor, double revolving field theory, equivalent circuit & determination, performance calculation, starting methods & types of 1-ϕ induction motor, their construction, working principle & applications, 1-ϕ series motor, servomotors.

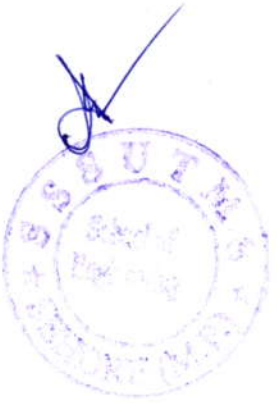
References:

1. M. G. Say, Alternating Current Machines', (5th Ed.) ELBS, 1986.
2. V.Del Toro, "Electrical Machines & Power Systems", 1985, Prentice-Hall, Inc., Englewood Cliffs.
3. V.Del Toro,"Electromechanical Devices for Energy Conversion & Control Systems", PHI Pvt. Ltd.,1975.
4. Electrical Machines by Nagrath and Kothari (TMH).
5. A.C. Machines by Langs dorf (mcgraw-Hill).
6. Electrical Machines by Dr.P.S.Bimbhra (Khanna).
7. Electrical Machines by Ashfaq Hussain (Dhanpat Rai).

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

List of Experiments (Extendable):

1. To Perform turn ratio and polarity test on 1-phase transformer
2. To perform load test on a 1-phase transformer and plot its load characteristic
3. To perform OC and SC tests on a 1-phase transformer and determine its equivalent circuit and its efficiency and regulation at different load and power factor.
4. To perform Sumpner's test on two 1-phase transformer and determine its efficiency at various load.
5. To perform No-load and block rotor test on a 3- phase IM and determine its equivalent circuit.
6. To Perform load test on a 3- phase IM and plot its performance characteristics.
7. Study of various types of starters used for 3- IMs.
8. To perform No-load and block rotor test on a 1- phase IM and determine its equivalent circuit.
9. To analyse open ckt. Characteristics of self excited DC generator
10. To analyse load characteristics of DC compound generator.
11. To perform load test on DC shunt motor.
12. To perform load test on DC series motor.
13. To perform speed control of DC shunt motor.
14. To conduct Swinburne's test on DC machine to determine efficiency when working as generator and motor without actually loading the machine.



EEC- 406 - Electronics Instrumentation

Unit I – A.C. Bridges: Measurement, sources and detectors, measurement of inductance, capacitance & Q factor, Maxwell's bridge, Maxwell's inductance & capacitance bridge, Hays bridge, Anderson's bridge, Owen's bridge, De-sauty's bridge, Schering bridge, Heaviside Campbell's bridge, Weins bridge, Universal bridge, errors in bridge circuit, Wagner's earthing device, Q meter.

Unit II - Transducers: Classification, characteristic & choice of transducers, resistive, inductive and capacitive transducers, strain gauge, gauge factor, thermistor, thermo couples, LVDT, RVDT, piezo-electric transducers, magneto elastic and magnetostrictive, hall effect transducers, opto-electronic transducers.

Unit III - Analog & Digital Data Acquisition Systems: Instrumentation systems used, interfacing transducers to electronic control & measuring systems, d/a multiplexing, a/d multiplexing, special encoders.

Unit IV - Signal Generators: Fixed & variable frequency AF oscillators, sine wave generators, AF sine and square wave generator, function generator, square & pulse generator, random noise generator, sweep generator, TV sweep generator, sweep- marker generator, video pattern generator vectroscope, beat frequency oscillator, frequency selective wave analyzer, heterodyne wave analyzer, harmonic distortion analyzer, spectrum analyzer, digital fourier analyzer.

Unit V - Digital Instruments: Advantages of digital instruments over analog instruments, resolution , sensitivity, digital voltmeter - ramp type, dual slope integration type, integrating type, successive approximation VM, digital multimeter, digital frequency meter, electronic counter, digital tachometer, digital Ph meter, digital phase meter, digital capacitance meter, LED, LCD, nixies, electro luminescent, incandescent, liquid vapor display, dot-matrix display, analog recorders, X-Y recorders, RS 232C, IEEE 488, GPIB electric interface.

List of Experiments (Extendable):

1. Measurement of inductance of a coil using Anderson Bridge.
2. Measurement of capacitance of a capacitor using Schering Bridge.
3. LVDT and capacitance transducers characteristics and calibration.
4. Resistance strain gauge- Strain Measurement and calibration.
5. Measurement of R, L, C & Q using LCR-Q meter.
6. Study & measurement of frequency using Lissajous patterns.
7. Measurement of pressure using pressure sensor.
8. Study of piezo-electric transducer and measurement of impact using piezo-electric transducer
9. Measurement of displacement using LVDT.
10. Measurement of speed of a motor using photoelectric transducer.
11. Study & measurement using ph meter.
12. Temperature measurement & control using thermo couple & using thermistor.

References:

1. Albert. D. Helfrick, W.D. Cooper, Modern Electronic Instrumentation and measurement techniques, PHI.
2. Kalsi H.S., Electronic Instrumentation, TMH.
3. A.K. Sawhney, Electrical and Electronic measurements and Instrumentation, Dhanpat Rai and Co.
4. E.W. Golding, Electrical Measurement and Measuring Instruments Sir Isaac Pitman and Sons, Ltd. London 1940
5. C.S. Rangan, G.R. Sarma, V.S.V. Mani, Instrumentation Devices.

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

Minutes of Board of Studies Committee Meeting Dated : 03.6.2017

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 03.6.2017. Following members were present.

1. Mr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Mr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Mr. Sandesh Pradhan (external)
8. Dr. N.P. Patidar (External)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EE-7th& 8th semester Scheme and Syllabus (NON-CBCS)

Discussion (If any) : Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion : Scheme and Syllabus was prepared as per current demand in industries and was approved for forthcoming 7th& 8th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Mr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Mr. Sandesh Pradhan (External)
8. Dr. N.P. Patidar (External)

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri SatyaSai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination

Seventh Semester –BE (EE)

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Credits Allotted Subject wise			Total Credits
			Theory Slot			Practical Slot							
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work			L	T	P	
							Lab work & sessional	Assignment/ quiz					
1	EE-701	Flexible AC Transmission Systems	70	20	10				100	3	1	-	4
2	EE-702	Control System	70	20	10	30	10	10	150	3	1	2	6
3	EE-703	Electrical Drives	70	20	10	30	10	10	150	3	1	2	6
4	Refer below	Elective –I	70	20	10	-	-	-	100	3	1	-	4
5	Refer below	Elective –II	70	20	10	-	-	-	100	3	1	-	4
6	EE-706	Major Project Synopsys-I	-	-	-	60	20	20	100	-	-	4	4
7	EE-707	Industrial Training -I (2Week)	-	-	-	60	20	20	100	-	-	4	4
		Total	350	100	50	180	60	60	800	15	5	12	32

Elective –I

EE- 704[A] - High Voltage Engg.
EE- 704[B] - Generalised Theory of Electrical Machines

Elective –II

EE- 705[A] - Computer Aided Design of Electrical Machines
EE- 705[B] - Artificial Intelligence

w.e.f July 2017

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EE

EE 701 Flexible AC Transmission Systems (FACTS)

Unit-1: Introduction: Facts basic concepts and general system considerations, power flow in ac system, definitions on facts, basic types of facts controllers, benefits from facts Technology, static var compensator (SVC): principle of operation and control strategy, thyristor controlled phase angle regulator (TCPAR): principle of operation and control strategy.

Unit-2: Transient Stability Analysis: Analysis of Power systems installed with FACTS devices.
Control with FACTS: Power Transmission Control using UPFC, power transmission control using phase shifting transformer (PST), power transmission control using SSSC.

Unit-3: **Oscillation Stability Analysis and Control with FACTS**: Linearised model of power systems installed with FACTS based stabilizers, Heffron-Phillips model of a SMIB system installed with SVC, TCSC and TCPS, Heffron-Phillips model of a SMIB system with UPFC, Heffron-Phillips model of a multi-machine system installed with SVC, TCSC and TCPS.

Unit-4: **Design of FACTS based stabilizers**: Analysis of damping torque contribution by FACTS based stabilizers installed in SMIB systems, selection of installing locations and feedback signal for FACTS based stabilizers, Dynamic Voltage restorer.

Unit-5: Power flow Controller: Unified Power Flow Controller (UPFC), principle of operation, configuration and control, simulation of UPFC, steady state model of UPFC, interline power flow controller (IPFC), principle of operation, configuration and control, static compensator (STATCOM), principle of operation and control, application for mitigation of SSR.

References:

1. "Understanding FACTS Devices" N.G. Hingorani and L. Guygi. IEEE Press Publications 2000.
2. Flexible AC Transmission System: Y.H.Song and A.T.Jhons, IEE, 1996(A Book)
3. Dr Ashok S & K S Suresh Kumar "FACTS Controllers and applications" course book for STTP, 2003.
4. Ned Mohan et.al, Power Electronics, John Wiley and Sons.
5. K. R. Padiyar, FACTS Controllers in Power Transmission and Distribution, New Age International, First Edition.

Registrar
Shri Satya Sai University of Technol
& Medical Sciences Sehore (M

S.S.S.U.T.M.S. School of Engineering SEHORE (M.P.)

EE- 702 Control Systems

Unit I - Introduction to Control System & Classification : Differential equations of systems, linear approximation, laplace transform and transfer function of linear system, model of physical system (electrical, mechanical and electromechanical), block diagram, signal flow graph, mason's gain formula, return difference and return ratio, error detectors, servomotor, tachogenerator, servo amplifier , magnetic amplifier, rotating amplifier.

Unit II - Time Domain Analysis: Representation of deterministic signals, first order system response, s- plane root location and transient response, impulse and step response of second order systems, performance characteristics in the time domain, effects of derivative and integral control, steady state response, error constant, generalized definition of error coefficients, concepts of stability, Routh Hurtwitz criterion.

Unit III - Frequency Domain Analysis: Frequency response bode plot, polar plot, nicol's chart, closed loop frequency response, frequency domain performance characteristics, and stability in the frequency domain, nyquist criterion.

Unit IV - Root Locus Method: Basis theory and properties of root loci, procedure for the construction of root loci, complete root locus diagram, design and compensation of feed back control system, approaches to compensation, cascade compensation networks and their design in the frequency domain, simple design in s- plane.

Unit V - State Variable Methods: Introduction to state variable concepts, state variable description of linear dynamic systems, representation in matrix forms, block diagram and signal flow graph representation of state equations – transfer matrix from state equations, transition matrix, general solution for linear time invariant state equations, basic principles of adaptive control systems.

References:

1. Ogata K, "Modern Control Engineering ", Prentice Hall
2. Modern Control Engineering,B S Mankey
3. Nagarath & Gopal," Control System Engineering," Wiley Eastern
4. Bakshi & Goyal. Feedback control system, Technical publication.

List of Experiment (Extendable):

1. To determine speed torque characteristics of armature controlled D.C. servomotor.
2. To determine the speed torque characteristics and relationship between torque speed and control windings voltage by AC servomotor.
3. To obtain the step response transient characteristics of first order electric system and to measure system parameters.
4. To plot the nyquist plot of a given transformer function using matlab.
5. To plot the bode plot of a given transformer function using matlab.

EE- 703 Electrical Drives

Unit I- Introduction to Electric Drives: Elements of drive systems, requirement of electric drives, rating & selection of drives, groups and individual drives, constant power and constant torque drives. Review of characteristics of AC & DC motors, load torque, load-drive, speed torque characteristics, quadrant speed torque characteristics, load equalization, stability of electric drives, moment of inertia and torque of motor load combination.

Unit II-DC Drives: Starting, braking, transient & steady state analysis phase controlled and chopper controlled drives, speed control, energy recovery systems, dual converter.

Unit III- Induction Motor Drives: Starting braking and speed control, PWM, voltage source inverter and current sources fed im drives, cyclo converter fed drive, vector control drives, slip power recovery, conventional control methods, rotor impedance control, converter controlled-Static Scherbius & Static Krammers drives.

Unit IV- Synchronous Motors Drives: Starting, braking, transient analysis, synchronous motors variable speed drives, V/F control, cyclo converter fed synchronous motor drive.

Unit V- Special Motor Drives: Fundamentals of switched reluctance motors, stepper motors, permanent magnet motor, vector control, digital control of drives.
Traction: Electric traction, machine tool drive, electric cars, steel & cements plants, textile & paper mills.

References:

1. G.K. Dubey "Fundamentals of Electrical Drives"-. Narosa Publications
2. 2. Gopal K. Dubey "Power semiconductor Controlled Drives"- PHI
3. S.K. Pillai, "A first course of Electrical Drive" New age International.
4. Ned Mohan Electrical Drive Wiley India
5. V. Subramanyam "Thyristor control of Electric Drive" Tata Mc Graw Hill Pub.
6. S.Shiva Nagaraju power semiconductor drive PHI learning

List of Experiments:

1. To study the starting and running characteristics of converter fed DC traction motor.
2. To study the energy recovery systems and braking of a DC drive.
3. To study the braking methods of a three-phase induction motor.
4. To study the performance of VSI fed three-phase induction motor using PWM technique.
5. To control the speed of a three phase slip ring Induction motor using rotor impedance control.
6. To study the performance of Vector Controlled three phase Induction motor drive.
7. To Study frequency Controlled Synchronous motor drive.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

S.S.U.T.M.S. School of Engineering SEHORE (M.P.)

(Elective-I) EE- 704 [A] - High Voltage Engineering

Unit –I Introduction: Basics of HV technology, advantages of transmitting electrical power at high voltages, need for generating high voltages in laboratory, applications of high voltage.

Unit –II Insulation & Breakdown: Classification of HV insulating media, its properties, gaseous dielectrics, ionizations, Townsend's theory & its limitations, streamer's theory breakdown in non uniform fields, corona discharges, Paschen's law and its significance, time lags of breakdown, breakdown in solid dielectrics, intrinsic breakdown, avalanche breakdown, thermal breakdown, and electro mechanic breakdown, breakdown of liquids dielectric, suspended particle theory, electronic breakdown, electro convection breakdown, cavity breakdown (bubble's theory).

Unit –III High Voltage AC DC : HV AC transformer, need for cascade connection, working of transformers units connected in cascade, series resonant circuit, principle of operation and advantages, tesla coil, HV DC voltage doubler circuit, Cock Croft- Walton type high voltage DC set.

Unit –IV: Impulse Voltage and current Introduction to standard lightning and switching impulse voltages, analysis of single stage impulse generator, expression for output impulse voltage, multistage impulse generator, its components, triggering of impulse generator by three electrode gap arrangement, triggering gap, oscillograph time sweep circuits, generation of switching impulse voltage, generation of high impulse current.

Unit –IV High Voltage Tests on Electrical Apparatus: Definitions of technologies, tests on isolators, circuit breakers, cables insulators and transformers.

Unit –V Measurement of High Voltages: Electrostatic voltmeter, generating voltmeter, series resistance micro ammeter, HV DC measurements, standard sphere gap measurements of HV AC & HV DC, potential dividers, resistance dividers, capacitance dividers, mixed RC potential dividers, surge current measurement.

References:

1. E. Kuffel and W.S. Zaengl, "High voltage engineering fundamentals", 2nd edition, Elsevier, press, 2005.
2. M.S.Naidu and Kamaraju, "High Voltage Engineering", 3rd edition, THM, 2007.
3. L. L. Alston, "High Voltage technology", BSB Publication, 2007..
4. Rakosh Das Begamudre, Extra High voltage AC transmission engineering, Wiley Easternlimited, 1987.
5. Transmission and distribution reference book-Westing House.
6. C.L.Wadhwa, High voltage engineering, New Age International Private limited, 1995.

EE- 704[B] - Generalised Theory of Electrical Machines

Unit I Generalized Theory: Conversions, basic two pole machines, transformer with movable secondary, transformer voltage and speed voltage, Kron's primitive machine , analysis of electrical machines, voltage and torque equation.

Unit II Linear Transformations: Invariance of power, transformations from displaced brush axis, three phases to two phase, rotating axes to stationary axes, transformed impedance matrix, torque calculations.

Unit III DC Machines: Generalized representation, generator and motor operation, operation with displaced brushes, steady state and transient analysis, sudden short circuit, sudden application of inertia load ,electric braking of dc motors.

Unit IV Synchronous Machines: Generalized representation, equivalent circuit, steady state analysis, transient analysis , phasor diagrams, electromechanical transients.
Induction Machines: Generalized representation, performance equation, equivalent circuit, steady state analysis, transient analysis, phasor diagrams, double cage machine, harmonics, voltage & torque equation for steady state operation of induction motor & Scharge motor.

Unit V Special Machines: Generalized representation, steady state analysis of reluctance motor, brushless dc motor, variable reluctance motor & single phase series motor.

References:

1. P.C.Krause, Analysis of Electric Machinery, Wiley India.
2. B.Adkins, The General theory of Electrical Machines.
3. B.Adkins & R.G.Harley, The General theory of AC Machines.
4. P.S.Bhimbra, Generalised theory of Electrical m/c
5. White & Woodson, Electro Mechanical Energy Conversion.

EE- 705[A] - Computer Aided Design of Electrical Machines

Unit-I Computer Aided Design Philosophy of computer aided design, advantages, limitations, analysis and synthesis methods, selection of input data and design variables, flow charts for design of induction motor and synchronous machine, optimization of design constrained and unconstrained optimization problem

Unit-II DC machine:-Design of armature windings & field systems, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design.

Unit-III Power Transformer:-Design of magnetic circuit, design of windings, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design.

Unit-IV Single Phase Induction Motor-Calculation of main dimensions of stator, complete design of stator with its punching details, design of main and auxiliary winding, design of rotor, performance calculation of designed rotor and performance by equivalent circuit approach.
Three Phase Induction Motor -Design of stator, windings design of squirrel cage rotor, design of slip ring rotor, selection of variables for optimal design, formulation of design equations, objective functions constraint functions, algorithms for optimal design.

Unit-V 3-Phase Alternator:-Design of stator, windings, design of field systems for salient pole and non-salient pole machines, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design.

References:

1. Computer- Aided Design of Electrical Equipment- by Dr. M. Ramamoorthy-Affiliated East-West press Pvt. Ltd. New Delhi.
2. Electrical Machine Design- by A.K. Sawhney, Dhanpat Rai & Sons.
3. Performance and Design of A.C. Machines-M.G. Say, Affiliated East West Press Pvt. Ltd., New Delhi.
4. Performance and Design of D.C. Machines- Clayton & Hancock.
5. Principles of Electrical Machine Design with Computer Programmes by- S.K. Sen, Oxford & IBH Publishing Co.

EE- 705[B] - Artificial Intelligence

Unit 01: Introduction: Organization of the brain, biological neuron, biological and artificial neuron models, historical developments, essentials of artificial neural networks, artificial neuron model, operations of artificial neuron, types of neuron activation function, ANN architectures

Unit 02: Classification Taxonomy of ANN: Connectivity, neural dynamics (activation and synaptic), learning strategy (supervised, unsupervised, reinforcement), learning rules. perceptron models: training algorithms: discrete and continuous perceptron networks, perceptron convergence theorem. multilayer feed forward neural networks

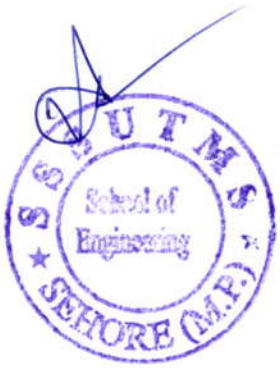
Unit 03: Memory: Associative memory, bi-directional associative memory, architecture, BAM training algorithms, storage and recall algorithm, BAM energy function, self-organizing maps (SOM) and adaptive resonance theory (ART).

Unit 04: Fuzzy Logic system: Fuzzy versus crisp, fuzzy sets, membership function, basic fuzzy set operations, properties of fuzzy sets, fuzzy relations, fuzzy control, predicate logic (interpretation of predicate logic formula, inference in predicate logic), fuzzy logic (fuzzy quantifiers, fuzzy inference), fuzzy rule based system, defuzzification methods.

Unit 05: Intelligent Tools: Introduction to genetic algorithm, biological background, GA operators, selection, encoding, crossover, mutation, chromosome, expert system, software architecture, rule base system.

References:

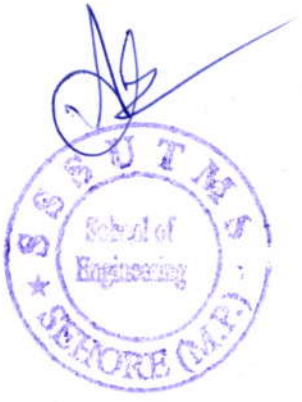
1. Simon Haykin, "Neural Networks: A Comprehensive Foundation", 2nd Edition, Pearson Education
2. S. Rajsekaram, G. A. Vijayalaxmi Pai, "Neural Networks, Fuzzy Logic & Genetic Algorithms Synthesis & Applications", Practice Hall India
3. James A. Anderson, "An Introduction to Neural Networks", Practice Hall India Publication
4. Mohamed H. Hassoun, "Fundamentals of Artificial Neural Network", Practice Hall
5. Kelvin Waruicke, Arthur Ekwlle, Raj Agarwal, "AI Techniques in Power System", IEE London U.K.
6. S. N. Sivanandam, S. Sumathi, S. N. Deepa, "Introduction to Neural Network Using MATLAB 6.0", Tata McGraw Hill.



Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EE-706 Major Project Synopsis-I

The students have to keep in mind that in final semester they would be required to implement whatever has been planned in the **Major Project Synopsis-I** in this semester. It is possible that a work, which involves greater efforts and time may be taken up at this stage and finally completed in final semester, but partial completion report should be submitted in this semester and also evaluated by an external examiner. At the end of semester, all students are required to submit a synopsis.



Registrar
Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)

EE-707 Industrial Training –I

Duration: 2 weeks after the VI semester in the summer break, Assessment in VII semester.

Students must observe following to enrich their learning during industrial training:

- Industrial environment and work culture.
- Organisational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Roles and responsibilities of different categories of personnel.
- Customer services.

-Problems related to various areas of Work etc.

- Layout if any

Registrar
Sri Satya Sai University of Technology
& Medical Sciences Sehore (M.P.)

Sri SatyaSai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination

B.E. VIII Semester (Electrical Engineering)

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Credits Allotted Subject wise			Total Credits
			Theory Slot			Practical Slot				L	T	P	
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work						
							Lab work & sessional	Assignment / quiz					
1	EE-801	Computer Application to Power System	70	20	10	30	10	10	150	3	1	2	6
2	EE-802	Advanced Electrical drives	70	20	10	30	10	10	150	3	1	2	6
3	Refer below	Elective -III	70	20	10	-	-	-	100	3	1	-	4
4	Refer below	Elective -IV	70	20	10	-	-	-	100	3	1	-	4
5	EE-805	Major Project-II	-	-	-	120	80	-	200	-	-	8	8
6	EE-806	Software Lab – III	-	-	-	30	10	10	50	-	-	2	2
7	EE-807	Seminar / Group Discussion	-			-	-	50	50	-	-	2	2
		Total	280	80	40	210	110	80	800	12	4	16	32

Elective – III

EE-803 (A) EHVAC and DC Transmission

EE-803 (B) Renewable & Non Conventional Energy Systems

Elective –IV

EE-804 (A) Power System Analysis & Control

EE-804 (B) Electrical Engineering Material

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EE

EE 801-Computer Applications to Power System

Unit I Power System Models- Models of power system components, network model using graph theory, formation of Z bus, transmission line models, regulating transformer, line loadability, capability curves of alternator.

Unit II Compensation- Control of load bus voltage using reactive power control variable, SVC & SVS, Regulated shunt compensation, series and shunt compensation, effect on loadability of transmission lines, Uniform series and shunt compensation.

Unit III Sensitivity Analysis-Sensitivity analysis- General sensitivity relations, generation shift distribution factors, line outage distribution factors, compensated shift factors, sensitivity associated with voltage-VAR, sensitivities relating load bus voltage changes in terms of PV bus voltage changes, sensitivity relating changes in reactive power generation for changes in PV Bus Voltage.

Unit IV Power System Security– Security functions, Security level, contingency analysis, security control, economic dispatch using LP formulation, pre-contingency and post-contingency, corrective rescheduling.

Unit V Stability -Voltage stability, Difference between voltage and angle stability, PV Curve for voltage stability assessment, proximity and mechanism, modal analysis using reduced Jacobian, participation factor, effect of series and shunt compensation on voltage stability , effect of load models.

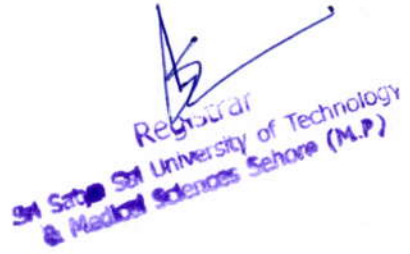
List of Experiments (Extendable): Matlab based:

1. Formation of bus admittance matrix using mat lab.
2. Z bus building algorithm using mat lab.
3. NEWTON RAPSON load flow analysis.
4. Fast de coupled load flow analysis.
5. Study of PV Curve for voltage stability.

References:

1. Power Generation, Operation and Control by A.J. wood and B.F. Wollenberg John Wiley & Sons Inc.
2. 1984.
3. Computer methods in power systems analysis – by stage G.W. and E.L. Abiad A.H. Mc Graw Hill.

4. Computer Techniques in Power Systems Analysis- Pai M.A. Tata Mc Graw Hill.
5. Computer Modeling of Electrical Power Systems, Arrillaga J. Arnord C.P Harker B.J. John Wiley & Son
6. Computer Aided Power Systems Analysis Kusic G.L.- 2nd Edition, CRC Press
7. Modern Power Systems Analysis Nagrath I.J. and Kothari D.P. Tata Mc Graw Hill.
8. Power System Analysis Grainger J.J. & Stevnson W.D. Mc Graw Hill.
9. Power System Stability and control –P Kundur ,IEEE Press 1994.
10. Advance Power Systems Analysis and Dynamics Singh L.P. John Wiley.



EE 802 - Advance Electrical Drives

Control of D.C. Motors by Converters: Thyristor controlled drives, single phase semi and fully controlled converters and three semi and fully controlled converters connected to d.c. separately excited, output voltage and current waveforms, speed and torque expression, speed-torque characteristics.

Unit-II: Induction Motors Control:-Control of induction motor by ac voltage controllers-waveforms, speed torque characteristics, variable frequency control of induction motor by voltage source, current source inverters and cycloconverters, PWM control comparison of VSI & CSI operations, speed torque characteristics.

Unit-III: Control of Induction Motors from Rotor Side:-Static rotor resistance control, slip power recovery static scherbius drive, static kramer drive, their performance and speed torque characteristics advantages, application, problems.

Unit-IV: Synchronous Motor Control: - Separate control & self control of synchronous motors, operation of self controlled synchronous motors by VSI, CSI and cycloconverters. load commutated CSI fed Synchronous motor, operation, waveform, speed torque characteristics, application, advantage, numerical problems, closed loop operation.

Unit-V: Special Motors: Servo drives, AC & DC servomotor, stepper motor, microstepping , control techniques, energy efficient electric motors.

List of Experiments (Extendable)-Matlab based experiments:

1. Thyristor controlling of single phase semi and fully controlled converters.
2. Thyristor controlling of three semi and fully controlled converters connected to d.c. separately excited.
3. Analysis of speed and torque expression of DC motor.
4. Variable frequency control of induction motor by voltage source, current source inverters.
5. Transient analysis of DC motors.
6. Transient analysis of Induction motors.
7. Transient analysis of Synchronous motors.

References:

1. G.K. Dubey "Fundamentals of Electrical Drives"-. Narosa Publications
2. Gopal K. Dubey "Power semiconductor Controlled Drives"- PHI
3. S.B. Dewan, G.R. Slemon, A. Straughen "Power semiconductor Controlled Drives"
4. B.K. Bose "Power Electronic control of AC Drives".
5. V. Subramanyam "Thyristor control of Electric Drive" Tata Mc Graw Hill Pub
6. N.K. De , P.K. Sen "Electric Drives" PHI
7. S.K. Pillai, "A first course of Electrical Drive" New age International.
8. S.K. Pillai. "Analysis of Thyristor Power conditioned Motors" University Press (India)Ltd. Longman
9. P.V. Rao, "Power semiconductor Drives", BS Publications.

EE 803 (A)- EHV A.C. and D.C. Transmission

Unit- I Introduction: EHV A.C. and D.C. links, Kind of d.c. links, limitations and advantages of a.c. and d.c. transmission, principal application of a.c. and d.c. transmission, trends in EHV A.C. and D.C. transmission, power handling capacity, firing angle control, overlapping.

Unit- II **FACTS Devices**: Basic types of controller, series controller, static synchronous series compensator(SSSC), thyristor-controlled series capacitor(TCSC), thyristor controlled series reactor(TCSR), shunt controller (STATCOM), static VAR compensator(SVC), seriesseries controller, combined series-shunt controller, unified power flow controller (UPFC), thyristor controlled phase shifting transformer(TCPST).

Unit- III Converters in EHV D.C: Components of EHV D.C. system, converter circuits, rectifier and inverter valves, reactive power requirements, harmonics generation, adverse effects, classification, remedial measures to suppress, filters, ground return. converter faults & protection harmonics misoperation, commutation failure, multiterminal d.c. lines.

Unit- IV Controlling: Control of EHV D.C. system desired features of control, control characteristics, constant current control, constant extinction angle control, ignition angle control. parallel operation of HVAC & DC system, problems & advantages.

Unit- V Transmission Systems: Travelling waves on transmission systems, Attenuation and distortion, effect of junction and termination on propagation of traveling waves, over voltages in transmission system. lightning, switching and temporary over voltages: control of lighting and switching over voltages.

References:

1. S. Rao,- "EHV AC & DC Transmission" Khanna pub.
2. Kimbark,-" HVDC Transmission" john willy & sons pub.
3. Arrillaga,- "HVDC Transmission"2nd Edition ,IEE londan pub.
4. Padiyar, -"HVDC Transmission" 1st Edition ,New age international pub.
5. T.K. Nagsarkar,M.S. Sukhiza, -"Power System Analysis", Oxford University
6. Narain.G. Hingorani, l. Gyugyi-"Undustanding of FACTS concept and technology", john willy & sons pub.
7. 7.P.Kundur- "H.V.D.C. Transmission" McGraw Hill

EE-803 (B) Renewable & Non Conventional Energy Systems

Unit – I Renewable Energy Systems: Energy sources, comparison of conventional and non-conventional, renewable and non-renewable sources, statistics of world resources and data on different sources globally and in indian context, significance of renewable sources and their exploitation, energy planning, energy efficiency and management.

Unit – II Wind Energy System: Wind Energy, wind mills, grid connected systems, system configuration, working principles, limitations, effects of wind speed and grid conditions. grid independent systems - wind-battery, wind diesel, wind-hydro biomass, wind operated pumps, controller for energy balance, small hydro system grid connected system, effect of hydro potential and grid condition, synchronous versus induction generator for stand alone systems, use of electronic load controllers and self excited induction generators, wave energy system: system configuration: grid connected and hybrid systems.

Unit – III Geothermal Energy Electric energy from gaseous cells, magneto-hydro generated energy, non hazardous energy from nuclear wastes, possibilities of other modern non-conventional energy sources.

Unit – IV Energy from oceans & Biomass Energy System: Ocean temperature difference, Principles of OTEC, plant operations, system configuration, biomass engine driven generators, feeding loads in stand-alone or hybrid modes, biomass energy and their characteristics.

Unit – V: Solar Energy: Extraterrestrial solar radiation, terrestrial solar radiation, solar thermal conversion, solar photo tonic system solar cell, solar cell materials, efficiency, characteristics of PV panels under varying insulation, PV operated lighting and water pumps, characteristics of motors and pumps connected to PV panels, electric energy conservation and audit.

References:

1. John Twidell & Toney Weir, Renewable Energy Resources, E & F N Spon.
2. El-Wakil, Power Plant Technology, McGraw Hill.
3. Rai G D, Non-conventional Energy Resources, Khanna.
4. F Howard E. Jordan, "Energy-Efficient Electric Motor & their Application-II", Plenum Press, New York, USA.
5. Anna Mani, "Wind Energy Resource Survey in India-III", Allied Publishers Ltd., New Delhi,
6. S.P. Sukhatme: Solar Energy, TMH-4e,
7. Dr. A. Ramachandran, Prof B.V Sreekantan & M F.C. Kohli etc, "TERI Energy Data Directory & Year book 1994-95", Teri Tata Energy Research Institute, New Delhi,

EE 804(A)- Power System Analysis and Control

UNIT I Introduction to power system stability problem: Rotor angle stability, voltage stability and voltage collapse, mid term and long-term stability, classification of stability, states of operation, system security, system dynamic problems, problems associated with modern interconnected power systems, deregulation, power systems restructuring, distributed generation, congestion, pricing.

Unit-II Power System Stability - Steady state, dynamic and transients stability, swing equation , equal area criterion, solution of swing equation using step by step method modified Eulers method and Rnge-Kutta method, methods of improving transient stability.

Unit-III Power Flow Atudies - Formulation of static power flow equations and solutions using Gauss- Seidel, Newton Raphson and FDLF methods, comparison of these methods, Economic operation of power system - Economic dispatch, Emission dispatch, line loss, ITL, economic dispatch using lagrangian multiplier method.

Unit-IV MW Frequency Control- Coherency, control area, modeling of speed control mechanism, load damping, block diagrammatic representation of single and two area interconnected system, static and dynamic response, .optimum parameter adjustment.

Unit-V MVAR Voltage Control - Difference in control strategy over MW – f control, characteristics of an excitation system, DC AC and static excitation system, General block diagram representation of voltage regulators.

References:

1. K.R. Padiyar, Power system dynamics, stability and control, BS Pub. Hydbid
2. P Kunder, Power system stability and control, TMH.
3. P. W. Sauer & M A Pai: Power system dynamics and stability: Pearson.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EE804 (B)-Electrical Engineering Materials

Unit I Conducting Material and Their Properties: Classification, properties, high resistivity alloy: constant mangann,nichrome, electrochemical, properties of copper, aluminum, steel tungsten, molybdenum, platinum, tantalum, niobium, mercurry, nickel, titanum, carbon, lead, thermal, bitmetals, thermocouple, materials, specific resistance, conductance, super conductors, variation of resistance with temperature.

Unit II Semi Conductor Materials: Electrical conductivity, elements having semiconductor properties, general application, hall effect, energy levels, conduction in semiconductors, intrinsic conduction, impurity conduction, p and n type impurities, electrical change, neutrality, drift, mobility current flow in semi conductors p-n junction formation by alloying, elasing (forward and reverse) of p-n junction, reverse separation current, zener effect, junction, capacitance, hall defects and hall coeffiecient.

Unit III Magnetic Materials: B.H. curve, soft and hard magnetic materials, di-magnetic, para magnetic and ferromagnetic materials, electrical sheet steel, cast iron, permanent magnetic materials, dynamic and static hysteresis loop, hysterisis loss, eddy current loss, magnetisation, magnetic susceptibility, coercive force, rectangular hysteresia loop, magnet rest square loop core materials, iron silicon, iron alloys.

Unit IV Insulating Materials: Electrical, mechanical and chemical properties of insulating material, electrical characteristics, volume and surface resistivity, permitivity loss, and dielectric loss, polarisability, classification of dielectric.

Unit V Mechanical Properties: Classification of insulating materials on the basis of temperature rise, general properties of transformer oil, varnishes, solidifying insulating materials, resins, bituminous waxes, drying oils, fibrous insulating materials, wood, paper and cardboard, insulating textiles, varnished adhesive tapes, inorganic fibrous material and other insulating materials, such as mica, ceramic, bakelite, ebonite, glass, PVC, rubber, other plastic molded materials.

References:

1. TTTI Madras; Electrical Engineering Materials; TMH.
2. Electrical Engineering Material s & Devices; John Allison ;TMH
3. Electrical Engineering Materials: Indulkar and S. Thruvengadem;
4. Electrical Engineering Materials; S. Chand
5. Dekkor AK; Electrical Engineering Materials; PHI

EE805 Major Project -II

The aim of the final year project is to develop student's knowledge for solving technical problems through structure project research study in order to produce competent and sound engineers. It provides the students with the opportunity to design undertake or conduct an independent research or study related to their degree course.

Following are the compulsory objectives to be needed :

1. It should be from the approved area of the subject.
2. Students must submit a written report of the same.
3. Students must submit outline and action plan for the project execution
4. Each student is required to prepare a project report and present the same at the final examination with a ppt. demonstration.
5. The project should be authentic and must not be copied from anywhere and it should be working.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EE 806 Software Lab.-III

List of Experiments (Matlab Based):

1. Developing Simulation Models using STATCOM in power system transmission lines.
2. Developing Simulation Models using SVC in power system transmission lines.
3. Developing Simulation Models using TCSC in power system transmission lines.
4. Developing Simulation Models using SSSC in power system transmission lines.
5. Developing Simulation Models using IPFC in power system transmission lines.
6. Developing Simulation Models using UPFC in power system transmission lines.
7. Developing Simulation Models for single and three phase Rectifier for different load models.
8. Developing Simulation Models for single and three phase Inverter for different load models.
9. Developing Simulation Models for single and three phase Converter different load models.
10. To develop a program in Matlab for information of Y-bus matrix for N bus system.
11. Load flow solution for 3-bus system using Gauss- Seidel, Newton Raphson and FDLF
12. methods up to 3 iteration.
13. Load flow solution for IEEE 6-bus and 30-bus system in Matlab using Newton Raphson method.
14. Assessment of transient stability of a single machine system.
15. Effect of compensation on voltage profile of IEEE 6-bus system.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

Minutes of Board of Studies Committee Meeting Dated : 03.6.2018

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 03.6.2018. Following members were present.

1. Mr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Mr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Mr. Sandesh Pradhan (external)
8. Dr. N.P. Patidar (External)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EE-5th semester Scheme and Syllabus (CBCS)

Discussion (If any) : Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion : Scheme and Syllabus was prepared as per current demand in industries and was approved for forthcoming 5th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Mr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Mr. Sandesh Pradhan (external)
8. Dr. N.P. Patidar (External)

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - CBCS Pattern

Academic Year 2018– 2019

Branch :Electrical Engineering **Semester - V**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P		
1	EEC- 501	Electrical Machine-II	60	30	10	30	20	2	1	2	4	150
2	EEC- 502	Power Electronics	60	30	10	30	20	2	1	2	4	150
3	EEC- 503	Control System	60	30	10	30	20	2	1	2	4	150
4	EEC- 504	Department Elective-I	60	30	10			2	1		3	100
5	EEC- 505	Department Elective-II	60	30	10			2	1		3	100
6	EEC- 506	Open Elective	60	30	10			2	1		3	100
7	EEC- 507	Industrial Training - I					100			4	2	100
TOTAL			**360**	**180**	**60**	**90**	**160**	**12**	**6**	**10**	**23**	**850**

Department Elective I-EEC -504	EEC-504(A) Neural Network	EEC-504(B) Reliability Engineering	EEC-504(C) Digital Electronics
Department Elective II-EEC-505	EEC-505(A) Renewable Energy Sources	EEC-505(B) Computer Application in Power System	EEC-505(C) Industrial Electronics
Open Elective -EEC- 506	EEC-506(A) Operating System	EEC-506(B) Modelling & Simulation of Electrical System	EEC-506(C) Biomedical Instrumentation

SSSUTMS

w.e.f July 2018

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 501 Electrical Machine-II

Unit I - Basics of Synchronous Machine: Construction, working principal, types of prime movers, excitation system, polyphase distributive winding, coil span and winding factors , integral and fractional slot windings, emf equation, harmonics and their elimination, armature reaction, synchronous reactance and impedance, equivalent circuit of alternator, relation between generated voltage and terminal voltage, voltage regulation of alternators using synchronous impedance, MMF, ZPF and A.S.A method.

Unit II - Synchronous Machine- I: Salient pole machines, two reaction theory equivalent circuit model and phasor diagram, determination of Xd and Xq by slip test, power angle equation and characteristics, synchronizing of alternator with infinite busbar, parallel operation and load sharing, synchronizing current, synchronizing power and synchronizing torque coefficient, synchroscopes, phase sequence indicator; effect of varying excitation and mechanical torque.

Unit III - Synchronous machine-II: Synchronous motor operation, starting and stopping of synchronous motor, pull in & pull out torque, motor under load power and torque, reluctance torque, effect of excitation, effect of armature reaction, power factor adjustment, V curves, inverted V curves, super synchronous and sub synchronous motors, hunting and damper winding, efficiency and losses.

UNIT IV- Short Circuit Ratio: SCR and its significance, short circuit oscillogram, determination of various transient, sub transient, steady reactances and time constants, expression of transient and sub transient reactances w.r.t self and mutual inductances of various winding, short circuit current, equivalent circuit.

Unit V- Special Electrical machines: PM brushless DC motors, switched reluctance motor, linear induction motor, stepper motors, their constructional features, principle of operation, applications.

References:

1. P.S. Bimbhra, Generalised Theory of Electrical Machines.
2. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.
3. Electrical Engineering by JB Gupta, SK Kataria & sons, New Delhi
4. Fitzgerald, C.Kingslay, S.D. Umans, Electric machinery ,5th Ed., McGraw Hills, 1992
5. Electrical Machines, Ashfaq Hussain ,2014

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

List of Experiments :(Extendable)

1. Study of torque step rate characteristic of a stepper motor.
2. Study of characteristic of switched reluctance motor.
3. To determine regulation of alternator using mmf and zpf methods.
4. To synchronise alternator with infinite bus bar.
5. To plot V and inverted V curves for a synchronous motor.
6. To find Xd and Xq of salient pole synchronous machine by slip test.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 502 Power Electronics

Unit-I Power Electronic Devices: Power diodes, power transistors, GTO, triac, diac, power MOSFET, IGBT, LASCR, fast recovery diode, schottey diode, construction, principle , operation & characteristics of SCR, two transistor analogy, turn on & off of SCR, commutation techniques (Class A,B,C,D,E,&F Commutation), UJT, ramp triggering, SCR rating & protection, snubber circuit, heating, cooling & mounting of SCR, series and parallel operation of SCR, String efficiency.

Unit-II Rectifier: Single phase half wave & full wave uncontrolled and controlled rectifier circuit with resistive, resistive & inductive load (continuous & non continuous conduction), & RLE loads, average load voltage and load current, active and reactive power, effect of free wheeling diode and source inductance, comparison of mid point & bridge rectifier circuits.

Unit-III Inverter: Series and parallel inverter, voltage source & current source inverter, Single phase and three phase bridge inverter, Self cumulated inverters, Mc- murray & MC murray bed ford inverters, Voltage control of single phase and three phase bridge inverter, Harmonics & their reduction.

Unit-IV Chopper: Chopper operation, Step up & step down choppers, chopper configuration (A, B, C, D, & E), steady state analysis, current & voltage commutation of chopper circuits, Jones & Morgens chopper.

Unit-V AC voltage controllers: AC voltage controllers using SCRs & traics, single phase full wave controller with R and RL load, RMS load voltage, load current and input power factor, three phase AC voltage controller, Dual converter, Switched mode voltage regulator, buck, Boost, & Chuck regulators, Single phase & three phase cyclo convertor.

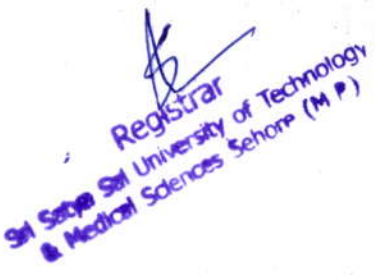
References:

1. M.H. Rashid, Power Electronics Circuits, Devices and Applications, Pearson
   a. Education, Singapore, 1993.
2. M Ramsmoorthy, An Introduction to transistor and their application, Affiliated East-West Press.
3. P.C. Sen, Power Electonics, TMH.
4. M.D. Singh, K.B. Khanchandani, Power Electronics, TMH, Delhi, 2001.
5. Chakravarti A., Fundamental of Power Electronics and Drives, Dhanpat Ray & Co.
6. P.S. Bhimbhra, Power Electonics, Khanna Pub.
7. Vedam Subramanyam, Power Electronics New Age International Revised II ed. 2006.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

List of Experiments (Extendable):

1. To study V-I characteristics of SCR.
2. To study UJT trigger circuit for half wave and full wave control.
3. To study single-phase half wave controlled rectified with R load (ii) L load with and without freewheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study single-phase ac voltage regulator with resistive and inductive loads.
6. To study single phase cyclo-converter.
7. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor.
8. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.



EEC- 503 Control System

Unit I - Control System & Classification : Differential equations of systems, linear approximation, laplace transform and transfer function of linear system, model of physical system (electrical, mechanical and electromechanical), block diagram, signal flow graph, mason's gain formula, return difference and return ratio, error detectors, servomotor, tachogenerator, servo amplifier, magnetic amplifier, rotating amplifier.

Unit II - Time Domain Analysis: Representation of deterministic signals, first order system response, s- plane root location and transient response, impulse & step response of second order systems, performance characteristics in time domain, derivative & integral control, steady state response, error constant, error coefficients, stability, Routh Hurtwitz criterion.

Unit III - Frequency Domain Analysis: Frequency response bode plot, polar plot, Nicol's chart, closed loop frequency response, frequency domain performance characteristics, and stability in the frequency domain, Nyquist criterion.

Unit IV - Root Locus Method: Basis theory and properties of root loci, procedure for the construction of root loci, complete root locus diagram, design and compensation of feed back control system, approaches to compensation, cascade compensation networks and their design in the frequency domain, simple design in s- plane.

Unit V - State Variable Methods: Introduction to state variable concepts, state variable description of linear dynamic systems, representation in matrix forms, block diagram & signal flow graph representation of state equations, transfer matrix from state equations, transition matrix, general solution for linear time invariant state equations, adaptive control systems.

References:

1. Ogata K, "Modern Control Engineering ", Prentice Hall
2. Modern Control Engineering,B S Mankey
3. Nagarath & Gopal," Control System Engineering," Wiley Eastern
4. Bakshi & Goyal. Feedback control system, Technical publication.

List of Experiment (Extendable):

1. To determine speed torque characteristics of armature controlled D.C. servomotor.
2. To determine the speed torque characteristics and relationship between torque speed and control windings voltage by AC servomotor.
3. To obtain the step response transient characteristics of first order electric system and to measure system parameters.
4. To plot the nyquist plot of a given transformer function using matlab.
5. To plot the bode plot of a given transformer function using matlab.

EEC-504(A) Neural Network

Unit-I Neural Network & Learning Process: Basic concept, neural network advantages, models of a neuron, neural network as directed graph, network architectures, artificial intelligence and neural network, learning processes, error correction learning, memory based learning, Hebbian learning, competitive learning, Boltzman learning, learning tasks, adaptation, statistical learning theory.

Unit-II Perceptrons : Single layer perceptrons, adaptive filtering problem, unconstrained optimization technique, linear least squares filter, least mean square algorithm, perceptron convergence theorem, multi layer perceptron, architecture, back propagation algorithm, generalization, network pruning techniques, approximations of functions.

Unit-III Radial Basis Function Networks: Cover's theorem, interpolation problem, supervised learning, regularization theory & network, generalized radial basis function networks (RBF), estimation of the regularization parameter, approximation properties of RBF networks, comparison of RBF networks and multilayer perceptrons, Kernel regression and its relation to RBF networks.

Unit-IV Entropy Analysis: Entropy, maximum entropy, mutual information, Kullback-Leibler divergence, mutual information as an objective function to be optimized, maximum mutual information, infomax and redundancy reduction, spatially coherent and incoherent features, independent components analysis, maximum likelihood estimation.

Unit V Recurrent Networks: Recurrent network architectures, state space model, non-linear autogressive with exogenous inputs model, computational power of recurrent networks, learning algorithms, back propagation through time, real time recurrent learning, system identification, model reference adaptive control, Kalman filter, decoupled Kalman filter.

References:

1. Haykin: Neural Networks- A Comprehensive Foundation, PHI Learning.
2. Sivanandam, Sumathi and Deepa: Introduction to Neural Networks using Matlab, TMH.
3. Freeman and Skapura: Fundamentals of Neural Networks- algorithms, applications and
4. programming techniques, Pearson Education.
5. Hagan, Demuth and Beale: Neural Network Design, Cengage Learning.
6. Anderson: An introduction ro Neural Networks, PHI Learning.
7. Satish Kumar: Neural Networks, TMH.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-504(B) Reliability Engineering

Unit I: Introduction to reliability and indices: Probability theory, density and distribution function of continuous and discrete random variable.

Unit -II Component reliability: Hazard function, failure laws, exponential failure law, wear in period and its importance, safety and reliability, replacement, methods of reliability improvement.

Unit -III Reliability evaluation: Evaluation of series, parallel, and series–parallel network. complex network reliability evaluation using event, space, decomposition, tie-set, cut-set, load sharing system, multi state models.

Unit -IV Evaluation methods: Markov process, state diagram, availability and unavailability function, evaluation of time dependent and limiting state probabilities, MTTF calculation. concept of frequency and durations. State enumeration method for evaluating failure frequency, MUT, MDT, frequency balance approach.

Unit -V Reliability Testing: Estimation of reliability function, failure function and MTTF from grouped and ungrouped datas, censoring and accelerations, parametric methods.

References:

1. Introduction to reliability engineering –E.E.Lewis, John Wiely and Sons, 1987
2. Reliability and maintainability engineering, C.E. Ebeling, TMH, 2006
3. Reliability Engineering : Probability Models and maintanance methods –Joel A.Nochlas,Taylor and Prancis 2005
4. Reliability evaluation of engineering system: concept and techniques-R. Billinton, R.N.Allon, Pitman, 1984

EEC-504(C) Digital Electronics

Unit-I :Number Systems : Decimal, binary, octal, Hexadecimal, Excess 3, Gray ASCII, decimal number system and conversion , binary weighted codes, signed numbers, 1s and 2s complement codes, Binary arithmetic, Boolean Algebra: Binary logic functions , Boolean laws, truth tables, associative and distributive properties, DeMorgans theorems, realization of switching functions using logic gates

Unit-II : Combinational Logic: AND, OR, NOT, XOR, XNOR, NAND, NOR, realization of boolean function using universal gates. half and full adder, half and full subtractor, series and parallel adder, BCD adders, lookahead carry generator, decoders, encoders, multiplexers and de-multiplexers. analysis and design of combination circuits, realization of various boolean functions using NAND,NOR gates and multiplexers.

Unit-III : Flip-Flops: R-S, Clocked R-S, T, D, J-K, race around problem, Master-slave J-K., state and excitation tables. shift registers and counters :synchronous and asynchronous counters, binary ripple counter, up-down counter, johnson and ring counter. analysis and design of sequential circuits

Unit-IV : Semiconductor memories: Organization and construction of RAM, SRAM, DRAM, RAMBUS ROM, PROM, EPROM, EEPROM, PAL and PLAs etc .

Unit V : Logic families: RTL, DTL, TTL, ECL, IIL, PMOS, NMOS and CMOS logic etc. Interfacing between TTL and MOS, vice-versa.

References:

1. M. Mano : Digital Logic and Computer Design, Pearson Education
2. W.H. Gothman : Digital Electronics, PHI.
3. Millman and Taub : Pulse, Digital and Switching Waveforms, MGH
4. Salivahanan and Ari Vahagan : Digital Circuits and Design, Vikas Publishing House
5. Leach and Malvino : Digital Principles and Applications, TMH

Registrar
Shri Sathya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-505(A) Renewable Energy Sources

Unit – I Renewable Energy Systems: Energy sources, comparison of conventional and non-conventional, renewable and non-renewable sources, statistics of world resources and data on different sources globally and in Indian context, significance of renewable sources, energy planning, energy efficiency and management.

Unit – II Wind Energy System: Wind Energy, wind mills, grid connected systems, system configuration, working principles, limitations, effects of wind speed and grid conditions. grid independent systems - wind-battery, wind diesel, wind-hydro biomass, wind operated pumps, controller for energy balance, small hydro system grid connected system, effect of hydro potential and grid condition, synchronous versus induction generator for stand alone systems, use of electronic load controllers and self excited induction generators, wave energy system: system configuration: grid connected and hybrid systems.

Unit – III Geothermal Energy: Electric energy from gaseous cells, magneto-hydro generated energy, non hazardous energy from nuclear wastes, possibilities of other modern non-conventional energy sources.

Unit – IV Energy from Oceans & Biomass Energy System: Ocean temperature difference, principles of OTEC, plant operations, system configuration, biomass engine driven generators, feeding loads in stand-alone or hybrid modes, biomass energy and their characteristics.

Unit – V: Solar Energy: Extraterrestrial solar radiation, terrestrial solar radiation, solar thermal conversion, solar photo tonic system solar cell, solar cell materials, efficiency, characteristics of PV panels under varying insulation, PV operated lighting and water pumps, characteristics of motors and pumps connected to PV panels, electric energy conservation and audit.

References:

1. John Twidell & Toney Weir, Renewable Energy Resources, E & F N Spon.
2. El-Wakil, Power Plant Technology, McGraw Hill.
3. Rai G D, Non-conventional Energy Resources, Khanna.
4. F Howard E. Jordan, "Energy-Efficient Electric Motor & their Application-II", Plenum Press, New York, USA.
5. Anna Mani, "Wind Energy Resource Survey **in** India-Ill", Allied Publishers Ltd., New Delhi,
6. S.P. Sukhatme: Solar Energy, TMH-4e,
7. Dr. A. Ramachandran, Prof B.V Sreekantan & M F.C. Kohli etc, "TERI Energy Data Directory & Year book 1994-95", Teri Tata Energy Research Institute, New Delhi,

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-505(B) Computer Application in Power System

Unit -I Power System Models: models of power system components, network model using graph theory, formation of Z bus, transmission line models, regulating transformer, line loadability, capability curves of alternator.

Unit- II Compensation: Control of load bus voltage using reactive power control variable, SVC & SVS, Regulated shunt compensation, series and shunt compensation, effect on loadability of transmission lines, Uniform series and shunt compensation.

Unit- III Sensitivity Analysis: Sensitivity analysis- general sensitivity relations, generation shift distribution factors, line outage distribution factors, compensated shift factors, sensitivity associated with voltage-VAR, sensitivities relating load bus voltage changes in terms of PV bus voltage changes, sensitivity relating changes in reactive power generation for changes in PV bus voltage.

Unit- IV Power System Security: Security functions, security level, contingency analysis, security control, economic dispatch using LP formulation, pre-contingency and post-contingency, corrective rescheduling.

Unit -V Stability : Voltage stability, difference between voltage and angle stability, PV curve for voltage stability assessment, proximity and mechanism, modal analysis using reduced jacobian, participation factor, effect of series and shunt compensation on voltage stability , effect of load models.

References:

1. Power Generation, Operation and Control by A.J. wood and B.F. Wollenberg John Wiley & Sons Inc.
2. 1984.
3. Computer methods in power systems analysis – by stage G.W. and E.L. Abiad A.H. Mc Graw Hill.
4. Computer Techniques in Power Systems Analysis- Pai M.A. Tata Mc Graw Hill.
5. Computer Modeling of Electrical Power Systems, Arrillaga J. Arnord C.P Harker B.J. John Wiley & Son
6. Computer Aided Power Systems Analysis Kusic G.L.- 2nd Edition, CRC Press
7. Modern Power Systems Analysis Nagrath I.J. and Kothari D.P. Tata Mc Graw Hill.
8. Power System Analysis Grainger J.J. & Stevnson W.D. Mc Graw Hill.
9. Power System Stability and control –P Kundur ,IEEE Press 1994.
10. Advance Power Systems Analysis and Dynamics Singh L.P. John Wiley

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-505(C) Industrial Electronics

Unit-I Power Supplies: Power supply, rectifiers (half wave, full wave), performance parameters of power supplies, filters (capacitor, inductor, inductor-capacitor, pi filter), bleeder resistor, voltage multipliers, regulated power supplies (series and shunt voltage regulators, fixed and adjustable voltage regulators, current regulator), comparison of linear and switched power supply, switch mode converter (flyback, buck, boost, buk-boost, cuk converters).

Unit-II Thyristors: Silicon controlled rectifies , constructional features, principle of operation, turn-on and turn-off methods, triggereing methods, types of commutation, thermal characteristics of SCR, causes of damage to SCR, SCR overvoltage protection circuit, seies and parrel operation of SCRs, line commutated converters (half wave rectifier with inductive and resistive load, single phase and three phase full wave rectifiers).

Unit-III Applications of OP-AMP: OP-AMP, relaxation oscillator, window comparator, rectangular to triangular pulse convertersion, Wien bridge oscillator, function generator, frequency response of OP-AMP, power supplies using OP-AMP, filters .

Unit-IV Programmable Logic Controller: Functions, applications, advantages and disadvantages of PLC over conventional relay controllers, comparison of PLC with process control computer system, selection of PLC, functional block diagram of PLC, microprocessor in PLC, memory, input and output modules (interface cards), ladder logic language, process control applications of PLC, Programming examples.

Unit-V Residential and Industrial Application Space Heating and air conditioner, high frequency fluorescent lighting, electronic timer, battery charger, switch-mode-power supply, uninterruptible power supply, static switches, induction heating, electric welding, introduction of HVDC and FACTs.

References:

1. Bishwanath Paul: Industrial Electronics and control, PHI Learning.
2. Rashid: Power Electronics- Circuits, devices and applications, Pearson Education.
3. Singh and Khanchandani: Power Electronics, TMH
4. Bhimbra: Power Electronics, Khanna Publishers.
5. Moorthi: Power Electronics, Oxford University Press.
6. Webb: Programmable Logic Controllers- Principles and Applications, PHI Learning.
7. Petruzulla: Programmable Logic Controllers, TMH.

EEC-506(A) Operating System

Unit I- Introduction: History of operating System, types of operating system: batch processing, real time, multitasking & multiprogramming, time-sharing system, operating system services, operating system structure, system call & system boots, operating system design & implementations, system protection, buffering & spooling.

Unit II- Processes Management: Process concept, process control block, systems programmer's view of processes, operating system services for process management, scheduling algorithms, first come first serve, round robin, shortest run time next, highest response ratio next, multilevel feedback queues, performance evaluation of scheduling algorithms.

Unit III Deadlock: Characterization, methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, process management in linux. file management:- file system, access methods, free space managements, allocation methods, directory systems, protection, organization, sharing & implementation issues, disk & drum scheduling, file system in linux & windows.

Unit IV- I/O Management: I/0 devices organization, I/0 devices organization, I/0 buffering, I/O Hardware, Kernel I/O subsystem, transforming I/O request to hardware operations, device management: path managements, sub module, procedure, scheduler, handler, interrupt service routine.

Unit V- Memory Management: Memory hierarchy, MFT & MVT, logical and physical address space, concept of swapping and paging, memory management without swapping or paging, contiguous and non-contiguous allocation, segmentation, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation and paging combined with segmentation, structure & implementation of page table, virtual memory, cache memory organization.

References:

1. Silberschatz ,"Operating system", Willey Pub.
2. Stuart,"Operating System Principles, Design & Applications",Cengage Learning.
3. Tannanbaum, "Modern operating system",PHI Learning.
4. Dhamdhere, "Operating System",TMH.
5. Achyut S Godbole,"Operating System", TMH.

EEC-506(B) Modelling & Simulation of Electrical System

Unit-I Choice of simulators: Power electronic circuit simulation, analysis of dynamic behaviour of electrical machines using MATLAB/SIMULINK.

Unit-II- Modelling of Power Electronic Converters: Modelling of semiconductor devices, switch realization– single quadrant and two quadrant switches, switching losses.

Unit-III DC-DC converters: Steady-state analysis of converter in continuous and discontinuous modes (CCM & DCM), and estimation of converter efficiency, development of circuit model for simulating dynamic operating conditions in CCM & DCM, Feedback control for converters.

Unit-IV Dynamic Modelling of Electrical Machines: Modelling of DC machines, modelling of three phase Induction machine, Reference frame theory – ARF, RRF, SYRF, SRF, equations of transformation, voltage equations, torque equations, analysis of steady-state operation, acceleration characteristics, effect of loading and operation with non-sinusoidal voltages.

UNIT-V Case Studies: Analytic Vs Simulation Models, advantages and disadvantages.

References:

1. R.W. Erickson, Dragan Maksimovic, Fundamentals of Power Electronics (2 e), Springer, 2005.
2. P.C. Krause, O. Wasynczuk, S.D. Sudhoff, Analysis of Electrical Machinery & Derive Systems (2e), Wiley Student Edition, 2002.

Registrar
Sri Sathya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-506(C) Biomedical Instrumentation

Unit I- Introduction: Origin of Bio electric signals and their characteristics. Noise coupling, powerline and other interfering sources, Artifacts, Analysis of concurrent, coupled and correlated processes.

Unit II -Bioelectric Signals: Detection of events in bioelectric signals like ECG, EEG, PCG, detection of waves, correlation & coherence analysis, few case studies.

Unit III-Measurement Systems: Specifications of instruments, static & dynamic characteristics, classification of errors, statistical analysis. Introduction to reliability, accuracy, fidelity, speed of response, linearization of technique, data acquisition system.

Unit IV-Bioelectric Amplifiers: Special features of bioelectric amplifiers, safety requirements, realization of bioelectric amplifiers, carrier amplifiers, chopper amplifiers, phase sensitive detector, isolation amplifiers, and instrumentation amplifiers.

Unit V-Patient Safety and Electro medical Equipment: Physiological effects of electrical currents, macroshock and microshock, preventive measures to reduce shock hazards, Leakage current, isolation of patient circuits, safety of electrically susceptible patients, radiation hazards and safety, shielding, open ground problem and earthing methods.

References:

1. Human Physiology- The Mechanism of Body Function By Vander, Sherman,TMH Ed.1981
2. Introduction To Biomedical Equipment Technology By Carr & Brown
3. Biomedical Instrumentation and Measurements By Cromwell, 2nd edition, PearsonEducation. 4. Handbook of Biomedical Instrumentation By R. S. Khandpur, TMH
4. Biomedical Digital Signal Processing, Tompkins, PHI
5. Biomedical Instrumentation, Arumugam.

EEC- 507 Industrial Training – I

Students must observe following points to enrich their learning in electrical engineering during industrial training:

- Industrial environment and work culture.
- Organisational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Roles and responsibilities of different categories of personnel.
- Customer services.
-Problems related to various areas of Work etc.
- Layout if any

To be submitted : The students has to submit the power point presentation of minimum15 slides of the training performed(comprising of points stated above) along with the original certificate of training performed with proper seal and signature of the authorized person.

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

Minutes of Board of Studies Committee Meeting Dated : 10.12.2018

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 10.6.2018. Following members were present.

1. Mr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Mr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Mr. Sandesh Pradhan (external)
8. Dr. N.P. Patidar (External)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EE-6th semester Scheme and Syllabus (CBCS)

Discussion (If any) : Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion : Scheme and Syllabus was prepared as per current demand in industries and was approved for forthcoming 6th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Mr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Mr. Sandesh Pradhan (external)
8. Dr. N.P. Patidar (External)

SSSUTMS ★ School of Engineering ★ SEHORE (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - CBCS Pattern

Academic Year 2018– 2019

Branch :Electrical Engineering **Semester - VI**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P		
1	EEC- 601	Power System Analysis	60	30	10	30	20	2	1	2	4	150
2	EEC- 602	Electrical Drives	60	30	10	30	20	2	1	2	4	150
3	EEC- 603	Power Systems and Control	60	30	10	30	20	2	1	2	4	150
4	EEC- 604	Department Elective-III	60	30	10			2	1		3	100
5	EEC- 605	Department Elective-IV	60	30	10			2	1		3	100
6	EEC- 606	Open Elective	60	30	10			2	1		3	100
7	EEC- 607	Industrial Training Project - I				100				4	2	100
TOTAL			**360**	**180**	**60**	**190**	**60**	**12**	**6**	**10**	**23**	**850**

Department Elective III-EEC -604	EEC-604(A) Digital System Design	EEC-604(B) EHVAC & DC	EEC-604(C)Evolutionary Techniques
Department Elective IV-EEC-605	EEC-605(A) Global Positioning System	EEC-605(B) Prime Movers	EEC-605(C) Electrical Engineering Graphics
Open Elective -EEC- 606	EEC-606(A) TCP-IP	EEC-606(B) Network Synthesis	EEC-606(C) Project Management

SSSUTMS

w.e.f July 2018

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 601 – Power Systems Analysis

Unit-I Mechanical Features of Overhead Lines: Conductor material and types of conductor, conductor arrangements and spacing, calculation of sag and tension, supports at different levels, effect of wind and ice loading, stringing chart and sag template, conductor vibrations and vibration dampers.

Unit-II Parameters of Transmission Lines: Resistance, inductance and capacitance of overhead lines, effect of earth, line transposition, GMD and distance, inductance and capacitance of line with symmetrical and unsymmetrical spacing, inductance and capacitance of double circuit lines, skin and proximity effects, equivalent circuits & performance of short, medium and long transmission lines.

Unit-III Insulators: Pin, shackle, suspension and strain insulators, voltage distribution across insulator string, grading and methods of improving string efficiency.

Unit-IV Underground Cables: Conductor, sheathing and armoring materials, types of cables, insulator resistance and capacitance calculation, electrostatic stresses and reduction of maximum stresses, causes of breakdown, thermal rating of cable, introduction to oil filled and gas filled cables.

Unit-V Economic Scheduling of Power Stations: Economic operation of power system, criteria of loading of power plants with and without transmission loss, load dispatching in power system, calculation of cost of generation, fixed charges, interest and depreciations methods of depreciation, power factor improvement.

References:

1. B. R. Gupta: Power System Analysis & Design, S. Chand Publishers. 2008
2. Soni, Gupta and Bhatnagar: A Course in Electrical Power, Dhanpat Rai. 1987
3. C. L. Wadhwa Electrical Power Systems, New Age. 2009
4. Nagrath Kothari: Modern Power System Analysis, MGH. 2011
5. J. J. Grainger & W. D. Stevenson: Power System Analysis, MGH. 2003
6. Kamaraju: Electrical Power Distribution Systems, MGH.

List of Experiment (Extendable):

1. Electrical design of transmission line.
2. Mechanical design of transmission line.
3. Drawing of tower structure.
4. Drawing of insulators.
5. Drawing of cables.
6. Determination of transmission line parameters using MATLAB
7. Layout of substation and various power plants.

EEC- 602 Electrical Drives

Unit I- Basics of Electrical Drives: Elements of drive systems, requirement of electric drives, rating & selection of drives, groups and individual drives, constant power and constant torque drives. Review of characteristics of AC & DC motors, load torque, load-drive, speed torque characteristics, quadrant speed torque characteristics, load equalization, stability of electric drives, moment of inertia and torque of motor load combination.

Unit II-DC Drives: Starting, braking, transient & steady state analysis phase controlled and chopper controlled drives, speed control, energy recovery systems, dual converter.

Unit III- Induction Motor Drives: Starting braking and speed control, PWM, voltage source inverter and current sources fed im drives, cyclo converter fed drive, vector control drives, slip power recovery, conventional control methods, rotor impedance control, converter controlled-Static Scherbius & Static Krammers drives.

Unit IV- Synchronous Motors Drives: Starting, braking, transient analysis, synchronous motors variable speed drives, V/F control, cyclo converter fed synchronous motor drive.

Unit V- Special Motor Drives: Fundamentals of switched reluctance motors, stepper motors, permanent magnet motor, vector control, digital control of drives.
Traction: Electric traction, machine tool drive, electric cars, steel & cements plants, textile & paper mills.

References:

1. G.K. Dubey "Fundamentals of Electrical Drives"-. Narosa Publications
2. 2. Gopal K. Dubey "Power semiconductor Controlled Drives"- PHI
3. S.K. Pillai, "A first course of Electrical Drive" New age International.
4. Ned Mohan Electrical Drive Wiley India
5. V. Subramanyam "Thyristor control of Electric Drive" Tata Mc Graw Hill Pub.
6. S.Shiva Nagaraju power semiconductor drive PHI learning

List of Experiments (Extendable):

1. To study the starting and running characteristics of converter fed DC traction motor.
2. To study the energy recovery systems and braking of a DC drive.
3. To study the braking methods of a three-phase induction motor.
4. To study the performance of VSI fed three-phase induction motor using PWM technique.
5. To control the speed of a three phase slip ring Induction motor using rotor impedance control.
6. To study the performance of Vector Controlled three phase Induction motor drive.
7. To Study frequency Controlled Synchronous motor drive.

EEC- 603 Power Systems and Control

Unit-I Introduction to Power System Stability Problem: Rotor angle stability, voltage stability and voltage collapse, mid term and long-term stability, classification of stability, states of operation, system security, system dynamic problems, problems associated with modern interconnected power systems, deregulation, power systems restructuring, distributed generation, congestion, pricing.

Unit-II Power System Stability - Steady state, dynamic and transients stability, swing equation , equal area criterion, solution of swing equation using step by step method modified Eulers method and Rnge-Kutta method, methods of improving transient stability.

Unit-III Power Flow Atudies - Formulation of static power flow equations and solutions using Gauss- Seidel, Newton Raphson and FDLF methods, comparison of these methods, Economic operation of power system - Economic dispatch, Emission dispatch, line loss, ITL, economic dispatch using lagrangian multiplier method.

Unit-IV MW Frequency Control- Coherency, control area, modeling of speed control mechanism, load damping, block diagrammatic representation of single and two area interconnected system, static and dynamic response, .optimum parameter adjustment.

Unit-V MVAR Voltage Control - Difference in control strategy over MW – f control, characteristics of an excitation system, DC AC and static excitation system, General block diagram representation of voltage regulators.

References:

1. K.R. Padiyar, Power system dynamics, stability and control, BS Pub. Hydbid
2. P Kunder, Power system stability and control, TMH.
3. P. W. Sauer & M A Pai: Power system dynamics and stability: Pearson.

List of experiments (Extendable):

1. To develop a program in Matlab for information of Y-bus matrix for N bus system.
2. Load flow solution for 3-bus system using Gauss- Seidel, Newton Raphson and FDLF methods up to 3 iteration.
3. Load flow solution for IEEE 6-bus and 30-bus system in Matlab using Newton Raphson method.
4. Assessment of transient stability of a single machine system.
5. Effect of compensation on voltage profile of IEEE 6-bus system.
6. Study of any software tools (PSCAD,EDSA, Mi POWER, ETAP etc)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-604(A) Digital System Design

Unit-I Principles of Combinational Logic: Boolean algebra, combinational forms, canonical forms, generation of switching equations from truth tables, Karnaugh maps-3, 4 and 5 variables, incompletely specified functions (don't care terms), simplifying max – term equations, Quine – McClusky minimization technique, Quine – McClusky using don't care terms, reduced prime implicant tables, map entered variable.

Unit-II Analysis and Design of Combinational Logic: Decoders, encoders, digital multiplexers-using multiplexers as boolean function generators, adders, subtractors, cascading full adders, look ahead carry, binary comparators, design methods of building blocks of combinational logics.

Unit-III Sequential Circuits: Basic bistable element, latches, SR latch, application of SR latch, A Switch debouncer, gated SR latch, gated D Latch, master-slave flip-flops, master-slave SR&JK flip-flops, edge triggered flip- flop, positive & negative edge-triggered D flip-flop, characteristic equations, registers, counters-binary ripple counter, synchronous binary counters, counters based on shift registers, design of a synchronous counters, design of a synchronous mod-N counters using clocked JK flip flops.

Unit-IV Sequential Design: Mealy and Moore models, state machine notation, synchronous sequential circuit analysis and design, construction of state diagrams, counters design.

Unit-V HDL: History of HDL, structure of HDL module, operators, data types, types of descriptions, simulation and synthesis, brief comparison of VHDL and Verilog, data-flow descriptions and structure, data type-vectors.

References:

1. Digital Logic Applications and Design John M Yarbrough Cengage Learning 2011
2. Digital Principles and Design Donald D Givone McGraw Hill Education 1 st Edition, 2002
3. Logic and computer design Fundamentals M. Morries Mano and Charles Kime Pearson Learning 4 th
4. Edition, 2014
5. Fundamentals of logic design Charles H Roth, JR and Larry L. Kinney Cengage Learning 6th Edition, 2013
6. Fundamentals of Digital Circuits A. Anand Kumar PHI 3rd Edition, 2014
7. Digital Logic Design and VHDL A.A.Rhatlke S.M.Deokar Wiley India 1st Edition, 2009

SSSUTMS

EEC-604(B) EHVAC & DC

Unit- I Introduction: EHV A.C. and D.C. links, Kind of D.C. links, limitations and advantages of A.C. and D.C. transmission, principal application of A.C. and D.C. transmission, trends in EHV A.C. and D.C. transmission, power handling capacity, firing angle control, overlapping.

Unit- II **FACTS Devices**: Basic types of controller, series controller, static synchronous series compensator(SSSC), thyristor-controlled series capacitor(TCSC), thyristor controlled series reactor(TCSR), shunt controller (STATCOM), static VAR compensator(SVC), series series controller, combined series-shunt controller, unified power flow controller (UPFC), thyristor controlled phase shifting transformer(TCPST).

Unit- III Converters in EHV D.C: Components of EHV D.C. system, converter circuits, rectifier and inverter valves, reactive power requirements, harmonics generation, adverse effects, classification, remedial measures to suppress, filters, ground return, converter faults & protection ,commutation failure, multi terminal D.C. lines.

Unit- IV Controlling: Control of EHV D.C. system, control characteristics, constant current control, constant extinction angle control, ignition angle control, parallel operation of HVAC & DC system, problems & advantages.

Unit- V Transmission Systems: Travelling waves on transmission systems, attenuation, distortion, effect of junction and termination on propagation of traveling waves, over voltages in transmission system, lightning, switching and temporary over voltages, control of lighting and switching over voltages.

References:

1. S. Rao,- "EHV AC & DC Transmission" Khanna pub.
2. Kimbark,-" HVDC Transmission" john willy & sons pub.
3. Arrillaga,- "HVDC Transmission"2nd Edition ,IEE londan pub.
4. Padiyar, -"HVDC Transmission" 1st Edition ,New age international pub.
5. T.K. Nagsarkar,M.S. Sukhiza, -"Power System Analysis", Oxford University
6. Narain.G. Hingorani, l. Gyugyi-"Undustanding of FACTS concept and technology", john willy & sons pub.
7. 7.P.Kundur- "H.V.D.C. Transmission" McGraw Hill

EEC-604(C) Evolutionary Techniques

Unit –I: Introduction: Approaches to intelligent control, architecture for intelligent control, symbolic reasoning system, rule-based systems, the AI approach, knowledge representation - expert systems.

Unit –II: Artificial Neural Networks: Basic concept mathematical model, mcculloch-pitts neuron model, simple perceptron, Adaline and Madaline, feed-forward multilayer perceptron, learning and training the neural network, data processing, scaling, fourier transformation, principal-component analysis, wavelet transformations, hopfield network, self-organizing network and recurrent network, neural network based controller.

Unit –III: Fuzzy Logic System: Crisp sets, fuzzy sets, basic fuzzy set operation and approximate reasoning, fuzzy logic modeling and control, fuzzification, inferencing and defuzzification, fuzzy knowledge and rule bases, fuzzy modeling and control schemes for nonlinear systems, self organizing fuzzy logic control.

Unit –IV: Genetic Algorithm: Basic concept of genetic algorithm and detail algorithmic steps, adjustment of free parameters, solution of typical control problems using genetic algorithm, concept on some other search techniques like Tabu search and Ant-colony search techniques for solving optimization problems.

Unit –V: Applications: GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-neural network toolbox, stability analysis of neural-network interconnection systems, implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, stability analysis of fuzzy control systems.

References:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.
3. Fuzzy Sets, Uncertainty and Information - Klir G.J. & Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
4. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
5. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.
6. Elements of Artificial Neural Networks - Kishan Mehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International.
7. Artificial Neural Network –Simon Haykin, 2nd Ed., Pearson Education.
8. Introduction Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa,1/e, TMH, New Delhi.

EEC-605(A) Global Positioning System

Unit-I - Geodesy: Basics of geodesy, earth, geoid and ellipsoid of rotation, reference surface, geodetic systems, Indian geodetic system, coordinate systems and transformation.

Unit -II GPS: History, Transit, Timation, NAVSTAR GPS,GLONASS, GALILEO,GPS design objectives and details of segments space, control and user, blocks of GPS- Block I, II/IIA, IIR satellites, IIF, advantages and current limitations of GPS, status of GPS surveying, applications.

Unit -III GPS Signal structure: Carriers, GPS codes: C/A, P, navigational message, GPS receiver, types and structure of receivers, principles of GPS position fixing: pseudo ranging.

Unit –IV: **GPS Orbits:** Determination of GPS satellite coordinates, types of ephemerides, GPS data formats, RINEX, SP3, satellite geometry based measures: geometry dependent (dilution of precision: DOP), user equivalent range error UERE.

Unit -V Errors and Accuracy: Satellite dependent, ephemeris errors and orbit perturbations, forces on GPS satellites, effects of orbital bias, types of satellite ephemerides, satellite clock bias, selective availability, receiver dependent: receiver clock bias.

References:

1. P. R. Wolf, and C. D. Ghilani, 1997. Adjustment Computations: Statistics and Least Squares in Surveying and GIS, Publisher: John Wiley &amp, Sons, New York (USA), pages 564.
2. J. V. Sickle, 2001. GPS for Land Surveyors Publisher: Ann Arbor Press, Michigan(USA), pages 284.
3. B. Hofmann-Wellenhof, H. Lichtenegger and J. Collins, 1994. Global Positioning System: Theory and Practice, Publisher: Springer, Berlin (Germany), pages 355.
4. Gunter Seeber, 2003. Satellite Geodesy, Publisher: Walter de Gruyter, Berlin (Germany), pages 612.
5. A. Leick, 2004. GPS Satellite Survey (2nd ed.), Publisher: John Wiley &amp, Sons, New York (USA), pages 429.

EEC-605(B) Prime Movers

Unit-I Fluid Mechanics: Newtonian and non-newtonian fluids, viscosity, types of fluid flows, continuity, momentum & energy equations, Bernoulli's equation and its applications, laminar and turbulent flows, flow through pipes, friction losses in pipes, Darcy equation, Reynolds number and its significance.

Unit-II Hydraulic Turbines: Classification and working principles of turbines, Pelton, Francis, and Kaplan turbine, velocity diagrams for impulse and reaction turbine, calculation of blade angles, work-done, power output and efficiencies, specific speed of turbines, function of draft tube and type of draft tubes, unit quantities, performance and characteristic curves.

Unit-III Generation of steam: Dryness fraction and properties of steam function of boilers, working principle of Lancashire boiler, Cornish boiler, Cochran boiler, Locomotive boiler, Babcock and Wilcox boiler, boiler mounting and accessories, Rankine and Modified Rankine cycle for steam engines, evaluation of mean effective pressure, power and cylinder dimension for single acting and double acting steam engines.

Unit-IV Steam turbines: Classification of steam turbines, velocity diagrams for simple impulse and reaction turbines, compounding of steam turbines, pressure compounding, velocity compounding, and pressure-velocity compounding, problems on work done, blade angles, power and thermal efficiency of the turbine. Gas turbine, classification of gas turbine-constant pressure combustion cycle, closed cycle and constant volume combustion gas turbine plants, calculation of various efficiencies and parameters.

Unit-V Pumps: Reciprocating pumps, working of single and double acting types, effect of acceleration head and friction, use of air vessels, work done and power required without and with air vessels centrifugal pumps: classification and working of centrifugal pumps, need for priming, work done and efficiencies, specific speed of pumps, cavitation and its effect on performance.

References:

1. R.K.Rajput, Thermal Engineering, Laxmi Publications, 2004
2. R.Yadav, Steam and Gas turbines, Central Publishing House Ltd 2004 .
3. S.Ramamrutham, Hydraulic Machines, Dhanpat Raiand Sons.2004.

SSSUTMS

w.e.f July 2018

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-605(C) Electrical Engineering Graphics

Unit-I Armature: Simplex lap/ wave dc armature windings, simplex lap/ wave, integral/ fractional slot, double layer three phase ac armature windings, single layer three phase ac armature windings.

Unit-II Transformers: Sectional plan and elevation of a transformer limb with windings, sectional plan and elevation of the core assembly of a power transformer, sectional plan and elevation of a distribution transformer tank with its accessories, sketches of capacitor and oil filled type transformer bushings.

Unit-III DC Machines: Sectional front and side elevation of armature with commutator, sectional front and side elevation of yoke and pole assembly with field winding, sectional front and side elevation of assembled machine.

Unit-IV Alternators: Sectional front and side elevation of water wheel rotor assembly with winding, sectional front and side elevation of salient pole alternato, sectional front and side elevation of turbo alternator, sketches of the methods of pole fixing and slot details of turbo and water wheel alternators.

Induction Motors: Sectional front and side elevation of slip ring induction motor, sectional front and side elevation of squirrel cage induction motor.

Unit-V Substations: Layouts and single line diagrams of outdoor and indoor substations, layout of a 220kv substation, layout of a captive power substation, single line diagram of a distribution center, experiments using electrical CAD.

References:

1. Bhattacharya S.K, Electrical Engineering Drawing, Wiley Eastern, Edition 2.
2. Clayton & Hancock, Performance and Design of DC Machines, ELBS, 1992.
3. Narang K.L., A Text Book of Electrical Engineering Drawing, Tech India Publications.
4. A.K. Sawhney, Electrical Machine Design, Dhanpath Rai, New Delhi, 1991.
5. Say M.G, Performance and Design of AC machines, Pitman, ELBS, 1991.

EEC-606(A) TCP-IP

Unit-I Network Managements: Network management framework, network based managements, evolution of network management: SGMP, CMIP, SNMP, network implementation and management strategies, network management categories: performance management, fault management, configuration management, security managements, accounting managements, network management configuration: centralized configuration, distributed configuration, selected management strategy.

Unit-II Management Information Base: Structure of management information, nms presentation of the SMI, NMS meter-ware network view, remote monitoring (RMON), RMON group, desktop management, desktop management interface(DMI), DMI architecture, DMI Browser, DMI/SNMP mapping, desktop SNMP extension agents, setting up LAN access, SNMP configuration.

Unit-III Layering: OSI Layering, TCP/IP layering, protocols & standards, internet standards, internet administration, internet addresses, internet protocol: introduction, IP header, IP routing, subnet addressing, subnet mask, special case of IP addresses, comparative study of IPV4 & IPV6, port numbers address resolution protocol, ARP packet format, proxy ARP, ARP command, ARP example, reverse address resolution protocol (RARP): RARP packet format, RARP examples, RARP server design

Unit-IV Routing: Delivery and Routing of IP Packets, routing methods, static versus dynamic routing, routing table, routing module, classless addressing, CIDR, internet protocol (IP), datagram, fragmentation, IP package, interior and exterior routing, routing information protocol (RIP), open shortest path first protocol (OSPF), BGP, GGP, private networks, virtual private network (VPN), network address translation (NAT).

Unit –V Internet Control Message Protocols: Types of message, message format, error reporting, query, checksum, ICMP package, IGMP, IGMP message and its operation, IGMP package, transmission control protocol, process-to-process communication, TCP Services Flow control, TCP timers. TCP operation, TCP package, application layers protocol, telnet protocol, file transfer protocol (FTP), simple mail transfer protocol (SMTP), X-window system protocol, remote procedure call, and network file system.

References:

1. Forouzan, TCP/IP Protocol Suite 4th edition, TMH
2. J.Richard Burkey, Network Management Concept and Practice, PHI
3. Stevens, TCP/IP Illustrated Volume-I, Pearson
4. Tittel: TCP/IP, Cenage Learning
5. Uyless Black, TCP/IP and related protocols, McGraw Hill.
6. Doughals E. Comer, Internetworking with TCP/IP Vol. I, Principles, Protocols, and Architecture, Prentice Hall, India.

EEC-606(B) Network Synthesis

Unit-I Laplace Transformation: Laplace transformation, laplace transform of a derivative df(t) /dt, laplace transform of an integral, laplace transform of common forcing function, initial and final value theorem, convolution, application of laplace transformation technique in electric circuit analysis, partial fraction expansion method, step response of RL, RC circuits, impulse response of series RC, RL network, response of RL circuit with pulse input, pulse response of series RC circuit, step response of RLC series circuit.

Unit- II Two Port Network Analysis: z parameters, y- parameters, hybrid parameter, ABCD parameters, condition of reciprocity and symmetry in two port parameter presentation, interrelationship between parameters of two port networks. expression of input and output impedance in terms of two port parameter, ladder network, equivalent T and pi section representation in parametric form.

Unit – III Network function: Driving point impedance and admittance transfer function, voltage and current transfer ratio, thevenin's theorem, norton theorem, milliman theorem, reciprocity theorem, maximum power transfer theorem, supeposition theorem, substitution theorem.

Unit – IV Network Graph Theory: Concept of network graph, terminology used in network graph, properties of tree in a graph, formation of incidence matrix, properties of incidence matrix, number of tree in a graph, cut set matrix, tie set matrix, fundamental tie set matrix, fundamental cut set matrix.

Unit –V Synthesis of Passive Networks: Concept of stability of a system from pole zero concept, necessary condition of stability of a network function, hurwitz polynomial, properties of hurwitz polynomials, positive real function, concept of network synthesis, reactive network, driving point immitance of LC Network, LC network synthesis, foster and caurr form, rc and RL network synthesis by foster and caurr form.

References:

1. Network Analysis by M.E. Van Valkenbarg, PHI/Pearson Education
2. Circuit Theory Analysis & Synthesis by A Chakraborty (Dhanpat Rai & Co. Pvt. Ltd, New Delhi)
3. Network Theory: Analysis & Synthesis – Smarjit Ghosh, PHI
4. Network Synthesis – T. Lapatra, TMH.

EEC-606(C) Project Management

Unit 1 Concepts of Project Management:: Meaning, definition and characteristics of a project, technical and socio-cultural dimensions, project life cycle phases, project planning, graphic presentation, work breakdown structure, manageable tasks, size of network, blow down NW, identity and logic dummy activity, Fulkerson rule for numbering NW, time-scaled NW

Unit-2 NW analysis: PERT network, mean time and variances, probability to complete PERT project in specified time, CPM network, Event Occurrence Time (EOT), activity start/ finish times, forward and reverse path calculations, concept and calculation of floats, resource allocation and critical-chain.

Unit-3 Project Duration And Control: Importance and options to accelerate project completion, timecost tradeoff, fixed variable and total costs, use of floats and cost optimization, project performance measures, project monitoring info and reports, project control process, Gant chart and control chart, cost-schedule S-graph, planned cost of work schedule (PV), budgeted/ earned cost of work completed (EV) and actual cost of work completed (AC), schedule and cost variances (SV, CV) forecasting final project costs.

Unit-4 Project Organization, Culture And Leadership: Projects within functional organization, dedicated project/ task-force teams, staff, matrix and network organization, choosing appropriate project organization, Organization culture, ten characteristics, cultural dimensions supportive to projects, social network and management by wandering around (MBWA), different traits of a manager and leader, managing project teams, five stage team development model, shared vision, conflicts, rewards, rejuvenating project teams, project stakeholders, concept of project partnering.

Unit-5 Strategic Planning and Project Appraisal: Capital allocation key criteria, Porters competitive strategy model, BCG matrix, Strategic Position Action Evaluation (SPACE), time value of money, cash flows, payback period, IRR, cost of capital, NPV, social cost benefit analysis, UNIDO approach, project risks and financing.

References:

1. Prasana Chandra: Projects: planning Implementation control, TMH.
2. Gray Clifford F And Larson EW, Project The managerial Process, TMH
3. Panneerselven and Serthil kumar, Project management, PHI
4. Burke , Project Management-Planning and control technics, Wiley India
5. Kamaraju R, Essentials of Project Management, PHI Learning
6. Jack R. Meredith, Project Management: a managerial approach, Wiley.
7. Choudhary ,Project Management, TMH
8. Srinath LS, PERT And CPM Principles and Appl, East West Press
9. Richman L, Project Management: Step By Step, PHI Learning

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 607- Industrial Training Project – I

The Industrial Training Project – I should be the outcome of the training done/performed during 5th semester .It should be submitted in hardware form (proto type)or simulation form along with proper data and certificates issued during project training. It should cover the electrical engineering aspects learned during training. A Power point presentation should also be submitted at the time of submission.

Sri Satya Sai
University of Technology and Medical Sciences
(Established under Govt. of M.P. Registered under UGC 2(F) 1956)

Bhopal-Indore Road, Opp. Pachama oilfed plant, Pachama, Dist.-Sehore M.P.PIN-466001
Ph. 07562-223647, Fax : 07562-223644, Web: www.sssutms.co.in, info@sssutms.co.in

Name of Faculty: **School of Engineering**

Minutes of Board of Studies Committee Meeting held on Dated **11/06/2018**

The Board of Studies Committee Meeting was held in the Board Room at **2:30 PM.** on **11/06/2018**. Following members were present.

1. Dr. G.R.Selokar, Professor (Mechanical), Chairman
2. Dr. Sanjay Rathore, Professor (Physics), Member
3. Mr. Vijay Prakash Singh, Associate Professor (Electronics and Communication), Member
4. Dr. Ajay Swarup Associate Professor (Civil Engineering), Member
5. Mr. Sanjay Kalraiya, Associate Professor (Mechanical Engineering), Member
6. Dr. Prabodh Khampariya, Associate Professor (Electrical and Electronics Engineering), Member
7. Mr. Kailash patidar , Assistant Professor (Computer Science and Engineering), Member
8. Ms. Alka Thakur, Associate Professor (Electrical Engineering), Member
9. Mr. Anil Verma, Assistant Professor (Mechanical Engineering), Member
10. Mr. Manoj Kumar Gandwane, Assistant Professor (Chemical Engineering), Member
11. Mr. Prashant Singh, Assistant Professor (Aeronautical Engineering), Member
12. Mr. Devendra Patle, Assistant Professor (Electronics and Communication), Member

All the member elected Dr. G.R.Selokar chairman for today's Board of Studies Meeting The Chairman welcomed the members of all department of SOE and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed.

Agenda: - Preparation of Syllabus and Scheme for BE First Year. As Per AICTE Norms

School of Engineering

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Discussion:

Committee member discussed the first (I) and second (II) Semester scheme and syllabus. It is decided that first year scheme should be applicable in group manner that is I Semester for Group A (July to December) and II Semester for Group B (July to December) student similarly for January to June session that is II nd Semester for group A and first Semester for group B

Scheme and syllabus was put up before the committee members as per guidelines of ALCTE, It was discussed in detail and some modification was suggested. So as to finalized the scheme

Resolution:

It is unanimously resolved that scheme and syllabus prepared on the guideline of AICTE New Delhi may be applicable w.e.f 2018-2019

The Chairman thanks to the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr. G.R.Selokar, Professor (Mechanical), Chairman
2. Dr. Sanjay Rathore, Professor (Physics), Member
3. Mr. Vijay Prakash Singh, Associate Professor (Electronics and Communication), Member
4. Dr. Ajay Swarup Associate Professor (Civil Engineering), Member
5. Mr. Sanjay Kalraiya, Associate Professor (Mechanical Engineering), Member
6. Dr. Prabodh Khampariya, Associate Professor (Electrical and Electronics Engineering), Member
7. Mr. Kailash patidar , Assistant Professor (Computer Science and Engineering), Member
8. Ms. Alka Thakur, Associate Professor (Electrical Engineering), Member
9. Mr. Anil Verma, Assistant Professor (Mechanical Engineering), Member
10. Mr. Manoj Kumar Gandwane, Assistant Professor (Chemical Engineering), Member
11. Mr. Prashant Singh, Assistant Professor (Aeronautical Engineering), Member
12. Mr. Devendra Patle, Assistant Professor (Electronics and Communication), Member

Chairman

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination

Bachelor of Engineering (CS, CE,ME,AE,MI,EI)

I Semester/ I Year

Academic Year 2019-20

GROUP - B

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	BEBSC-101	Mathematics-I	60	30	10	-	-	100	3		-	3
2	BEBSC- 202	Engineering Physics	60	30	10	30	20	150	2	1	2	4
3	BEESC-203	Basic Computer Engineering	60	30	10	30	20	150	3	-	2	4
4	BEESC-204	Basic Mechanical Engineering	60	30	10	30	20	150	2	-	2	3
5	BEESC-205	Basic Civil Engineering & Mechanics	60	30	10	30	20	150	3	-	2	4
6	BEHSMC-206	Language Lab	-	-	-	30	10	40	-	-	2	1
7	BELC-107	Self Study / GD Seminar					10	10			2	1
		Total	**300**	**150**	**50**	**150**	**100**	**750**	**13**	**1**	**12**	**20**

S.S.U.T.M.S. School of Engineering SEHORE (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination

Bachelor of Engineering (CS, CE,ME,AE,MI,EI)

II Semester/ I Year

Academic Year 2019-20

GROUP - B

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	BEBSC-201	Mathematics-II	60	30	10	-	-	100	3		-	3
2	BEBSC-102	Engineering Chemistry	60	30	10	30	20	150	3		2	4
3	BEHSMC-103	English for Communication	60	30	10	30	20	150	3	-	2	4
4	BEESC-104	Basic Electrical and Electronics Engineering	60	30	10	30	20	150	2	-	2	3
5	BEESC-105	Engineering Graphics	60	30	10	30	20	150	2	1	2	4
6	BEESC-106	Manufacturing Practices	-	-	-	30	10	40	-	-	2	1
7	BELC-207	Industrial Training					10	10	-	-	2	1
		Total	**300**	**150**	**50**	**130**	**100**	**750**	**13**	**1**	**12**	**20**

SSSUTMS School of Engineering SEHORE (M.P.)

BEBSC-101 Mathematics-I

BEBSC-101	Mathematics-I	3L:0T:0P	3 credits	3Hrs/Week

Preambles:

The objective of this foundational course is to review mathematical concepts already learnt in higher secondary. This course will also introduce fundamentals of mathematical functions, derivatives and aspects of calculus to students. This course deep understanding of matrix, differential equations, Sequences and series, Vector Space as well as a strong sense of how useful the subject can be in other disciplines of learning.

Outcomes:-

Course work is designed to provide students the opportunity to learn key concepts of mathematical functions, key concepts of matrix , Vector Spaces as well as fundamentals and applications of integral calculus.

Unit-I Calculus (10Hrs):

Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two variables), Method of Lagrange's Multipliers.

Unit-II Integral (6 Hrs):

Definite Integral as a limit of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas, Multiple Integral, Change the order of the integration, Applications of multiple integral for calculating area and volumes of the curves.

Unit-III Sequences and series (6 Hrs):

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-IV Vector Spaces (6 Hrs):

Vector Space,Vector Sub Space, Linear Combination of Vectors, Linearly Dependent, Linearly Independent, Basis of a Vector Space,Linear Transformations.

Unit-V Matrices (10 Hrs):

Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.

References:-

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

BEBSC-102 Engineering Chemistry

BEBSC-102	Engineering Chemistry	3L:0T:0P	3 credits	3Hrs/Week

Preambles:

1. To acquire knowledge about hardness of water and importance of water in industrial purpose.
2. To understand the concept of molecular spectroscopy.
3. To gain the knowledge of about polymeric material and biodegradable substances.
4. To understand the mechanism of lubricant and properties of lubricant.

Outcomes:

1. Develop innovative methods to produce soft water for industrial use.
2. Identify the structure of unknown / new compounds with the help of spectroscopy.
3. Substitute metal with conducting polymers and produce cheaper biodegradable polymers to reduce environmental pollution.
4. Apply their knowledge for use and protect to industrial and domestic equipment.

UNIT-I Atomic and molecular structure (6Hrs)

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. water treatment- Introduction, hardness of water, Units of hardness, disadvantage of hard water, scale and sludge formation in boilers, boilers troubles.

UNIT-II Spectroscopic techniques and applications (10Hrs)

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

UNIT-III Intermolecular forces and potential energy surfaces (6Hrs)

Ionic, dipolar and van Der Waals interactions. Lubricant-Introduction, mechanism of lubricant, classification of lubricant, properties of lubricating oils.

UNIT-IV Use of free energy in chemical equilibria (10Hrs)

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. High Polymers-Introduction, nomenclature, types of polymerization, classification of polymers, plastics-important, thermo-plastic resins and thermo setting resin.

UNIT-V Periodic properties (10Hrs)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

REFRENCES:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A.
   Plane Fundamentals of Molecular Spectroscopy, by C. N. Banwell
3. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.
4. Physical Chemistry, by P. W. Atkins
5. engg. Chemistry jain.jain
6. engg. Chemistry shashi chawla.

BEBSC-102	Engineering Chemistry	0L:0T:1P	1 credits	2Hrs/Week

LIST OF EXPERIMENTS:

1. Determination of surface tension and viscosity
2. Determination of chloride content of water
3. Determine the change of viscosity of given lubricating oil with change in temperature by Redwood Viscometer No. 1.
4. Determine the change of viscosity of given lubricating oil with change in temperature by Redwood Viscometer No. 2.
5. To determine the flash and fire point of given lubricating oil by Cleveland's open cup apparatus.
6. To determine the flash and fire point of given lubricating oil by Abel's closed cup apparatus.
7. To determine the flash and fire point of given lubricating oil by Pensky Marten's apparatus.
8. To determine the total hardness of given water sample by titrating it against EDTA solution using EBT as an indicator.

Laboratory Outcomes:
The students will learn to:

- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt sample

BEHSMC-103 English for Communication

BEHSMC-103	English for	3L:0T:0P	3 credits	3Hrs/Week

	Communication			

Preambles:

1. To enhance Professional competence in reading, writing, listening and speaking.
2. To modify the tactic of providing information about the language by using several techniques.
3. To minimize the Grammar Translation Method of ELT by replacing it with Direct Learning Method.
4. To Introduce Communicative Method of ELT and focusing the teaching pedagogy to the student-centered learning rather than the teacher-centered learning.
5. To develop the skills to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. To provide a deep insight of techniques for delivering effective presentations, appealing job interviews, and actively participating in various forms of group communication.

Outcomes :

At the end of this course students will have:

- Ability to design a language component or process to meet desired need within
- Realistic, Constraints such as economic, environmental, social, political, ethical Scenario.
- Ability to analyze the usage of English words in different contexts.
- An understanding of technical and academic articles' comprehension.
- The ability to present oneself at multinational levels knowing the type of different

Standards of English

UNIT-I Identifying Common errors in writing (6 Hrs):
Articles, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure.

UNIT-II Vocabulary building and Comprehension (6 Hrs)
Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, Reading comprehension.

UNIT-III Communication: (10 Hrs)
Introduction, Meaning and Significance, Process of Communication, Oral and Written Communication, 7 c's of Communication, Barriers to Communication and Ways to overcome them, Importance of Communication for Technical students, nonverbal communication.

UNIT-IV Developing Writing Skills (10 Hrs)
Planning, Drafting and Editing, Precise Writing, Précis, Technical definition and Technical description. Report Writing: Features of writing a good Report, Structure of a Formal Report, Report of Trouble, Laboratory Report, Progress Report.

UNIT-VBusiness Correspondence (10 Hrs):
Importance of Business Letters, Parts and Layout; Application, Contents of good Resume, guidelines for writing Resume, Calling/ Sending Quotation, Order, Complaint, E-mail and Tender.

References:-

1. 'Technical Communication : Principles and practice', Meenakshi Raman and Sangeeta Sharma (Oxford)
2. 'Effective Business Communication', Krizan and merrier (Cengage learning)
3. 'Communication Skill, Sanjay Kumar and pushlata, OUP2011
4. "Practical English Usage Michael Swan OUP, 1995.
5. "Exercises in spoken English Parts I-III CIEFL, Hyderabad, Oxford University Press
6. On writing well, William Zinsser, Harper Resource Book 2001.
7. Remedial English Grammar, F.T. Wood,Macmillan2007.

BEHSMC-103	English for Communication	0L:0T:1P	1 credits	2Hrs/Week

List of Experiments:-

1. Listening Comprehension.
2. Pronunciation, Intonation, Rhythm
3. Practicing everyday dialogues in English
4. Interviews.
5. Formal Presentation

BEESC-104 Basic Electrical and Electronics Engineering

BEESC-104	Basic Electrical and Electronics Engineering	2L:0T:0P	2 credits	2Hrs/Week

Preambles:

Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context and to provide students the working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices. To impart basic knowledge of electronic devices and digital conversion.

Outcomes

- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations and safety devices.
- To introduce with basic electronics devices and logic gates

Unit-I Electrical circuit elements (10 Hrs):

Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, Kirchhoff's laws, Loop and-delta transformation, nodal methods, Superposition of a theorem, Thevenin theorem, Norton theorem.

Unit-II AC Circuits (10 Hrs):
Representation of Sinusoidal waveforms –Average and effective values, Form and peak factors, Concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of single phase AC Circuits consisting of R, L, C, RL, RC, RLC combinations (Series and Parallel), Apparent, active & reactive power, Power factor, power factor improvement. Concept of Resonance in series & parallel circuits, bandwidth and quality factor. Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit-III Magnetic circuit (6 Hrs)
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. **Components of LT Switchgear:** Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance of earthing. Types of Batteries, Important characteristics for Batteries.Elementary calculations for energy consumption and savings, battery backup.

Unit-IV (10 Hrs): Digital Electronics (10 Hrs): Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, floating point and signed numbers, Demorgan's theorem, AND, OR, NOT, NOR, NAND, EX-NOR, EX-OR gates and their representation, truth table, half and full adder circuits, R -S flip flop, J-K flip flop.

Unit-V Electronic Components And Circuits- (6Hrs)

Introduction to Semiconductors, Diodes, V -I
characteristics, amplifiers,transistors,Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations, different configurations and modes of operation of BJT, DC biasing of BJT

Reference's: -

1. "Basic Electrical Engineering", Ritu Sahdev,
2. "Electrical Engineering S. Singh, P.V. Prasad,
3. E. Hughes, "Electrical Technology," Pearson Education, 2010.
4. I. J. Nagrath & D. P. Kothari, „Basic Electrical Engineering" TATA McGraw Hill Edu.
5. V. Del Toro, "Electrical Engg Fundamentals," PHI Learning.
6. B. Dwivedi & A. Tripathi "Fundamentals of Electrical Engineering" Wiley India.
7. D. A. Bell, "Electric Circuits," 7th Ed., Oxford Higher Education.
8. Graham Bell: Electronic Devices and Circuits, PHI

BEESC-104	**Basic Electrical**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

	and Electronics Engineering			

Laboratory objectives:

1. Read and demonstrate the rating of basic equipments used in electrical engineering
2. Connections of different components as per the rules
3. Application different components in electrical field

Laboratory Outcomes

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical machines.

List of Experiments: -

1. Verification of Kirchhoff's laws
2. Verification of Superposition and Thevenin Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Connection and measurement of power consumption of a fluorescent lamp (tube light).
6. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.
7. Determination of parameters of ac single phase series RLC circuit
8. To observe the B-H loop of a ferromagnetic material in CRO.
9. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer
10. Determination of efficiency of a dc shunt motor by load test
11. To study running and speed reversal of a three phase induction motor and record speed in both directions.
12. Demonstration of cut-out sections of machines: dc machine, three phase induction machine, single-phase induction machine and synchronous machine.
13. To study the V-I Characteristics of Transistors.
14. To study V-I characteristics of various Diodes.

BEESC-105 Engineering Graphics and Design

BEESC-105	**Engineering Graphics and Design**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preambles:

1. Increase ability to communicate with people.
2. Learn to sketch and take field dimensions.
3. Learn to take data and transform it into graphic drawings.
4. Learn basic Auto Cad skills.
5. Learn basic engineering drawing formats.
6. Prepare the student for future Engineering positions.

Outcomes:

Student's ability to hand letter will improve.

1. Student's ability to perform basic sketching techniques will improve.
2. Students will be able to draw orthographic projections and sections.
3. Student's ability to use architectural and engineering scales will increase.
4. Students ability to produce engineered drawings will improve
5. Student's ability to convert sketches to engineered drawings will increase.
6. Students will become familiar with office practice and standards.
7. Students will become familiar with Auto Cad two dimensional drawings.
8. Students will develop good communication skills and team work.

UNIT-I Introduction to Engineering Drawing(10 Hrs):
Principles of Engineering Graphics and their significance, usage of Drawing instruments, Lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales –Plain, Diagonal and Vernier Scales;

UNIT-II Orthographic Projections **(10 Hrs):**
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; Projections of Regular Solids those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale

UNIT-III Sections and Sectional Views of Right Angular Solids (6 Hrs):
Prism, Cylinder, Pyramid, Cone –Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only).

UNIT-IV Isometric Projections: **(6 Hrs):**
Principles of Isometric projection –Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT-V Overview of Computer Graphics: (10 Hrs):
Listing the computer technologies that impact on graphical communication, Demonstrating

knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Objects, Isometric Views of lines, Planes, Simple and compound Solids; Customization & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of Units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance.

References:-

1.Bhatt N.D., Paschal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2.Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3.Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4.Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5.CAD Software Theory and User Manuals

BEESC-105	**Engineering Graphics and Design**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

List of Experiments:-

1. Sketching and drawing of geometries and projections based on above syllabus
2. Term work: A min. of 30 hand drawn sketches (on size A4 graphic sketch Book) plus 5 CAD-printouts on size A4 sheets plus 10 sheets of size A2 or 6 sheets of size A1, (50% marks to be allotted for this record + 25% marks for attendance +25%marks for Teachers Assessment

BEESC-106 Manufacturing Practices

BEESC-106	Manufacturing Practices	0L:0T:1P	1 credits	2Hrs/Week

Preambles:

1. To understand process of cutting shaping.
2. To understand working principles for various machining processes.
3. To understand construction, working and applications of various machine tools.
4. To learn basic set up, working and applications of a few important non conventional machining processes to get hand on experience on various machine tools.

Course Outcomes:

1. The students will be able to understand the details about machines used in production.
2. The students will be able to understand the mechanics behind metal cutting.
3. The students will be able to understand the finishing and super finishing processes.

4. The students will be able to understand the Physics of material removal behind the various non-conventional machining processes.

Manufacturing is fundamental to the development of any engineering product. The course on Engineering Workshop Practice is intended to expose engineering students to different types of manufacturing / fabrication processes, dealing with different materials such as metals, ceramics, plastics, wood, glass etc. While the actual practice of fabrication techniques is given more weightage, some lectures and video clips available on different methods of manufacturing are also included.

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools
4. Carpentry
5. Plastic molding, glass cutting
6. Metal casting
7. Welding (arc welding & gas welding), brazing

List of Experiments:-

1. Carpentry Shop Experiment To Make a T-LAP joint with wood Pieces
2. Machine Shop Experiment To Perform Knurling on Iron Rod
3. WELDING SHOP (LAP Joint) , Tools, Accessories, Diagram And Explanation
4. SHEET METAL SHOP (Square Tray) , Parts, Accessories, Diagram And Explanation
5. FITTING SHOP (Make a Joint) , Parts, Accessories, Diagram And Explanation
6. CARPENTRY SHOP (T-Lap Joint) , Cutting Tools, Accessories, Diagram and Explanation
7. MACHINE SHOP (the lathe machine) , Parts, Accessories, Diagram and Explanation

BELC 207 Industrial Training

BELC 207	Industrial Training	0L:0T:1P	1 credits	2Hrs/Week

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.

BEBSC-201 Mathematics-II

BEBSC-201	Mathematics-II	3L:0T:0P	3 credits	3Hrs/Week

Preambles

1. To introduce the basic concepts required to understand, construct, solve and interpret differential equations.
2. 2. To teach methods to solve differential equations of various types.
3. 3. To give an ability to apply knowledge of mathematics on engineering problems

Outcomes

The students will be able to :

1. Classify differential equations according to certain features.
2. Solve first order linear equations and nonlinear equations of certain types and interpret the solutions.
3. Understand the conditions for the existence and uniqueness of solutions for linear differential equations
4. Solve second and higher order linear differential equations with constant coefficients and construct all solutions from the linearly independent solutions
5. Find series solutions about ordinary and regular singular points for second order linear differential equations.
6. Solve initial value problems using the Laplace transform.
7. Solve systems of linear differential equations with methods from linear algebra

Unit - I Ordinary Differential Equations I (6 Hrs):

Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations.

UNIT-II Ordinary differential Equations II (6 Hrs):

Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Unit III Partial Differential Equations (10 Hrs)

Formulation of Partial Differential equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients.

Unit IV Functions of Complex Variable (10 Hrs)

Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, theorem ,Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral

Unit V Vector Calculus (10 Hrs)

Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems.

References : -

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig , Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. Dip Rima, Elementary Differential Equations and Boundary Value Problems, 9th End., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Inca, Ordinary Differential Equations, Dover Publications, 1958.

7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

BEBSC- 202 Engineering Physics

BEBSC- 202	Engineering Physics	2L:1T:0P	3 credits	3Hrs/Week

Preambles:

- A comprehensive, high-quality education in the physical sciences
- A flexible curriculum with multiple concentrations that allows students to tailor their education according to their specific interests
- The opportunity to experience the excitement of scientific discovery through direct participation in faculty research
- An increased awareness of the physical processes in the surrounding world
- The essential knowledge and analytical, mathematical and computational tools with which to pursue post-graduate education in a variety of physics-related and other fields
- The foundation and practical skillsets for eventual success in any of a broad array of careers
- The motivation for a lifelong love of learning

Outcomes

- an ability to apply knowledge of mathematics, science, and engineering.
- an ability to design and conduct experiments, as well as to analyze and interpret data.
- an ability to design a system, component, or process to meet desired needs within realistic constraints.
- an ability to function on multidisciplinary teams.
- an ability to identify, formulate, and solve engineering problems.
- an understanding of professional and ethical responsibility.
- an ability to communicate effectively.
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- a recognition of the need for, and an ability to engage in life-long learning.
- a knowledge of contemporary issues.
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Unit I Relativistic Mechanics: (6 Hrs):
Frame of reference, Inertial & non-inertial frames, Galilean transformations, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Velocity addition theorem. Variation of mass with velocity, Einstein's mass energy relation, Relativistic relation between energy and momentum. Massless particle.

Unit II Solid state & Nuclear physics (10 Hrs):
Free electron theory of metals, Qualitative discussion of Kronig-penny model and origin of energy bands. Intrinsic and Extrinsic Semiconductors. V-I Characteristics of PN junction diode, Zener diode, Hall-effect.
Introduction to Nuclear Physics , Static properties of Nucleus,Nuclear liquid drop model, Nuclear Shell Model, Linear particle accelelerator, Cyclotron, Betatron, Bainbridge mass sprectrograph.

Unit III Quantum Mechanics: (6Hrs):
Introduction to Quantum mechanics, Wave particle duality, Matter waves, Particle velocity, Phase velocity , Group velocity and their relation. Heisenberg's Uncertainty Principle. Time-dependent and time-independent Schrodinger wave equation, Solution to stationary state Schrodinger wave equation for one-Dimensional particle in a box, Compton effect.

Unit IV Wave Optics: (10 Hrs):
Interference :Coherent sources, Interference in uniform and wedge shaped thin films, Newton's Rings and its applications Fraunhoffer diffraction at single slit and at double slit, Absent spectra, Diffraction grating, Spectra with grating Dispersive power of grating, Rayleigh's criterion of resolution. Resolving power of grating and Prism.

Unit V Fibre Optics & Lasers: Fibre Optics(10 Hrs):
Introduction to fibre optics, Acceptance angle, Numerical aperture, Normalized frequency, Classification of fibre Attenuation and Dispersion in optical fibres.
Laser: Absorption of radiation, Spontaneous and stimulated emission of radiation, Einstein's coefficients, Population inversion, Various levels of Laser, Ruby Laser, He-Ne Laser, Laser applications.

Reference Books: -

1. Concepts of Modern Physics - AurthurBeiser (Mc-Graw Hill)
2. Introduction to Special Theory of Relativity- Robert Resnick (Wiley)
3. Optics - Brijlal& Subramanian (S. Chand)
4. Engineering Physics: Theory and Practical- Katiyar and Pandey (Wiley India)
5. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New)
6. Engineering Physics-Malik HK and Singh AK (McGrawHill)

BEBSC- 202	**Engineering Physics**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

List of Experiments: -
1. To determine the wavelength of sodium light by Newton's ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.
3. To determine the energy band gap of a given semiconductor material.
4. To determine the plank's constant with help of photocell.
5 .Resolving Power of Telescope.
6 .V-I Charecteristics of P-N Junction diode.
7. Zener diode characteristics.
8. To determine the dispersive power of prism.

BTEESC-203 Basic Computer Engineering

BTEESC-203	**Basic Computer Engineering**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preambles:

- Successfully practice computer engineering to serve state and regional industries, government agencies, or national and international industries.
- Work professionally in one or more of the following areas: computer hardware and software design, embedded systems, computer networks and security, system integration, and electronic design automation.
- Achieve personal and professional success with awareness and commitment to their ethical and social responsibilities, both as individuals and in team environments.
- Maintain and improve their technical competence through lifelong learning, including entering and succeeding in an advanced degree program in a field such as engineering, science, or business.

Outcomes:-

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- an ability to communicate effectively with a range of audiences
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Unit –I Computer: (6Hrs):

Definition, Classification, Organization i.e. CPU, register, Memory & Storage Systems, I/O Devices, and System & Application Software. Computer application E-Business, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and, Computer Gaming, Multimedia and Animation etc.

Unit –II Introduction to Algorithms (6 Hrs):

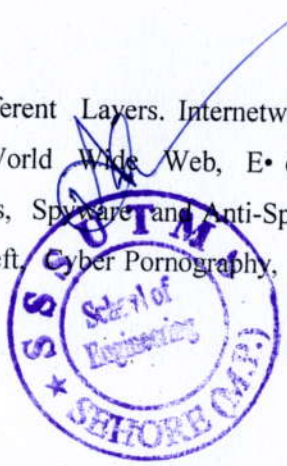
Complexities and Flowchart, Introduction to Programming, Categories of Programming Languages, Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS object oriented Programming. Introduction to C, Character Set, Tokens, Precedence and Associativity, Program Structure, Data Types, Variables, Operators, Expressions, Statements and control structures, I/O operations, Array, Functions,

Unit – III Computer System Overview (10 Hrs):

Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System. - Computer System Organization- Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

Unit IV Computer Networking (10 Hrs):

Introduction, Goals, OSI Model, Functions of Different Layers. Internetworking Concepts, Devices, TCP/IP Model. Topology, Introduction to Internet, World Wide Web, E• commerce Computer Security Basics: Introduction to viruses, worms, malware, Trojans, Spyware and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Cyber Pornography, Email spoofing, Denial of Service



(DoS), Cyber Stalking, ,Logic bombs, Hacking Spamming, Cyber Defamation, Security measures Firewall,

Unit V Data base Management System (10 Hrs):

Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data independence, Data dictionary, DBA, Primary Key, Data definition language and Manipulation Languages. Cloud computing: definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of cloud (public' private, community and hybrid clouds), Pros and Cons of cloud computing

Reference books:

1. Introduction of computers: Peter Norton, TMH
2. Object oriented programming with c++ :E.Balaguruswamy,TMH
3. Object oriented programming in C++: Rajesh k.shukla ,Wiley India
4. Computer network: Andrew Tananbaum,PHI
5. Data base management system,Korth,TMH
6. Operating system-silberschatz and Galvin-Wiley India

BTEESC-203	Basic Computer Engineering	0L:0T:1P	1 credits	2Hrs/Week

List of Experiment:-

1. Study of input and output devices of computer systems .
2. Write a program of addition, subtract, multiplication and division by using C.
3. Write a program to check weather a number is prime or not.
4. Study of various types of Operating System.
5. Study and practice of basic Linux commands-ls, cp, mv, rm, chmod kill, ps etc.
6. Design color coding of straight & crossover cable.
7. Installation of oracle 10g. Also create a employee table.

BEESC-204 Basic Mechanical Engineering

BEESC-204	Basic Mechanical Engineering	2L:0T:0P	2 credits	2Hrs/Week

Preambles:

- To provide a comprehensive knowledge of basic mechanical systems.
- Basic concepts from mechanical engineering sciences,
- Basic concepts I.C Engine
- Modern engineering tools (machine-tools, laboratory instrumentation, Working principle of steam Engine), and related subjects to design mechanical engineering components

Outcome:

- After successful completion of this course students will able to
- To describe and use basic engineering concepts
- principles and components of mechanical equipment
- measuring & testing method of physical quantities
- Assessment of boiler component.

Unit I Materials (6 Hrs):
Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness ductility, brittleness , malleability etc. of materials , Tensile test- Stress-strain diagram of ductile and brittle materials ,

Unit II Measurement (10 Hrs):
Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination set. Production Engineering: Elementary theoretical aspects of production processes like casting, carpentry, welding etc Introduction to Lathe and Drilling machines and their various operations.

Unit III Fluids (6Hrs):
Fluid properties pressure, density and viscosity etc. Types of fluids , Newton's law of viscosity , Pascal's law , Bernoulli's equation for incompressible fluids, Only working principle of Hydraulic machines, pumps, turbines, Reciprocating pumps .

Unit IV Thermodynamics (10Hrs):
Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy.
Steam Engineering: Classification and working of boilers, mountings and accessories of boilers, Efficiency and performance analysis, natural and artificial draught, steam properties, use of steam tables.

Unit V Reciprocating Machines (10 Hrs) :
Working principle of steam Engine, Carnot, Otto, Diesel and Dual cycles P-V & T-S diagrams and its efficiency, working of Two stroke & Four stroke Petrol & Diesel engines. Working principle of compressor.

References : -
1- Kothandaraman & Rudramoorthy, Fluid Mechanics & Machinery, New Age . 2- Nakra & Chaudhary , Instrumentation and Measurements, TMH.

3- Nag P.K, Engineering Thermodynamics , TMH .
4- Ganesan , Internal Combustion Engines, TMH .
5- Agrawal C M, Basic Mechanical Engineering ,Wiley Publication. 6- Achuthan M , , Engineering Thermodynamics ,PHI.

BEESC-204	Basic Mechanical Engineering	0L:0T:1P	2 credits	2Hrs/Week

List of Experiments:-

1- Study of Universal Testing machines.
2- Linear and Angular measurement using, Micrometer, Slip Gauges, Dial Gauge and
3- Study of Lathe Machine.
4- Study of Drilling Machines.
5- Verification of Bernoulli's Theorem.
6- Study of various types of Boilers.
7- Study of different IC Engines.
8- Study of different types of Boilers Mountings and accessories.

BEESC-205 Basic Civil Engineering & Mechanics

BEESC-205	Basic Civil Engineering & Mechanics	3L:0T:0P	3 credits	3Hrs/Week

Preambles:

The goal of this Engineering Mechanics course is to expose students to problems in mechanics as applied to plausibly real-world scenarios. Problems of particular types are explored in detail in the hopes that students will gain an inductive understanding of the underlying principles at work; students should then be able to recognize problems of this sort in real-world situations and respond accordingly.

The civil engineering program will serve Connecticut and the nation by providing a quality engineering education that enables students to enter a profession that can improve the civil infrastructure, and economic welfare. Our civil engineering program will maintain a strong emphasis on undergraduate education with the goal that our program will be recognized for quality instruction in civil engineering analysis and design

Outcomes:

- Demonstrate knowledge of various surveying methods.
- Conduct a chain survey.
- Conduct a compass survey.
- Conduct levelling survey and be able to do RL calculations.
- Demonstrate knowledge of properties of various building materials.

- Draw free body diagrams and determine the resultant of forces and/or moments.
- Determine the centroid and second moment of area of sections.
- Apply laws of mechanics to determine efficiency of simple machines with consideration of friction.
- Analyse statically determinate planar frames.

Unit I Building Materials & Construction (10 Hrs)
Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

Unit II Surveying & Positioning (10 Hrs):
Introduction to surveying Instruments – levels, theodolites , plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal levelling .

Unit III Basics of Engineering Mechanics covering (10 Hrs):
Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces ,Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

Unit IV Centroid and Centre of Gravity covering (10 Hrs):
Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia Definition, Moment of inertia of plane sections from first principles. Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

Unit V Friction covering (10 Hrs):
Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames

Reference Books:
1. S. Ramamrutam & R.Narayanan; Basic Civil Engineering, Dhanpat Rai Pub.
2. Prasad I.B., Applied Mechanics, Khanna Publication.
3. Punmia, B.C., Surveying, Standard book depot.
4. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI

BEESC-205	**Basic Civil Engineering & Mechanics**	**0L:0T:2P**	**1 credits**	**2Hrs/Week**

List of Experiments:-

1. To perform traverse surveying with prismatic compass, check for local attraction and determine corrected bearings and to balance the traverse by Bowditch's rule.
2. To perform leveling exercise by height of instrument of Rise and fall method.
3. To measure horizontal and vertical angles in the field by using Theodolite.
4. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
5. To determine the workability of fresh concrete of given proportions by slump test or compaction factor test.
6. To determine the Compressive Strength of brick .
7. To determine particle size distribution and fineness modulus of course and fine Aggregate.
8. To verify the law of Triangle of forces and Lami's theorem.
9. To verify the law of parallelogram of forces.
10. To verify law of polygon of forces
11. To find the support reactions of a given truss and verify analytically.
12. To determine support reaction and shear force at a given section of a simply Supported beam and verify in analytically using parallel beam apparatus.
13. To determine the moment of inertia of fly wheel by falling weight method.
14. To verify bending moment at a given section of a simply supported beam.

BEHSMC-206 Language Lab and Seminar

BEHSMC-206	**Language Lab and Seminar**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

Preambles: This course intends to impart practical training in the use of English Language for Communicative purposes and aims to develop students' personality through language Laboratory.

Topics to be covered in the Language laboratory sessions:

1. **1.** Introducing oneself, family, social roles.
2. 2.Public Speaking and oral skills with emphasis on conversational practice, extempore speech, JAM(Just a minute sessions), describing objects and situations, giving directions, debate, telephonic etiquette.

3. Reading Comprehension: Intensive reading skills, rapid reading, and reading aloud (Reading material to be selected by the teacher).
4. To write a book review. Standard text must be selected by the teacher.
5. Role plays: preparation and delivery topic to be selected by teacher/faculty.

BELC–207 Self Study / GD Seminar

BELC-207	Self-Study / GD Seminar	0L:0T:1P	1 credits	2Hrs/Week

Preambles:

To improve the mass communication and convincing / understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves. Evaluation will be done by assigned faculty based on group discussion and power point presentation.

Outcomes:

- Analytical thinking
- Lateral thinking
- constructive argument
- Communication skill
- Presentation of views

Students will discuss the course related and interdisciplinary topics for problem solving. They will improve the mass communication and convincing / understanding skills about subject and their related problem in a group of students.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

Minutes of Board of Studies Committee Meeting Dated : 03.6.2019

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 03.6.2019. Following members were present.

1. Dr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Dr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Mr. Sandesh Pradhan (external)
8. Dr. N.P. Patidar (External)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EE-7th& 8th semester Scheme and Syllabus (CBCS)

Discussion (If any) : Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion : Scheme and Syllabus was prepared as per current demand in industries and was approved for forthcoming 7th& 8th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Dr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Dr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Mr. Sandesh Pradhan (External)
8. Dr. N.P. Patidar (External)

SSSUTMS School of Engineering

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - CBCS Pattern

Academic Year 2019– 2020

Branch :Electrical Engineering **Semester - VII**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P		
1	EEC- 701	Power System protection	60	30	10	30	20	2	1	2	4	150
2	EEC- 702	Generalized Theory of Electrical Machines	60	30	10	30	20	2	1	2	4	150
3	EEC- 703	Computer Aided Design of Electrical machine	60	30	10	30	20	2	1	2	4	150
4	EEC- 704	Department Elective-V	60	30	10			2	1		3	100
5	EEC- 705	Department Elective-VI	60	30	10			2	1		3	100
6	EEC- 706	Open Elective	60	30	10			2	1		3	100
7	EEC- 707	Industrial Training - II					100			4	2	100
TOTAL			**360**	**180**	**60**	**90**	**160**	**12**	**6**	**10**	**23**	**850**

Department Elective V-EEC -704	EEC-704(A) Solar PV Application	EEC-704(B) Power Quality	EEC-704(C) Entrepreneurship Development
Department Elective VI-EEC-705	EEC-705(A) Digital signal procesing	EEC-705(B) Advanced Microprocessor	EEC-705(C) Demand side management
Open Elective -EEC- 706	EEC-706(A) System Engineering	EEC-706(B) Embedded System	EEC-706(C) Fuzzy Logic System

SSSUTMS

w.e.f July 2019

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - CBCS Pattern

Academic Year 2019– 2020

Branch : Electrical Engineering **Semester - VIII**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P		
1	EEC- 801	SCADA System and Application	60	30	10	30	20	2	1	2	4	150
2	EEC- 802	Asynchronous Machines	60	30	10	30	20	2	1	2	4	150
4	EEC- 803	Department Elective-VII	60	30	10			2	1		3	100
5	EEC- 804	Department Elective-VIII	60	30	10			2	1		3	100
6	EEC- 805	Open Elective	60	30	10			2	1		3	100
7	EEC- 806	Industrial Training Project - II				50	100			8	4	150
8	EEC- 807	General Proficiency					100		2		2	100
TOTAL			**300**	**150**	**50**	**110**	**240**	**10**	**7**	**12**	**23**	**850**

Department Elective VII-EEC -803	EEC-803(A) Coding Theory & Techniques	EEC-803(B) Energy Conservation	EEC-803(C) Reactive Power Control & FACTS
Department Elective VIII-EEC-804	EEC-804(A) High Voltage Engineering	EEC-804(B) Special Machines	EEC-804(C) Optical Instrumentation & Measurement
Open Elective -EEC- 805	EEC-805(A) Digital Image Processing	EEC-805(B) Optimization Techniques	EEC-805(C) Power Controller

SSSUTMS

w.e.f July 2019

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 701 Power System Protection

Unit I Faults: Introduction, need for protective schemes, nature and cause of faults, types of fault, per unit representation, analysis of symmetrical fault, current limiting reactors, current transformers, potential transformers and their applications in their protection schemes.

Unit II Protective Relays :Requirement of relays, universal torque equation, non-directional and directional over current relays, earth fault relays, distance relays ,impedance, mho and reactance relays, differential relays ,negative sequence relays ,under frequency relays, static relays, microprocessor and computer based protective relaying, apparatus and line protection: alternator, transformer, bus bar and motor protection using relay, feeder protection, radial and ring main system, microprocessor based protective schemes.

Unit III Circuit Breakers: Functions of switchgear, arc extinction ,arc control devices, recovery voltage and restriking voltage, current chopping and capacitance current breaking, bulk oil, low oil, air break, air blast, and sulphur hexafluoride and vacuum circuit breakers , HVDC breakers, rating, testing of circuit breakers.

Unit IV Surge Protection: Switching surges, lightning phenomenon, traveling waves on transmission lines, over voltage due to lightning, protections against lightning, lightning arresters, lightning arrester selection ,surge absorbers.

Unit V Earthing and Insulation Co-Ordination: Solid resistance and reactance earthing, arc suppression coil, earthing transformers, earth wires, earthing of appliances, insulation coordination: determination of line insulation, insulation levels of sub-station equipment, co-ordination amongst items of substation equipment, introduction to Indian electricity rules.

References:

1. CL Wadhwa, Electrical Power systems, New age International.
2. B. Ravindran and M Chander, Power System protection and Switchgear, New Age
3. International reprint 2006.
4. Badrirka, Power System protection and switchgear, TMH
5. Haddi Saadet, Power System Analysis, TMH
6. Switchgear & protection Sunil S. Rao. Khanna Publication

List of Experiments :(Extendable)

1. Determination of drop out factor of an instantaneous over current relay.
2. Determination of operating characteristic of IDMT relay.
3. Determination of operating characteristic of differential relay.
4. Study and operation of gas actuated protective relay.
5. Study and operation of static over current relay
6. Analysis of power system faults (Symmetrical & Asymmetrical) using MATLAB.
7. Study of SF6 circuit breaker
8. Protectional simulation study of generator, Transformer, Feeder & Motor protection.

EEC- 702 Generalized Theory of Electrical Machines

Unit I Generalized Theory: Conversions, basic two pole machines, transformer with movable secondary, transformer voltage and speed voltage, Kron's primitive machine , analysis of electrical machines, voltage and torque equation.

Unit II Linear Transformations: Invariance of power, transformations from displaced brush axis, three phases to two phase, rotating axes to stationary axes, transformed impedance matrix, torque calculations.

Unit III DC Machines: Generalized representation, generator and motor operation, operation with displaced brushes, steady state and transient analysis, sudden short circuit, sudden application of inertia load ,electric braking of dc motors.

Unit IV Synchronous Machines: Generalized representation, equivalent circuit, steady state analysis, transient analysis , phasor diagrams, electromechanical transients.

Unit V Special Machines: Generalized representation, steady state analysis of reluctance motor, brushless dc motor, variable reluctance motor & single phase series motor.

References:

1. B.Adkins & R.G.Harley, The General theory of AC Machines.
2. P.S.Bhimbra, Generalised theory of Electrical m/c
3. White & Woodson, Electro Mechanical Energy Conversion.
4. D. P. Kothari,B. S. Umre, "Laboratory Manual for Electrical Machines", IK International New Delhi.

List of Experiments (Extendable):

1. To determine subtransient direct axis and quadrature axis synchronous reactances of salient pole machine.
2. To conduct Hopkinson's test on a pair of DC shunt machine.
3. Retardation test on dc shunt motor.
4. Regenerative test on dc shunt machines.
5. Brake test on three phase squirrel cage induction motor
6. To Study the Variation of Speed and Load Test on Schrage Motor
7. To determine Negative Sequence and Zero sequence Reactances of Synchronous Generator
8. Load characteristics of universal motor. Operating on DC and AC supply, comparison of performance.

EEC- 703 Computer Aided Design of Electrical machine

Unit-I Computer Aided Design Philosophy of computer aided design, advantages, limitations, analysis and synthesis methods, selection of input data and design variables, flow charts for design of induction motor and synchronous machine, optimization of design constrained and unconstrained optimization problem

Unit-II DC machine:-Design of armature windings & field systems, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design.

Unit-III Power Transformer:-Design of magnetic circuit, design of windings, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design.

Unit-IV Single Phase Induction Motor-Calculation of main dimensions of stator, complete design of stator with its punching details, design of main and auxiliary winding, design of rotor, performance calculation of designed rotor and performance by equivalent circuit approach.

Three Phase Induction Motor -Design of stator, windings design of squirrel cage rotor, design of slip ring rotor, selection of variables for optimal design, formulation of design equations, objective functions constraint functions, algorithms for optimal design.

Unit-V 3-Phase Alternator:-Design of stator, windings, design of field systems for salient pole and non-salient pole machines, selection of variables for optimal design, formulation of design equations, objective function, constraint functions, algorithms for optimal design.

References:

1. Computer- Aided Design of Electrical Equipment- by Dr. M. Ramamoorthy-Affiliated East-West press Pvt. Ltd. New Delhi.
2. Electrical Machine Design- by A.K. Sawhney, Dhanpat Rai & Sons.
3. Performance and Design of A.C. Machines-M.G. Say, Affiliated East West Press Pvt. Ltd., New Delhi.
4. Performance and Design of D.C. Machines- Clayton & Hancock.
5. Principles of Electrical Machine Design with Computer Programmes by- S.K. Sen, Oxford & IBH Publishing Co.

EEC- 703 Computer Aided Design of Electrical machine

List of Experiment (Extendable):

1. Computer Program in "C" in MATLAB for Complete Design of 500KW, 600v lab wound dc machine
2. Computer Program in "C" in MATLAB for Optimal Design of dc machine
3. Computer Program in "C" in MATLAB for Complete Design of core type power Transformer
4. Computer Program in "C" in MATLAB for Complete Design of salient pole Alternator
5. Computer Program in "C" in MATLAB for Complete Design of Synchronous Machines
6. Computer Program in "C" in MATLAB for Optimal Design of cage rotor
7. Computer Program in "C" in MATLAB for Complete Design Of single ph IM
8. Computer Program in "c" in MATLAB for Optimal Design of slip ring IM

EEC-704(A) Solar PV Application

Unit-I Solar Photovoltaic: Solar Cell and its function, Solar Technologies, Solar Cell Parameters, Efficiency of Solar Cell, Solar PV Module, Rating of Solar PV Module, PV Module Parameters, Efficiency of PV Module, Measuring Module Parameters, Solar Photovoltaic Module Array Connection of PV Module in Series and Parallel, Estimation and Measurement of PV Module Power, Selection of PV Module

Unit-II Batteries: Battery function, Types of Batteries, Battery parameters, Selection of Battery, Series Parallel combination of Batteries, Batteries for Photo voltaic System, Application of Batteries in Solar PV system, Battery Maintenance and Measurements, Battery Fault Detection and Test, Battery Installation for PV system.

Unit-III Controller: Charge Controller, MPPT and Inverter Power MOSFET and IGBT, Opto coupler, Buck and Boost Converter, Fly back Converter, Full Bridge Inverter, Voltage and Current Feedback, DC to DC power converter, DC to AC Converter, AC to DC Converter, Battery Charge controller, Maximum Power Point Tracking, Specification of Inverter and charger.

Unit-IV Design: Solar PV System Design and Integration Solar Radiation Energy Measurements, Estimating Energy requirement, Types of Solar PV System, Design methodology for SPV system, Design of Off Grid Solar Power Plant, Design and Development of Solar Street Light and Solar Lantern, Off Grid Solar power Plant.

Unit-V Installation: Safety Installation and Trouble shooting of Standalone Solar PV System, Maintenance of Solar PV System, Safety in installation of Solar PV System.

References:

1. Chetan Singh Solanki, Solar Photovoltaic's: Fundamental Technologies and applications, 2 nd Edition, Prentice Hall India Learning Private Limited, 2011
2. H.P. Garg & Prakash, Solar Energy-Fundamentals and applications, TMH Publication, 2000
3. Tomas Markvart Solar Electricity, 2 nd Edition, John Wiley Publication, 12 May 2000
4. Michael boxwell, The Solar Electricity Handbook, Greenstream publishing, 2013

EEC-704(B) Power Quality

Unit-1: Introduction-Characterization of Electric Power Quality: Transients, short duration and long duration voltage variations, Voltage imbalance, waveform distortion, Voltage fluctuations, Power frequency variation, Power acceptability curves – power quality problems: poor load power factor, and unbalanced loads, DC offset in loads, Notching in load voltage, Disturbance in supply voltage – Power quality standards.

Unit-II: Non Linear Loads-Single phase / Three phase static converters, Battery chargers, Arc furnaces, Fluorescent lighting, pulse modulated devices, Adjustable speed drives.

Unit-III: Analysis and Conventional Mitigation Methods-Analysis of power outages, Analysis of unbalance: Symmetrical components of phasor quantities, Instantaneous symmetrical components, instantaneous real and reactive powers, Analysis of distortion: On– line extraction of fundamental sequence components from measured samples – Harmonic indices.

Unit-IV : Voltage Sag-Analysis of voltage sag: Detorit Edison sag score, Voltage sag energy, Voltage Sag Lost Energy Index (VSLEI)- Analysis of voltage flicker, Reduced duration and customer impact of outages, Classical load balancing problem: Open loop balancing, Closed loop balancing, current balancing, Harmonic reduction, Voltage sag reduction.

Unit-V: Power Quality Improvement-Utility-Customer interface –Harmonic filters: passive,– Custom power devices: Network reconfiguring Devices, Load compensation using DSTATCOM, Voltage regulation using DSTATCOM, protecting sensitive loads using DVR, UPQC – control strategies: P-Q theory, Synchronous detection method – Custom power park – application of custom power devices.

References:

1. Power Quality Enhancement Using Custom Power Devices 2002 ArindamGhosh Kluwer
2. Academic Publishers
3. Electric Power Quality 1994(2nd edition) G.T.Heydt Stars in a Circle Publications
4. Power Quality Edition (Year of publication) R.C. Duggan
5. Power system harmonics A.J. Arrillga
6. Power electronic converter harmonics Derek A. Paice

EEC-704(C) Entrepreneurship Development

Unit-I : Promotion of Entrepreneurship: Meaning, definition and functions of an entrepreneur, qualities of a good entrepreneur; Role of Entrepreneur in economic development; Government measures for the promotion of small scale industries with special reference to Haryana; Cultural factors in developing entrepreneurship.

Unit -II : Ownership and Location of Industrial Units: Different forms of industrial organisation, theories of industrial location. process of preparing project reports.

Unit -III : Size of Firm and Pricing :Concept of optimum firm, factors determining optimum size, technical, managerial, marketing uncertainties and risk, pricing methods, policies and procedures.

Unit -IV : Financing of Small Industries : Importance and need : Commercial Banks and term lending in India; Banks and under-writing of capital issues; Brief description about the role of other financial agencies viz; Industrial Finance Corporation of India, State Financial Corporation, Industrial Development Bank of India; Unit Trust of India.

Unit -V : Problems Faced by Small Enterprises: Problems connected with Marketing, Management of New Products; Power; Finance; Raw Material; Under-utilization of capacity; Causes of under – utilization; Rehabilitation of Sick Mills.

References:

1. Entrepreneurship of Small Scale Industries – Deshpande Manohar D. (Asian Publishers, New Delhi)
2. Environment and Entrepreneur – Tandon B.C. (Asian Publishers, New Delhi).
3. The Industrial Economy of India – Kuchhal S.C. (Chaitanya, Allahabad).
4. Emerging Trends in Entrepreneurship Development Theories & Practices – Singh P.Narendra (International Founder, New Delhi)
5. Entrepreneur, Banker & Small Scale Industries – Bhattacharya Hrisnikes.
6. Entrepreneurship & Growth of Enterprise in Industrial Estates – Rao Gangadhara N.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-705(A) Digital Signal Processing

Unit – I Discrete-Time Signals and Systems: Discrete-time signals, discrete-time systems, analysis of discrete-time linear time-invariant systems, discrete time systems described by difference equation, solution of difference equation, implementation of discrete-time systems, stability and causality, frequency domain representation of discrete time signals and systems.

Unit – II The Z-Transform: The direct Z-transform, properties of the Z-transform, rational Z-transforms, inversion of the Z transform, analysis of linear time-invariant systems in the Z-domain, block diagrams and signal flow graph representation of digital network, matrix representation.

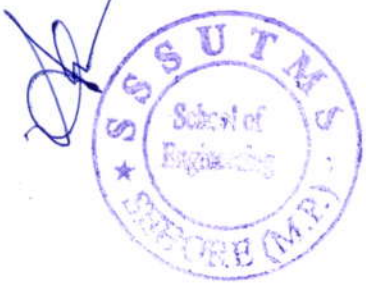
Unit – III Frequency Analysis of Discrete Time Signals: Discrete Fourier Series (DFS), properties of the DFS, discrete Fourier transform (DFT), properties of DFT, two dimensional DFT, circular convolution.

Unit – IV Efficient Computation of the DFT: FFT algorithms, decimation in time algorithm, decimation in frequency algorithm, decomposition for 'N' composite number.

Unit – V Digital filters Design Techniques: Design of IIR and FIR digital filters, Impulse invariant and bilinear transformation, windowing techniques rectangular and other windows, examples of FIR filters, design using windowing.

References:

1. Oppenheim and Schafer: Digital Signal Processing, PHI Learning.
2. Johnny R. Johnson: Introduction to Digital Signal Processing, PHI Learning.
3. Proakis: Digital Signal Processing, Pearson Education.
4. Rabiner and Gold: Theory and Application of Digital Signal Processing, PHI Learning.
5. Ingle and Proakis: Digital Signal Processing- A MATLAB based Approach, Thompson, Cengage Learning.



EEC-705(B) Advanced Microprocessor

Unit – I Introduction: Need of advance microprocessors, Difference between RISC and CISC, RISC Design philosophy, ARM Design Philosophy, ARM processor family, Development of ARM architecture

Unit –II The ARM Architecture and Programmers Model : The Acorn RISC Machine, ARM Core data flow model, Architectural inheritance, The ARM7TDMI programmer's model: General purpose registers, CPSR, SPSR, ARM memory map, data format, load and store architecture, Core extensions, Architecture revisions, ARM development tools

Unit –III ARM Instruction set: Data processing instructions, Arithmetic and logical instructions, Rotate and barrel shifter, Branch instructions, Load and store instructions, Software interrupt instructions, Program status register instructions, Conditional execution, Multiple register load and store instructions, Stack instructions, Thumb instruction set, advantage of thumb instructions, Assembler rules and directives, Assembly language programs for shifting of data, factorial calculation, swapping register contents, moving values between integer and floating point registers

Unit – IV Memory Management Units: Moving from memory protection unit (MPU) to memory management unit (MMU), Working of virtual memory, Multitasking, Memory organization in virtual memory system, Page tables, Translation look aside buffer, Caches and write buffer, Fast context switch extension

Unit – V Advanced Microprocessor Bus Architecture (AMBA) Bus System: User peripherals, Exception handling in ARM, ARM optimization techniques

References:

1. ARM Assembly Language Programming & Architecture By. Muhammad Ali Mazidi, Kindle edition
2. Arm Assembly Language, Fundamentals and Techniques, 2nd edition, William Hohl, Christppher Hinds, CRC Press.
3. Arm System Developer's Guide, Designing and Optimizing Software, Andrew N. Sloss, Dominic Symes, Chris Wwight, Elsevier
4. Arm System-on-chip Architecture, 2nd Edition, Steve Furber, Pearson publication
5. Embedded Systems By. Lyla Das, Pearson publication

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-705(C) Demand Side Management

Unit I Introduction to Energy Auditing: Energy Situation – world and India, energy consumption, conservation, codes, standards and legislation, energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, sankey diagrams, load profiles, energy conservation schemes. measurements in energy audits, presentation of energy audit results.

Unit ii Demand Side Management Basics : Introduction to DSM, concept of DSM, benefits of DSM, different Techniques of DSM – time of day pricing, multi-utility power exchange model, time of day models for planning.

Unit III Demand Side Management for load: Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. management and organization of energy

Unit IV Economics Of DSM: Basic payback calculations, depreciation, net present value calculations, taxes and tax credit – numerical problems. importance of evaluation, measurement and verification of demand side management programs.

Unit V Cost Effectiveness Tests of DSM: Cost effectiveness test for demand side management programs - ratepayer impact measure test, total resource cost, participant cost test, program administrator cost test numerical problems: participant cost test, total resource cost test and ratepayer impact measure test.

References:

1. Demand Side Management Jyothi Prakash, TMH Publishers.
2. Clark W. Gellings, John H. Chamberlin, Demand-side management : concepts and methods, 2 nd Edition, Prentice Hall, 1 May 1993
3. Aníbal T. de Almeida, Arthur H. Rosenfeld, Demand-side management and electricity end use efficiency, 1 st Edition, Springer, Softcover reprint of the original, 28 October 2011
4. R. K. Pachauri & P. Mehrotra , India Vision 2020

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-706(A) System Engineering

Unit I- Systems Engineering: Role, Purpose and Value Mission, definitions, codes of practice, competencies, relation to other corporate functions, marketing, risk-management, business performance, time-to-market

Unit III Systems Engineering Organization: Life cycle process models—waterfall, helix, prototyping, simultaneous/concurrent, evolutionary acquisition, Sashami, chaotic, regression, etc. The engineering and application systems model. The 5 systems model. Engineering environments; ATMOSPHERE, SEAMS, system factory

Unit III Methods, Modelling and Mathematics: Principles of systems creativity, system theory, dynamic systems, simulation models, queuing models, linear and non-linear control models, stochastic models, statistics. Creative methods: Ishikawa, Majaro, Causal Loop Modelling, stakeholder analysis, interpretive structural modelling.

Unit Iv Evaluating Systems: Efficiency, effectiveness, cost-effectiveness; net contribution; tradeoffs, ranking methods, weighting and scoring methods

Unit V Requirements Enquiry: soft systems methodology, hierarchical issue method. Requirements definition. TRIAD building system. Requirements specification, compliance and certification specification.

References:

1. Benjamin S. Blanchard and Wolter J. Fabrycky, Systems Engineering and Analysis, 5th ed., Prentice Hall
2. International Series in Industrial and Systems Engineering, (Upper Saddle River, NJ), 2006. ISBN-13: 978-0-13-221735-4

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-706(B) Embedded System

Unit I: Introduction to Embedded System: Categories, Requirements, Applications, Challenges and Issues. Core of Embedded system, Memory, Sensors and Actuators, communication interface, embedded firmware, system components.

Unit II: Computational Models: Fundamental issues of hardware software co-design, computational models in embedded design data flow graph, control flow graph, state machine model, sequential programmed model, concurrent model, unified modeling language.

Unit III: 8085 Microcontroller: Architecture of 8085 microcontroller, memory organization, registers, interrupts, addressing modes, instruction sets.

Unit IV: Embedded Firmware Design Approaches- OS based, Super loop based. Embedded firmware development languages- Assembly language based, high level language based, mixed, Programming in embedded C.

Unit V: Task operation: Types of Operating system, Task, process and threads, Multi processing and multi task, Task scheduling, Task communication, Task synchronization.

References:-

1. Shibu K V, "Introduction to Embedded System", TMH.
2. David E Simon, "An Embedded Software Primer", Pearson education Asia, 2001.
3. Steven F. Barett, Daniel J. Pack, "Embedded Systems" Pearson education, First Impression 2008.
4. Vahid Frank, Tony Givargis, "Embedded System Design", John Wiley and Sons, Inc.
5. Dream Tech Software Team, "Programming for Embedded Systems" Wiley Publishing house Inc.
6. Sriram V Iyer, Pankaj Gupta, "Embedded Real time Systems Programming", TMH.
7. Raj Kamal, "Embedded Systems", TMH.

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-706(C) Fuzzy Logic System

Unit I-Classical & Fuzzy Sets: Introduction to classical sets – properties, operations and relations; fuzzy sets, membership, uncertainty, operations, properties, fuzzy relations, cardinalities, fuzzy, properties of fuzzy sets.

Unit II-Membership Functions: Features of the membership function, standard forms and boundaries, fuzzification, membership value assignments – intuition, inference, rank ordering, angular fuzzy sets,

Unit III-Fuzzy Logic System Components: Fuzzification, development of rule base and decision making system, defuzzification to crisp sets, defuzzification methods.

Unit IV-Application: Fuzzy logic control – inverted pendulum – image processing – home heating system – blood pressure during anesthesia – introduction to neuro fuzzy controller.

Unit V-Fuzzy Associative Memories: Fuzzy systems as between-cube mappings, fuzzy and neural function estimators, fuzzy hebb FAMs, adaptive FAMs: product-space clustering in FAM cells.

References:-

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
2. John Yen & Reza Langari, 'Fuzzy Logic – Intelligence Control & Information', Pearson Education, New Delhi, 2003.
3. Klir.G, Yuan B.B. "Fuzzy sets and Fuzzy Logic Prentice Hall of India private limited, 1997.
4. Fuzzy Logic and Fuzzy Decision Making Paperback – 26 Jun 2008 by Dr G Kannan

SSSUTMS School of Engineering SEHORE (M.P.)

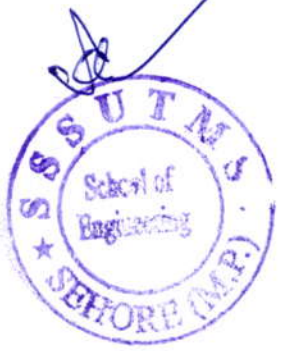
Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 707-Industrial Training - II

Students must observe following points to enrich their learning in electrical engineering during industrial training:

- The training must be the advance/ different already done on minor training.
-Industrial environment and work culture.
- Organisational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Roles and responsibilities of different categories of personnel.
- Customer services.
-Problems related to various areas of Work etc.
- Layout if any

To be submitted : The students has to submit the power point presentation of minimum15 slides of the training performed(comprising of points stated above) along with the original certificate of training performed with proper seal and signature of the authorized person.



Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 801-SCADA System and Application

Unit – I SCADA and PLC: Data acquisition system, evaluation of SCADA, communication technologies, monitoring and supervisory functions. PLC: Block diagram, programming languages, Ladder diagram, Functional Block diagram, Applications, Interfacing of PLC with SCADA.

Unit II- SCADA system components: Schemes, Remote Terminal Unit, Intelligent Electronic Devices, Communication Network, SCADA server.

Unit III-SCADA Architecture-Various SCADA Architectures, advantages and disadvantages of each system, single unified standard architecture IEC 61850 SCADA / HMI Systems.

Unit IV -SCADA Communication-Various industrial communication technologies- wired and wireless methods and fiber optics, open standard communication protocols.

Unit V-Operation and Control Of Interconnected Power System-Automatic substation control,SCADA configuration, Energy management system, system operating states, system security,state estimation, SCADA applications Utility applications, transmission and distribution sectoroperation, monitoring analysis and improvement. Industries oil gas and water. Case studies,implementation, simulation exercises.

References:

1. Ronald L. Krutz, "Securing SCADA System", Wiley Publications.
2. Stuart A Boyer, "SCADA supervisory control and data acquisition", ISA, 4th Revised
3. Edition
4. Sunil S. Rao, "Switchgear and Protections", Khanna Publications.
5. Gordan Clark, Deem Reynders, "Practical Modern SCADA Protocols", ELSEVIER
6. S. K. Singh, "Computer Aided Process Control", PHI
7. S. Gupta, JP Gupta, "PC interface For Data Acquiring & Process Control", 2nd Ed., Instrument Society of America.
8. John W. Web, Ronald A. Reis, "Programmable Logic Controllers" 5th Edition, PHI
9. Liptak, B. G. (E.d.), "Instrument Engineers Handbook", vol. I to III, Chilton Book Co.
10. Bhatkar, Marshal, "Distributed Computer control & Industrial Automation", Dekker Publication
11. Frank D. Petruzella, "Programmable Logic Controllers", 3rd Edition, McGraw Hill

List of Experiments PLC & SCADA based (Extendable):

SCADA based Experiments

1Experiments on Transmission Module Local Mode for Simulation of Faults

a. Line to Ground Faults (LG)
b. Line to Line Faults (LL) Line to Line to Line Faults (LLL)
c. Line to Line to Ground Faults (LLG)
d. Line to Line to Line to Ground Faults (LLLG)

2 Experiments on Transmission Line Loading

a. Resistive Loading
b. Inductive Loading
c. Resistive and Inductive Loading

3 Experiments on Series Compensation Shunt Compensation

4 Experiments on Sudden Load Rejection Remote Mode for Simulation of Faults

a. Line to Ground Faults (LG)
b. Line to Line Faults (LL) Line to Line to Line Faults (LLL)
c. Line to Line to Ground Faults (LLG)
d. Line to Line to Line to Ground Faults (LLLG)

PLC based Experiments

1. To start a 3 squirrel cage induction motor in star-delta method using PLC.
2. Interfacing of simple I/O devices with PLC for ON & OFF operation
3. DOL starter operation using PLC.
4. Star delta starter operation using PLC.
5. Direction/speed control of a DC motor using PLC
6. Control a conveyer belt using PLC
7. Control a simulated elevator using PLC
8. PLC based thermal ON/OFF control.
9. Interfacing PLC with SCADA, Parameter reading of PLC using SCADA
10. Reporting & trending in SCADA system
11. Project based on PLC

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC 802 - Asynchronous Machines

Unit I- Induction Machines: Generalized representation, performance equation, equivalent circuit, steady state analysis, transient analysis, phasor diagrams, field distribution of space distributed three-phase winding, concept of rotating field, production and concept of asynchronous and synchronous torques., leakage reactance, effect of rotor circuit resistance, starting torque, cage motors, double cage and deep bar motor, generator action, methods of excitation, space harmonics, estimation of equivalent circuit parameters, effect of voltage injection in rotor circuit of slip ring induction motor, Schrage motor.

Unit II- Reference Frame Theory: Real time model of a two phase induction machine-Transformation to obtain constant matrices-three phase to two phase transformation-Power equivalence.

Unit III- Dynamic Modeling Of Three Phase Induction Machine: Generalized model in arbitrary reference frame-Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference frame model-Rotor reference frame model synchronously rotating reference frame model-Equations in flux linkages-per unit model

Unit IV- Small Signal Modeling of Three Phase Induction Machine : Small signal equations of Induction machine-derivation-DQ flux linkage model derivation control principle of Induction machine.

Unit V- Symmetrical and Unsymmetrical 2 phase Induction Machine: Analysis of symmetrical 2 phase induction machine-voltage and torque equations for unsymmetrical 2 phase induction machine-voltage and torque equations in stationary reference frame variables for unsymmetrical 2 phase induction machine-analysis of steady state operation of unsymmetrical 2 phase induction machine- single phase induction motor - Cross field theory of single-phase induction machine.

References:

1. Electric machinery A.E. Fitzgerald and C. Kingsley.
2. Theory of A.C. machines A.S. Langsdorf.
3. The performance and design of A. C. E.O. Taylor. Commutator Machines.
4. P.C.Krause, Oleg Wasynczuk, Scott D.Sudhoff, "Analysis of Electrical Machinery and Drive systems", IEEE Press, Second Edition.
5. P.S.Bimbra, "Generalized Theory of Electrical Machines" Khanna publications, 5th edition-1995
6. Dynamic simulation of Electric machinery using MATLAB / Simulink –Chee Mun Ong-
7. Prentice Hall.
8. R. Krishnan, "Electric Motor Drives - Modeling, Analysis& control", Pearson Publications, 1st edition, 2002.

List of Experiments (Extendable)-Matlab based experiments:

1. Construction of Induction motor model using matlab.
2. Construction of Real time model of a two phase induction machine
3. Analysis of symmetrical 2 phase induction machine-voltage and torque equations for unsymmetrical 2 phase induction machine
4. Effect of voltage injection in rotor circuit of slip ring induction motor,
5. Simulation and study of production and concept of asynchronous and synchronous torques
6. Characteristics curves for various speed control techniques of induction motor.
7. Characteristics curves for various braking of induction motor.

EEC-803(A) Coding Theory & Techniques

Unit I Coding: Coding for reliable digital transmission and storage, types of codes, modulation and coding, maximum likelyhood decoding, types of errors, source coding: shannon-fano coding, huffman codes, run-length encoding, Lampel-Ziv codes.

Unit II : Block codes: Important linear block codes, repetition codes, hamming codes, a class of single error-correcting and double-error correcting codes, reed-muller codes, the (24,12) golay code, product codes, interleaved codes.

Unit II : Convolutional codes: Encoding, structural properties, state diagram, code tree diagram, maximum-likelihood decoding, soft decision and hard decision decoding, the viterbi algorithm.

Unit II : Low Density Parity Check codes: Introduction, galleger's method of construction, regular and irregular ldpc codes, other methods of constructing LDPC codes, tanner graphs, decoding of LDPC codes.

Unit V: BCH and RS codes: Groups, fields, binary arithmetic, construction of galois fields GF(2m), basic properties of galois fields, introduction to BCH and RS codes.

References:

1. Shu Lin and Daniel J. Costello, Jr. "Error Control Coding," 2/e, Pearson, 2011.
2. K Sam Shanmugum, "Digital and Analog Communication Systems," Wiley, 2010.
3. Simon Haykin, "Digital Communication," TMH, 2009.
4. Bernard Sklar, "Digital Communications-Fundamental and Application", PE.
5. John G. Proakis, "Digital Communications", 5 th Edition, 2008, TMH.
6. Salvatore Gravano, "Introduction to Error Control Codes", Oxford
7. Todd K.Moon, "Error Correction Coding – Mathematical Methods and Algorithms", 2006, Wiley India.
8. Ranjan Bose, "Information Theory, Coding and Cryptography", 2nd Edition, 2009, TMH.

SSSUTMS

Registrar
Sri Sathya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-803(B) Energy Conservation

Unit-I General Energy Problem: Energy use patterns and scope for conservation, energy audit, energy monitoring, energy accounting analysis, and targeting, energy management, types of energy audit, qualities and function of energy managers, language of an energy manager, check list for top management, loss of energy in material flow, energy performance, maximizing system efficiency, input energy requirements, energy auditing instruments, material load energy balance diagram.

Unit- III Thermodynamics of Energy Conservation: Basic principle, irreversibility, second law, efficiency analysis of systems, primary energy sources, optimum use of prime-movers, energy recovery in thermal systems, waste heat recovery techniques, thermal insulation, thermal energy audit in heating, ventilation and air conditioning, friction, lubrication, predictive and preventive maintenance.

Unit-III Load curve analysis: Load curve analysis & load management, DSM, energy storage for power systems (mechanical, thermal, electrical & magnetic), restructuring of electric tariff from energy conservation consideration, economic analysis depreciation method, time value of money, evaluation method of projects, replacement analysis, pay back period, energy economics, cost benefit risk analysis.

Unit-IV Energy Efficient System: Energy efficient electric drives, energy efficient house keeping, energy efficient motors, energy flow networks, simulation & modeling, matrix chart.

Unit-V Energy conservation: Energy conservation policy, energy conservation task before industry, energy conservation equipment's , co-generation, energy conservation process, energy conservation in transportation system in electric vehicle industry, sugar, textiles, cement industries, electrical energy conservation in building, heating, lighting & domestic gadgets .

References:

1. Energy Management – W.R. Murphy & G. Mckey Butler worths.

2. Energy Management Head Book- W.C. Turner, John Wiley.

3. Energy Management Principles- Craig B. Smith, Pergamon Press.

4. Energy Conservation- Paul O Callagan- Pergamon Press.

5. Design & Management of energy conservation. Callaghan.

6. Elect, Energy Utilization & Conservation. Dr. Tripathi, S.C.

EEC-803(C) Reactive Power Control & FACTS

Unit-1: Introduction: Facts basic concepts and general system considerations, power flow in ac system, definitions on facts, types of facts controllers, benefits from facts Technology, static var compensator (SVC): principle of operation and control strategy, Thyristor controlled phase angle regulator (TCPAR): principle of operation and control strategy.

Unit-2: Transient Stability Analysis: Analysis of Power systems installed with FACTS devices **Control with FACTS:** Power Transmission Control using UPFC, Power Transmission Control using Phase Shifting Transformer (PST), Power Transmission Control using SSSC.

Unit-3: **Oscillation Stability Analysis and Control with FACTS**: Linearised model of power systems installed with FACTS based Stabilizers, Heffron-Phillips model of a SMIB system installed with SVC, TCSC and TCPS, Heffron-Phillips model of a SMIB system with UPFC, Heffron-Phillips model of a Multi-machine system installed with SVC, TCSC and TCPS.

Unit-4: **Design of FACTS Based Stabilizers**: Analysis of damping torque contribution by FACTS based stabilizers installed in SMIB systems, Selection of installing locations and feedback signal for FACTS based stabilizers, Dynamic Voltage restorer.

Unit-5: Power Flow Controller: Unified Power Flow Controller (UPFC): Principle of operation, configuration and control, Simulation of UPFC, Steady state model of UPFC, Interline Power Flow Controller (IPFC): Principle of operation, configuration and control, Static compensator (STATCOM): principle of operation and control, Application for mitigation of ssr.

References:

1. "Understanding FACTS Devices" N.G. Hingorani and L. Guygi. IEEE Press Publications 2000.
2. Flexible AC Transmission System: Y.H.Song and A.T.Jhons, IEE, 1996(A Book)
3. Dr Ashok S & K S Suresh Kumar "FACTS Controllers and applications" course book for STTP, 2003.
4. Ned Mohan et.al, Power Electronics, John Wiley and Sons.
5. K. R. Padiyar, FACTS Controllers in Power Transmission and Distribution, New Age International, First Edition.
6. T J E Miller, John Wiley, Reactive Power Control in Power Systems, Wiley India Pvt Ltd 28 January 2010 2. J Arriliga and N R Watson, Wiley, Computer modeling of Electrical Power Systems, Wiley India Pvt Ltd, 2009
7. R Mohan Mathur and Rajiv K Varma, Thyristor based FACTS controller for electrical transmission system, Wiley-IEEE Press, 12 August 2011

SSSUTMS

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-804(A) High Voltage Engineering

Unit –I Introduction: Basics of HV technology, advantages of transmitting electrical power at high voltages, need for generating high voltages in laboratory, applications of high voltage.

Unit –II Insulation & Breakdown: Classification of HV insulating media, its properties, gaseous dielectrics, ionizations, Townsend's theory & its limitations, streamer's theory breakdown in non uniform fields, corona discharges, Paschen's law and its significance, time lags of breakdown, breakdown in solid dielectrics, intrinsic breakdown, avalanche breakdown, thermal breakdown, and electro mechanic breakdown, breakdown of liquids dielectric, suspended particle theory, electronic breakdown, electro convection breakdown, cavity breakdown (bubble's theory).

Unit –III High Voltage AC DC : HV AC transformer, need for cascade connection, working of transformers units connected in cascade, series resonant circuit, principle of operation and advantages, tesla coil, HV DC voltage doubler circuit, Cock Croft- Walton type high voltage DC set.

Unit –IV: Impulse Voltage and current Introduction to standard lightning and switching impulse voltages, analysis of single stage impulse generator, expression for output impulse voltage, multistage impulse generator, its components, triggering of impulse generator by three electrode gap arrangement, triggering gap, oscillograph time sweep circuits, generation of switching impulse voltage, generation of high impulse current.

Unit –V High Voltage Tests on Electrical Apparatus: tests on isolators, circuit breakers, cables insulators and transformers. Electrostatic voltmeter, generating voltmeter, series resistance micro ammeter, HV DC measurements, standard sphere gap measurements of HV AC & HVDC, potential dividers, resistance dividers, capacitance dividers, mixed RC potential dividers, surge current measurement.

References:

1. E. Kuffel and W.S. Zaengl, "High voltage engineering fundamentals", 2nd edition,
2. Elsevier, press, 2005.
3. M.S.Naidu and Kamaraju, "High Voltage Engineering", 3rd edition, THM, 2007.
4. L. L. Alston, "High Voltage technology", BSB Publication, 2007..
5. Rakosh Das Begamudre, Extra High voltage AC transmission engineering, Wiley Easternlimited, 1987.
6. Transmission and distribution reference book-Westing House.
7. C.L.Wadhwa, High voltage engineering, New Age International Private limited, 1995.

EEC-804(B) Special Machines

Unit I-Stepper Motor Introduction, Types, Hybrid stepper motor- construction, principle of operation, two phases energized at a time, conditions for operation, different configurations, VR Stepper motor- single stack and multi stack, Drive systems and circuit for open loop and Closed loop control of stepping motor, Dynamic characteristics ,Single phase stepper Motor, Expression of voltage, current and torque for stepper motor and criteria for synchronization.

Unit II - Switched Reluctance Motor: Constructional features, principle of operation, Design Aspects and profile of the SRM, Torque equation, Power converters and rotor sensing mechanism, expression of torque and torque-speed characteristics.

Unit III - Permanent Magnet synchronous motor: Principle of operation, EMF, power input and torque expressions, Phasor diagram, Power controllers, Torque speed characteristics, Self control, Vector control, Current control schemes.

.

Unit IV - Permanent Magnet Brushless DC Motor: Commutation in DC motors, Difference between mechanical and electronic commutators, Hall sensors, Optical sensors, Multiphase Brushless motor, Square wave permanent magnet brushless motor drives, Torque and emf equation, Torque-speed characteristics, Controllers-Microprocessor based controller.

Unit V - Synchronous Reluctance Motors: Constructional features: axial and radial air gap Motors, Operating principle, reluctance torque, phasor diagram, motor characteristics – Linear induction machines.

References:-

1. Vekatratnam, "Special Electrical Machines", Universities Press
2. Fitzerald and Kingsley," Electrical Machines" McGraw Hill. Miller. T. J. E., "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon Press, Oxford, 1989.
3. Kenjo. T and Nagamori. S, "Permanent Magnet and Brushless DC Motors", Clarendon Press, Oxford, 1989.
4. Kenjo. T, "Stepping Motors and their Microprocessor Control", Clarendon Press, Oxford, 1989
5. Krishnan R, "Switched Reluctance Motor Drives", Modelling, Simulation, Analysis, Design and applications, CRC press

S S S U T M S School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-804(C) Optical Instrumentation & Measurement

Unit I Light Sourcing, Transmitting and Receiving Concept of Light: Classification of different phenomenon based on theories of light, basic light sources and its characterization, polarization , coherent and incoherent sources, grating theory ,application of diffraction grating, electro-optic effect, acousto-optic effect and magneto-optic effect.

Unit II Opto –Electronic devices and Optical Components : Photo diode, PIN, photo-conductors, solar cells, ,phototransistors, materials used to fabricate LEDs and lasers design of LED for optical communication, response times of LEDs ,LED drive circuitry, lasers classification :ruby lasers, neodymium lasers, He- Ne Lasers, CO2 lasers, dye lasers, semiconductors lasers, lasers applications.

Unit III Interferometry :Interference effect, radio-metry, types of interference phenomenon and its application, michelson's interferometer and its application fabry-perot interferometer, refractometer, rayleigh's interferometers, spectrographs and monochromators, spectrophotometers, calorimeters, medical optical instruments

Unit IV Holography: Principle of Holography, on-axis and off axis holography, application of holography, optical data storage. optical fiber sensors: active and passive optical fiber sensor, intensity modulated, displacement type sensors, multimode active optical fiber sensor (micro bend sensor)single mode fiber sensor-phase modulates and polarization sensors

Unit III Interferometry Interference effect, radio-metry, types of interference phenomenon and its application, michelson's interferometer and its application fabry-perot interferometer, refractometer, rayleigh's interferometers, spectrographs and monochromators, spectrophotometers, calorimeters, medical optical instruments.

Unit V Fiber optic fundamentals and Measurements: Fundamental of fibers, fiber optic communication system, optical time domain reflectometer (OTDR), time domain dispersion measurement, frequency domain dispersion measurement, laser doppler velocimeter,

References:-

1. J. Wilson & J. F. B. Hawkes, "Optoelectronics: An Introduction" PHI/ Pearson
2. Rajpal S. Sirohi "Wave Optics and its Application", Hyderabad, Orient longman Ltd.
3. Yariv, "Optical Electronics", C. B. S. Collage Publishing, New York, 1985.

EEC-805(A) Digital Image Processing

Unit-I Digital Image Processing-Elements of a digital image processing system, structure of the human eye, image formation and contrast sensitivity, sampling and quantization, neighbours of a pixel, distance measures, photographic file structure and exposure, filem characteristics, linear scanner, video camera, image processing applications.

Unit-II Image Transforms- Introduction to Fourier transform-DFT, properties of two dimensional FT, separability, translation, periodicity, rotation, average value, FFT algorithm, walsh transform, hadamard transform, discrete cosine transform.

Unit-III Image Enhancement- Definition, spatial domain methods, frequency domain methods, histogram modification technique, neighborhood averaging, media filtering, lowpass filtering, averaging of multiple images, image sharpening by differentiation and high pass filtering.

Unit-IV-Image Restoration-Definition, Degradation model, discrete formulation, circulant matrices, block circulant matrices, effect of diagnolization of circulant and block circulant matrices, unconstrained and constrained restorations , inverse filtering, wiener filter, restoration in spatial domain.

Unit-VImage Encoding-Objective and subjective fidelity criteria, basic encoding process, mapping, quantizer, coder, differential encoding, contour encoding, run length encoding, image encoding relative to fidelity criterion, differential pulse code modulation.

References:

1. Rafael, C. Gonzlez., and Paul, Wintz, "Digital Image Processing", Addison-Wesley PublishingCompany.
2. Jain Anil K., "Fundamentals of Digital Image Processing", Prentice Hall.
3. Sosenfeld, and Kak, A.C., "Digital Image Processing", Academic Press.
4. William K. Pratt., "Digital Image Processing", John Wiley and Sons.

EEC-805(B) Optimization Techniques

Unit I Linear Programming: Introduction - formulation of linear programming model-graphical solution–solving lpp using simplex algorithm – revised simplex method

Unit II Advances In LPP : Dualit theory- dual simplex method - sensitivity analysis–-transportation problems– assignment problems-traveling sales man problem -data envelopment analysis

Unit III Non Linear Programming : Classification of non linear programming – lagrange multiplier method – karush – kuhn tucker conditions–reduced gradient algorithms–quadratic programming method – penalty and barrier method.

Unit IV Interior Point Methods : Karmarkar's algorithm–projection scaling method–dual affine algorithm–primal affine algorithm barrier algorithm.

Unit V Dynamic Programming : formulation of multi stage decision problem–characteristics–concept of sub-optimization and the principle of optimality–formulation of dynamic programming–backward and forward recursion– computational procedure–conversion offinal value problem in to initial value problem.

References:

1. Hillier and Lieberman "Introduction to Operations Research", TMH, 2000.
2. R.Panneerselvam, "Operations Research", PHI, 2006.
3. Hamdy ATaha, "Operations Research –An Introduction", Prentice Hall India, 2003.Philips, Ravindran and Solberg, "Operations Research", John Wiley, 2002.
4. Ronald L.Rardin, "Optimization in Operation Research" Pearson Education Pvt. Ltd.New Delhi, 2005.

Registrar
Sri Sathya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC-805(C) Power Controller

Unit I Various Power Semiconductor Devices: SCR, GTO, MOSFET, BJT, IGBT & MCT's & their protection, series-parallel operation, Heat sink calculations, Design of firing circuit for converters, choppers & inverters.

Unit II- Analysis & Design: 1-φ bridge converter, 3-φ bridge converter with and without freewheeling diode, effect of source impudence, power factor improvement techniques, and pulse width modulated converters, Dual converters, converter for HVDC application & DC drives.

Unit III-Analysis & Design: voltage commutated, current commutated and load commutated choppers, multiquadrant choppers, chopper for traction application. Resonant choppers, SMPS.

Unit IV-VSI & CSI : 1-φ VSI, 3-φ VSI (180° mode, 150° mode & 120° mode of conduction), various inverter commutation circuits, harmonic reduction techniques, PWM inverters, Inverters for HVDC application & AC drives. Advantages & limitation of current source inverters over VSI, 1-phase and 3-phase CSI. Resonant inverters.

Unit V- Cycloconverter: 1-φ to 1-φ, 3-φ to 3-φ cycloconverter circuits, circulating current scheme, non-circulating current operation, Mean output voltage, harmonics in supply current waveform & input-power factor. Concept of power quality

References:

1. Thyristorised Power Controllers - G.K.Dubey, Doradla, Joshi, Sinha
2. Power Electronics - C.W.Lander
3. Power Electronics - Rashid
4. Thyristorised power controlled converters & cycloconverters - B.R.Pelly
5. Power Electronics - N.Mohan
6. Power Electronics Application - Vithyathil.

SSSUTMS

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

Minutes of Board of Studies Committee Meeting Dated : 03.6.2019

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 03.6.2019. Following members were present.

1. Dr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Dr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Dr. N.P. Patidar (External Academic Expert)
8. Mr. Amit Raje (External Industry Expert)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EE-3rd and 4th semester Scheme and Syllabus (AICTE)

Discussion (If any) : Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion : Scheme and Syllabus was prepared as per current demand in industries and was approved for forthcoming 3rd and 4th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Dr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Dr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Ms. Jyotsna Sagar
7. Dr. N.P. Patidar (External Academic Expert)
8. Mr. Amit Raje (External Industry Expert)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination

Bachelor of Engineering (Electrical Engineering)

III Semester/ II Year **Academic Year 2019-20**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assign-ments/ Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	BEA-301	Mathematics -III	60	30	10	-	-	100	3		-	3
2	EEA-302	Electromagnetic Fields	60	30	10	-	-	100	3		-	3
3	EEA-303	Electrical Machines – I	60	30	10	30	20	150	2	1	2	4
4	EEA-304	Analog Electronics	60	30	10	30	20	150	3	-	2	4
5	EEA-305	Electrical Circuit Analysis	60	30	10	30	20	150	2	1	2	4
6	EEA-306	Java Programming	-	-	-	30	20	50	-	-	2	1
7	EEA-307	Self study /GD Seminar	-	-	-	-	50	50	-	-	2	1
TOTAL			**300**	**150**	**50**	**120**	**130**	**750**	**13**	**2**	**10**	**20**

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P)

BEA- 301 Mathematics-III

UNIT- I

Numerical Methods: Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT- II

Numerical Methods: Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss-Seidal, and Relaxation method.,

UNIT- III

Numerical Methods: Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations, Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

UNIT- IV

Transform Calculus: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

UNIT-V

Concept of Probability: Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics.

EEA- 302 Electromagnetic Field

UNIT-I

Review of Vector Calculus Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical), vector calculus-differentiation, partial differentiation, integration, vector operator del, gradient, divergence a nd curl;integraltheorems of vectors. conversion of a vector from one coordinate system to another.

UNIT-II

Static Electric Field Coulomb's law, electric field intensity, electrical field due to point charges. line, surface and volume charge distributions, gauss law and its applications. absolute electric potential, potential difference, calculation of potential differences for different configurations. electric dipole, electrostatic energy and energy density.

UNIT-III

Conductors, Dielectrics and Capacitance Current and current density, ohms law in point form, continuity of current, boundary conditions of perfect dielectric materials. permittivity of dielectric materials, capacitance, capacitance of a two wire line, poisson's equation, laplace's equation, solution of laplace and poisson's equation, application of laplace's and poisson's equations.

UNIT-IV

Static Magnetic Fields Biot-Savart law, ampere law, magnetic flux and magnetic flux density, scalar and vector magnetic potentials, steady magnetic fields produced by current carrying conductors.

Magnetic Forces, Materials and Inductance: Force on a moving charge, force on a differential current element, force between differential current
elements, nature of magnetic materials, magnetization and permeability, magnetic boundary conditions, magnetic circuits, inductances and mutual inductances.

UNIT-V

Time Varying Fields and Maxwell's Equations Faraday's law for electromagnetic induction, displacement current, point form of maxwell's equation, integral form of maxwell's equations, motional electromotive forces, boundary conditions.

Electromagnetic Waves: Derivation of wave equation, uniform plane waves, maxwell's equation in phasor form, wave equation in phasor form, plane waves in free space and in a homogenous material, wave equation for a conducting medium, plane waves in lossy dielectrics, propagation in good conductors, skin effect, poynting theorem.

References:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. A. Pramanik,"Electromagnetism-Theory & applications",PHI Learning Pvt. Ltd, New Delhi,2009.
3. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
4. G.W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
5. W.J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
6. W.J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
7. E.G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.
8. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers, International Edition, 1971.
9. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012

EEA- 303 Electrical Machines – I

UNIT-I

Magnetic Fields And Magnetic Circuits Review of magnetic circuits - mmf, flux, reluctance, inductance; review of Ampere Law and Biot Savart Law; Visualization of magnetic fields produced by a bar magnet and a current carrying coil - through air and through a combination of iron and air; influence of highly permeable materials on the magnetic flux lines.

UNIT-II

Electromagnetic Force And Torque B-H curve of magnetic materials; flux-linkage vs current characteristic of magnetic circuits; linear and nonlinear magnetic circuits; energy stored in the magnetic circuit; force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element. Examples - galvanometer coil, relay contact, lifting magnet, rotating element with eccentricity or saliency

UNIT-III

DC Machines Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation - Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

UNIT-IV

DC Machine - Motoring and Generation Armature circuit equation for motoring and generation, Types of field excitations – separately excited, shunt and series. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed, V-I characteristics and torque-speed characteristics of separately excited, shunt and series motors. Speed control through armature voltage. Losses, load testing and back-to-back testing of DC machines

UNIT-V

Transformers Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of 1-phase and three-phase transformers, Autotransformers - construction, principle, applications and comparison with two winding transformer, Magnetizing current, effect of nonlinear B-H curve of magnetic core material, harmonics in magnetization current, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers, Cooling of transformers.

References

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.
5. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
6. Electric Machinery, Ashfaque Hussain,2010

List of Experiments :-

1. To Perform turn ratio and polarity test on 1-phase transformer
2. To perform load test on a 1-phase transformer and plot its load characteristic
3. To perform OC and SC tests on a 1-phase transformer and determine its equivalent circuit and its efficiency and regulation at different load and power factor.
4. To perform Sumpner's test on two 1-phase transformer and determine its efficiency at various load.
5. To analyse open ckt. Characteristics of self excited DC generator
6. To analyse load characteristics of DC compound generator.
7. To perform load test on DC shunt motor.
8. To perform load test on DC series motor.
9. To perform speed control of DC shunt motor.
10. To conduct Swinburne's test on DC machine to determine efficiency when working as generator and motor without actually loading the machine.

SSSUTMS Sehore (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEA-304 Analog Electronics

UNIT-I

Diode C(P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

UNIT-II

BJT C Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

UNIT-III

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

UNIT-IV

Differential, Multi-Stage And Operational Amplifiers Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)

UNIT-V

Linear Applications Of Op-Amp Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift), Analog to Digital Conversion.

Nonlinear Applications Of Op-Amp (6 Hours): Hysteretic comparator, zero crossing detector, square-wave and triangular-wave generators, precision rectifier, peak detector.

References:

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and
3. applications", McGraw Hill U. S., 1992.
4. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
5. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
6. P.R. Gray, R.G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.

List of Experiments :-

1. V-I characteristics of various Diodes (P-N , Zener, Varactor, Schottky, Tunnel, Photodiode.
2. Characteristics of Transistors (BJT and FET)
3. Design of various clipping and clamping circuits
4. Design of half & full wave rectifier
5. Design & analysis of transistor amplifier in CE, CB & CC configuration.
6. Design & analysis of JFET Amplifier.
7. Design & analysis of MOSFET Amplifier.

SSTC SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEA- 305 Electrical Circuit Analysis

UNIT-I

Network Theorems Superposition theorem, thevenin theorem, norton theorem, maximum power transfer theorem, reciprocity theorem, compensation theorem, analysis with dependent current & voltage sources, node & mesh analysis, duality & dual networks.

UNIT-II

Solution of First and Second Order Networks Solution of first and second order differential equations for series and parallel R-L, R-C, R-L-Ccircuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

UNIT-III

Sinusoidal Steady State Analysis Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, ac circuit analysis, effective or rms values, average power and complex power, three-phase circuits, mutual coupled circuits, dot convention in coupled circuits, ideal transformer.

UNIT-IV

Electrical Circuit Analysis Using Laplace Transforms Review of laplace transform, analysis of electrical circuits using laplace transform for standard inputs, convolution integral, inverse laplace transform, transformed network with initial conditions, transfer function representation, poles and zeros, frequency response (magnitude and phase plots), series and parallel resonances

UNIT-V

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

References:

1. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.
3. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
4. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
5. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.

List of Experiments :-

1. To determine node voltages and branch currents in a resistive network.
2. To obtain Thevenin's equivalent circuit of a resistive network.
3. To obtain transient response of a series R-L-C circuit for step voltage input.
4. To Verify Thevenin Theorem.
5. To Verify Superposition Theorem.
6. To Verify Reciprocity Theorem.
7. To Verify Maximum Power Transfer Theorem.
8. To Verify Millman's Theorem.
9. To Determine Open Circuit parameters of a Two Port Network.

EEA- 306 Java Programming

List of Experiments :-

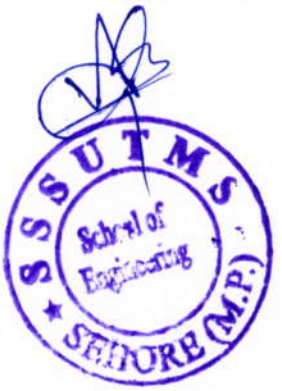
1. Study of circuit simulation software (any one- TINA-PRO/ PSPICE/ CIRCUIT MAKER/ GPSIM/SAPWIN,MATLAB etc).
2. Designing and Simulation of Different Electronics Circuit.
3. Designing and Simulation of Different Network Circuit.
4. Designing and Simulation of Digital Logic Circuit.
5. Designing and fabrication of PCB with circuit simulator
6. Write a Program to show Inheritance and Polymorphism
7. Write a program to show Interfacing between two classes
8. Write a program to Add a Class to a Package
9. Write a program to demonstrate AWT.
10. Write a program to Hide a Class
11. Write a Program to show Data Base Connectivity Using JAVA
12. Write a Program to show "HELLO JAVA " in Explorer using Applet
13. Write a Program to show Connectivity using JDBC
14. Write a program to demonstrate multithreading using Java.
15. Write a program to demonstrate applet life cycle.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEA- 307 Self study /GD Seminar

The main objective is to improve the mass communication and convincing/understanding skills of students .And to give the students an opportunity to exercise their rights to express themselves.The evaluation will be done based on their presentation work and group discussion.



Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination

Bachelor of Engineering (Electrical Engineering)

IV Semester/ II Year **Academic Year 2019-20**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	BEA-401	Energy, Ecology, Environment & Society	60	30	10	-	-	100	3	-	-	3
2	EEA-402	Digital Electronics	60	30	10	30	20	150	2	1	2	4
3	EEA-403	Electrical Machines – II	60	30	10	30	20	150	3	-	2	4
4	EEA-404	Power System-I	60	30	10	30	20	150	3	-	2	4
5	EEA-405	Power Electronics	60	30	10	30	20	150	2	1	2	4
6	EEA-406	Software Lab I (Circuit Simulator)	-	-	-	30	20	50	-	-	2	1
7	EEA-407	Industrial Training-I	To be completed during fourth semester semester break. Its evaluation/credit to be added in fifth semester									
	TOTAL		**300**	**150**	**50**	**150**	**100**	**750**	**13**	**2**	**10**	**20**

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

BEA-401 Energy, Ecology, Environment and Society

UNIT-1

Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydro, nuclear sources.

UNIT-2

Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation

UNIT-3

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.

UNIT-4

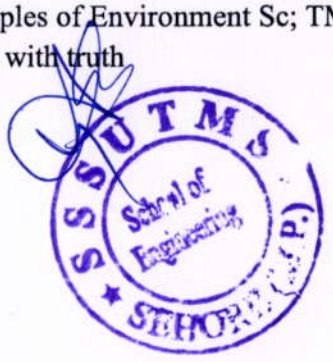
Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

UNIT-5

Society, Ethics & Human values– Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study . Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.

References:-

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.
6. BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
7. Bala Krishnamoorthy; "Environmental management"; PHI
8. Gerard Kiely, "Environmental Engineering" ; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. Cunninghan WP and MA; principles of Environment Sc; TMH
11. Gandhiji M.K.- My experiments with truth



EEA- 402 Digital Electronics

UNIT-I

Fundamentals of Digital Systems And Logic Families Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT-II

Combinational Digital Circuits Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De- Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator ,parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT-III

Sequential Circuits And Systems A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, Applications of flip flops, shift registers, applications of shift registers, series to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT-IV

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

UNIT-V

Semiconductor memories and Programmable logic devices. Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

References:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

List of Experiments :-

1. To test and study of operation of all logic Gates for various IC's.
2. Implementation of AND, OR, NOT, NOR, X-OR and X-NOR Gates by NAND and NOR Universal gates.
3. Binary Addition by Half Adder and Full Adder circuit.
4. Binary Subtraction by Half Subtractor and Full Subtractor circuit.
5. Design a BCD to Excess-3 code converter.
6. Verification of the Demorgan's Theorem.
7. Multiplexer/Demultiplexer based Boolean function realization.

SSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEA- 403 Electrical Machines – II

UNIT-I

Fundamentals of AC Machine Windings coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, 3d visualization of the above winding types, air-gap mmf distribution with fixed current through winding-concentrated and distributed, sinusoidally distributed winding, winding distribution factor

UNIT-II

Pulsating and Revolving Magnetic Fields Constant magnetic field, pulsating magnetic field - alternating current in windings with spatial displacement, magnetic field produced by a single winding - fixed current and alternating current pulsating fields produced by spatially displaced windings, windings spatially shifted by 90 degrees, addition of pulsating magnetic fields, three windings spatially shifted by 120 degrees (carrying three-phase balanced currents), revolving magnetic field.

UNIT-III

Induction Machines (12 Hours): Construction, 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), methods of starting, braking and speed control for induction motors, generator operation, self-excitation, doubly-fed induction machines.

UNIT-IV

Single-Phase Induction Motors (6 Hours): Constructional features double revolving field theory, equivalent circuit, and determination of parameters, split-phase starting methods and applications

UNIT-V

Synchronous Machines (10 Hours): Constructional features, cylindrical rotor synchronous machine - generated emf, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation, operating characteristics of synchronous machines, v-curves, salient pole machine - two reaction theory, analysis of phasor diagram, power angle characteristics, parallel operation of alternators - synchronization and load division.

References:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
4. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
5. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
6. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.

List of Experiments :-

1. To perform No-load and block rotor test on a 3- phase IM and determine its equivalent circuit.
2. To Perform load test on a 3- phase IM and plot its performance characteristics.
3. Study of various types of starters used for 3- IMs.
4. To determine regulation of alternator using mmf and zpf methods.
5. To synchronise alternator with infinite bus bar.
6. To plot V and inverted V curves for a synchronous motor.
7. To find Xd and Xq of salient pole synchronous machine by slip test.

]

EEA- 404 Power System – I

UNIT-I

Introduction: Typical layout of an electrical power system–present power scenario in india. generation of electric power: conventional sources (qualitative):hydro station, steam power plant, nuclear power plant and gas turbine plant, non-conventional sources (qualitative): ocean energy, tidal energy, wave energy, wind energy, fuel cells, and solar energy, cogeneration and energy conservation and storage.

UNIT-II

Economics of Generation: Introduction, connected load, maximum demand, demand factor, load factor, diversity factor, load duration curve, number and size of generator units, base load and peak load plants, cost of electrical energy-fixed cost, running cost, tariff on charge to customer.

UNIT-III

Transmission Systems: Various Systems of transmission & their comparison, HVDC transmission converter, inverter, filters & substation layout, voltage and reactive power control.
Cables: Classification, Construction and characteristic of different types, insulation resistance and capacitance, grading (capacitance and inter sheath), laying, jointing and splicing of cables. phenomenon of dielectric losses, dielectric stress and sheath loss in cables.

UNIT-IV

Distribution Systems: Primary and secondary distribution systems, concentrated & uniformly distributed loads on distributors fed at one and both ends, ring distribution, sub mains and tapered mains, voltage drop and power loss calculations, voltage regulators, feeders kelvin's law and modified kelvin's law for feeder conductor size .

UNIT-V

Overhead Transmission Lines: Types of Conductors, line parameters: calculation of inductance and capacitance of single and double circuit transmission lines, three phase lines with stranded and bundle conductors, Generalized ABCD constants and equivalent circuits of short ,medium & long lines, line performance: circle diagram, regulation and efficiency of short, medium and long lines.

References:-

1. Ashfaque hussain , CBS Publication,2014
2. C.L. Wadhwa –Generation, Distribution and Utilization of Electrical Energy, Second Edition, New Age International, 2009
3. C.L. Wadhwa –Electrical Power Systems, Fifth Edition, New Age International, 2009
4. M.V. Deshpande –Elements of Electrical Power Station Design, Third Edition, WheelerPub. 1998
5. V.K. Mehta principal of electrical power system, S Chand Publication
6. J.B. Gupta electrical power system,kataria and sons publication

List of Experiment:-

1. To study and draw the typical Layout of an Electrical Power System
2. To draw the Electrical design of transmission line.
3. 3 To draw the Mechanical design of transmission line.
4. To study AC distribution- Single phase, 3-phase& 3 phase 4 wire system.
5. 5. Study of different type of insulator.
6. To study and draw the typical Layout of substation
7. To study and draw different types of towers
8. Study of different type of cables.

S S S U T M S School of Engineering SEHORE (M.P.)

Registrar Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEA- 405 Power Electronics

UNIT-I

Power Switching Devices Diode, thyristor, MOSFET, IGBT: their characteristics; firing circuit for thyristor; voltage and current commutation of a thyristor; gate drive circuits for MOSFET and IGBT.

UNIT-II

Thyristor Rectifiers Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor.

UNIT-III

DC-DC Buck Converter Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit of a buck converter, analysis and waveforms at steady state, duty ratio control of output voltage.

UNIT-IV

DC-DC Boost Converter Power circuit of a boost converter, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

UNIT-V

Single-Phase Voltage Source Inverter

Power circuit of single-phase voltage source inverter, switch states and instantaneous output voltage, square wave operation of the inverter, concept of average voltage over a switching cycle, bipolar sinusoidal modulation and unipolar sinusoidal modulation, modulation index and output voltage

Three-Phase Voltage Source Inverter

Power circuit of a three-phase voltage source inverter, switch states, instantaneous output voltages, average output voltages over a sub-cycle, three-phase sinusoidal modulation

References:

1. M. H. Rashid, "Power electronics: circuits, devices, and applications", Pearson Education India, 2009.
2. N. Mohan and T. M. Undeland, "Power Electronics: Converters, Applications and Design", John Wiley & Sons, 2007.
3. R. W. Erickson and D. Maksimovic, "Fundamentals of Power Electronics", Springer Science & Business Media, 2007.
4. L. Umanand, "Power Electronics: Essentials and Applications", Wiley India, 2009

List of Experiments:-

1. To study V-I characteristics of SCR.
2. To study UJT trigger circuit for half wave and full wave control.
3. To study single-phase half wave controlled rectified with R load (ii) L load with and without freewheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study single-phase ac voltage regulator with resistive and inductive loads.
6. To study single phase cyclo-converter.
7. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor.
8. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.

EEA- 406 Software Lab-I (Circuit Simulator)

List of Experiments:-

1. Study of circuit simulation software (any one- TINA-PRO/ PSPICE/ CIRCUIT MAKER/ GPSIM/SAPWIN etc).

2. Designing and Simulation of Different Electronics Circuit .

3. Designing and Simulation of Different Network Circuit.

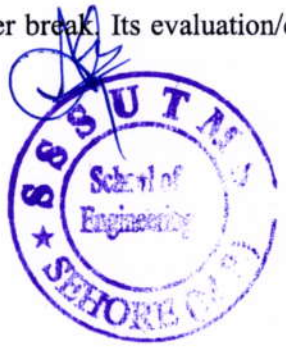
4. Designing and Simulation of Digital Logic Circuit.

5. Designing and fabrication of PCB with circuit simulator

EEA- 407- Industrial Training – I

The Industrial Training– I should be the outcome of the training done/performed during semester break of 4th Semester .It should be submitted in hardware form (proto type)or simulation form along with proper data and certificates issued during project training. It should cover the electrical engineering aspects learned during training. A Power point presentation should also be submitted at the time of submission.

To be completed during fourth semester Semester break. Its evaluation/credit to be added in fifth semester



SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

Minutes of Board of Studies Committee Meeting Dated : 05.7.2020

The Board of Studies Committee Meeting was held through online video conferencing on 05.7.2020. Following members were present.

1. Dr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Dr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EE-5th and 6th semester Scheme and Syllabus (AICTE)

Discussion (If any) : The following points were discussed in length.:

1. The **Internal members** of the Committee suggested that the Scheme and Syllabus should be prepared as per current demand in industry.
2. The **External members (Academic Expert)** suggested for **Inter- Branch** subjects such as mechanical, computer science and electronics based subject for developing latest knowledge of different streams as per the current technology.
3. The **External members (Industry Expert)** suggested for few subjects related to **Industry oriented and manufacturing streams** and few subjects related to renewable energy and green technology.

Resolution of the Discussion:

On the basis of discussion the following amendments were made:

1. Scheme and Syllabus was prepared as per current demand in industries such as syllabus of electromagnetic field has been revised and renamed as **"Computational Electromagnetics"**.
2. The **"Minor Projects"** content has been revised as per the need of real world and industries.
3. **The Inter –Branch** subjects such as **"Computer Architecture", "Internet of Things", "Signals and Systems", "Embedded Systems" "Modern Manufacturing Processes"** etc.. have been added.

SSUTMS School of Engineering Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

4. The Industry oriented subjects such as "**Power Plant Engineering**", "**Industrial Electrical Systems**" were added in the curriculum.
5. Few subjects related to renewable energy and green technology such as "**Electrical and Hybrid Vehicles**"

Final Resolution of the Discussion:

With the above amendments the Scheme and Syllabus was approved for forthcoming 5th and 6th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Dr. Mukesh Tiwari
2. Mr. Vijay Prakash Singh
3. Dr. Prabodh Khampariya
4. Ms. Alka Thakur
5. Mr. Devendra Patle
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - AICTE Pattern

Academic Year 2020- 2021

Branch : Electrical Engineering **Semester - V**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	EEA-501	Control Systems	60	30	10	30	20	150	2	1	2	4
2	EEA-502	Microprocessors	60	30	10	30	20	150	2	1	2	4
3	EEA-503	Electrical Machine Design	60	30	10	30	20	150	2	1	2	4
4	EEA-504	Program Elective-I	60	30	10	-	-	100	3	1	0	4
5	EEA-505	Open Core Elective - I	60	30	10	-	-	100	3	1	0	4
6	EEA-506	Industrial Training-I	-	-	-	150	100	250	-	-	4	2
		TOTAL	**300**	**150**	**50**	**240**	**160**	**900**	**12**	**5**	**10**	**22**

Program Elective - I	
EEA-504	EEA-504 (A) Signals and Systems
	EEA-504(B) Line Commutated and Active Rectifiers

Open Core Elective-I	
EEA-505	EEA-505 (A) Electrical Materials
	EEA-505 (B)Embedded Systems

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Syllabus Vth Semester

EEA-501 Control Systems

EEA-501	Control Systems	2L:1T:0P	3 credits	3 Hrs/Week

Preamble

To make students understand the concept of state –space analysis, stability and to design the compensator in time and frequency domain.

Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the modeling of linear-time-invariant systems using transfer function and state-space representations.
- Understand the concept of stability and its assessment for linear-time invariant systems.
- Design simple feedback controllers.

Unit 1: Introduction to control problem (5 hours)

Industrial Control examples, Mathematical models of physical systems. Control hardware and their models. Transfer function models of linear time-invariant systems.
Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra.

Unit 2: Time Response Analysis (9 hours)

Standard test signals. Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Design specifications for second-order systems based on the time-response. Concept of Stability. Routh-Hurwitz Criteria. Relative Stability analysis. Root-Locus technique. Construction of Root-loci.

Unit 3: Frequency-response analysis (8 hours)

Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Closed-loop frequency response.

Unit 4: Introduction to Controller Design (10 hours)

Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems.
Root-loci method of feedback controller design.
Design specifications in frequency-domain. Frequency-domain methods of design.
Application of Proportional, Integral and Derivative Controllers, Lead and Lag compensation in designs. Analog and Digital implementation of controllers.

School of Engineering
SSSUTMS SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit 5: State variable Analysis (10 hours)

Concepts of state variables. State space model. Diagonalization of State Matrix. Solution of state equations. Eigenvalues and Stability Analysis. Concept of controllability and observability. Pole-placement by state feedback.

Discrete-time systems. Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems, Introduction to Optimal Control and NonlinearControl Performance Indices. Regulator problem, Tracking Problem. Nonlinear system–Basic concepts and analysis.

References:

1. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 1997.
2. B. C. Kuo, "Automatic Control System", Prentice Hall, 1995.
3. K. Ogata, "Modern Control Engineering", Prentice Hall, 1991.
4. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Control Systems Lab

EEA-501	**Control Systems**	**0L:0T:1P**	**1 Credits**	**2 Hrs/week**

List of Experiments:

1. To determine speed torque characteristics of armature controlled D.C. servomotor.
2. To determine the speed torque characteristics and relationship between torque speed and control windings voltage by AC servomotor.
3. To obtain the step response transient characteristics of first order electric system and to measure system parameters.
4. To plot the nyquist plot of a given transformer function using matlab.
5. To plot the bode plot of a given transformer function using matlab.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-502 Microprocessors

EEA-502	Microprocessors	2L:1T:0P	3 Credits	3 Hrs/Week

Preamble:

To introduce students with the architecture and operation of typical microprocessors, programming and interfacing of microprocessors and to provide strong foundation for designing real world applications using microprocessors and microcontrollers.

Outcomes:

At the end of this course, students will demonstrate the ability to

- Do assembly language programming.
- Do interfacing design of peripherals like I/O, A/D, D/A, timer etc.
- Develop systems using different microcontrollers.

Unit I: Fundamentals of Microprocessors: (10 Hours)

Fundamentals of Microprocessor Architecture. 8-bitMicroprocessor and Microcontroller architecture, Comparison of 8-bit microcontrollers, 16-bit and 32-bit microcontrollers. Definition of embedded system and its characteristics, Role of microcontrollers in embedded Systems. Overview of the 8051 family.

Unit II: The 8051 Architecture (10 Hours)

Internal Block Diagram, CPU, ALU, address, data and control bus, Working registers, SFRs, Clock and RESET circuits, Stack and Stack Pointer, Program Counter, I/O ports, Memory Structures, Data and Program Memory, Timing diagrams and Execution Cycles.

Unit III: Instruction Set and Programming (10 Hours)

Addressing modes: Introduction, Instruction syntax, Data types, Subroutines Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing, Indexed addressing, Bit inherent addressing, bit direct addressing. 8051 Instruction set, Instruction timings. Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembly language programs, C language programs. Assemblers and compilers. Programming and debugging tools.

Unit IV: Memory and I/O Interfacing (6 Hours):

Memory and I/O expansion buses, control signals, memory wait states. Interfacing of peripheral devices such as General Purpose I/O, ADC, DAC, timers, counters, memory devices.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit V: External Communication Interface (6Hours)

Synchronous and Asynchronous Communication. RS232, SPI, I2C. Introduction and interfacing to protocols like Blue-tooth and Zig-bee. LED, LCD and keyboard interfacing. Stepper motor interfacing, DC Motor interfacing, sensor interfacing.

References:

1. M. A.Mazidi, J. G. Mazidi and R. D. McKinlay, "The8051Microcontroller and Embedded Systems: Using Assembly and C",Pearson Education, 2007.
2. K. J. Ayala, "8051 Microcontroller", Delmar Cengage Learning,2004.
3. R. Kamal, "Embedded System", McGraw Hill Education,2009.
4. R. S. Gaonkar, ", Microprocessor Architecture: Programming and Applications with the 8085", Penram International Publishing, 1996
5. D.A. Patterson and J.H. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Morgan Kaufman Publishers, 2013.
6. D. V. Hall, "Microprocessors & Interfacing", McGraw Hill Higher Education, 1991.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-502	**Microprocessors**	**0L:0T:1P**	**1 Credits**	**2 Hrs/week**

Hands-on experiments related to the course contents

1. To study 8085 based microprocessor system.
2. To study 8086 based microprocessor system.
3. Write an Assembly Language Program to add two 16 bit numbers.
4. Write an Assembly Language Program to subtract two 16 bit numbers.
5. To perform multiplication/division of given numbers.
6. To perform computation of square root of a given number.
7. To obtain interfacing of RAM chip to 8085/8086 based system
8. To develop and run a program for finding out the largest/smallest number from a given set of numbers.

Registrar
Sri Satya Sai University of Technolo
& Medical Sciences, Sehore (M.P.

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-503 Electrical Machine Design

EEA-503	Electrical Machine Design	2L:1T:0P	3 Credits	3Hrs/Week

Preamble
To familiarize students with the design concepts and various factors which influence the design
Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the construction and performance characteristics of electrical machines.
- Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines
- Understand the principles of electrical machine design and carry out a basic design of an ac machine.
- Use software tools to do design calculations.

Unit I: Introduction (10 Hours)
Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines.

Unit II: Transformers (10 Hours)
Sizing of a transformer, main dimensions, kVA output for single- and three-phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of cooling tank, methods for cooling of transformers.

Unit III: Induction Motors (10 Hours)
Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, SC current circle diagram, leakage reactance of polyphase machines, magnetizing current

Unit IV: Synchronous Machines (11 Hours)
Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of air gap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit V: Computer aided Design (CAD): (9 Hours)

Limitations (assumptions) of traditional designs, need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design. Introduction to complex structures of modern machines-PMSMs, BLDCs, SRM and claw-pole machines.

Text / References:

1. A. K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai and Sons, 1970.
2. M.G. Say, "Theory & Performance & Design of A.C. Machines", ELBS London.
3. S. K. Sen, "Principles of Electrical Machine Design with computer programmes", Oxford and IBH Publishing, 2006.
4. K. L. Narang, "A Text Book of Electrical Engineering Drawings", SatyaPrakashan, 1969.
5. A. Shanmugasundaram, G. Gangadharan and R. Palani, "Electrical Machine Design Data Book", New Age International, 1979.
6. K. M. V. Murthy, "Computer Aided Design of Electrical Machines", B.S. Publications, 2008.
7. Electrical machines and equipment design exercise examples using Ansoft's Maxwell 2D machine design package.

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-503 Electrical Machine Design

EEA-503	**Electrical Machine Design**	**0L:0T:1P**	**1 Credits**	**2Hrs/Week**

List of Experiment (Extendable):

1. Computer Program in "C" in MATLAB for Complete Design of 500KW, 600v lab wound dc machine
2. Computer Program in "C" in MATLAB for Optimal Design of dc machine
3. Computer Program in "C" in MATLAB for Complete Design of core type power Transformer
4. Computer Program in "C" in MATLAB for Complete Design of salient pole Alternator
5. Computer Program in "C" in MATLAB for Complete Design of Synchronous Machines
6. Computer Program in "C" in MATLAB for Optimal Design of cage rotor
7. Computer Program in "C" in MATLAB for Complete Design Of single ph IM
8. Computer Program in "c" in MATLAB for Optimal Design of slip ring IM

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Program Elective-I

EEA-504 (A) Signals and Systems

EEA-504(A)	Signals and Systems	3L:1T:0P	4 Credits	4Hrs/Week

Preamble:

1. To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms.
2. 2 To understand Sampling theorem, with time and frequency domain analysis of discrete time signals with DTFS, DTFT and Z-Transform.
3. 3 To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems and lay down the foundation for advanced courses.

Outcomes:

On completion of the course, student will be able to

1) Analyze the discrete time signals and system using different transform domain techniques.
2) Design and implement LTI filters for filtering different real world signals.
3) Develop different signal processing applications using DSP processor.

Unit I- Introduction to Signal & Systems: (10 Hours)

Signals, classification of signals, basic continuous time and discrete time signals, continuous LTI, discrete LTI systems , impulse and step functions, impulse response stability, linearity, stability, time invariance, eigen values, eigen functions, discrete convolution, properties of discrete and continuous LTI system, systems described by difference and differential equations.

Unit II- Fourier Analysis of Continuous Time Signals and Systems: (10 Hours)

Fourier series, fourier series representation of continuous periodic signal & its properties, fourier transform and its properties, parseval's theorem, frequency response of LTI systems.

Unit III- Fourier Analysis of Discrete Time Signals & Systems: (10 Hours)

Discrete-time fourier series, discrete-time fourier transform (including DFT) and properties, frequency response of discrete time LTI systems, continuous time fourier transform for periodic and non-periodic signals, properties of CTFT.

Unit IV- Laplace & Z-Transform Transform: (8Hours)
Laplace transform and its inverse, existence conditions, region of convergence and properties, application of laplace transform for the analysis of continuous time LTI system, Z-Transform, properties of Z-transform, inversion of Z-transform, two dimensional Z- transform, convergence of Z-transform, region of convergence and properties, application of Z-transform for the analysis of discrete time LTI systems, Z transform problems.

Unit V- State Space Analysis: (12 Hours)
Concept of state, state space representation, discrete time LTI systems, state space representation of continuous time LTI systems, solutions of state equation for discrete time LTI systems, solutions of state equation for continuous time LTI systems.
Sampling: Sampling theorem, ideal & real sampling, reconstruction of signal from its samples, aliasing sampling in frequency domain, sampling of discrete-time signals.

References:

1. Alan V. Oppenheim, Alan S. Willsky and H. Nawab, Signals and Systems, Prentice Hall, 1997
2. Simon Haykin, Communication Systems, 3rd Edition, John Wiley, 1995.
3. Signals & Systems, 2nd Edition, by Alan Oppenheim, Alan Wilsky, S. Nawab. Prentice Hall, 1997.
4. Signals and Systems, by Simon Haykin and Barry Van Veen. Wiley, 1999.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-504 (B) Line Commutated and Active Rectifiers

EEA-504 (B)	**Line Commutated and Active Rectifiers**	**3L:1T:0P**	**4 Credits**	**4Hrs/Week**

Preamble:
Analyse controlled rectifier circuits. Understand the operation of line-commutated rectifiers
6 pulse and multi-pulseconfigurations. nderstand the operation of PWM rectifiers operation in rectification and regenerationmodes and lagging, leading and unity power factor mode

Outcomes:
At the end of this course, students will demonstrate the ability to
- Analyse controlled rectifier circuits.
- Understand the operation of line-commutated rectifiers – 6 pulse and multi-pulse configurations.
- Understand the operation of PWM rectifiers – operation in rectification and regeneration modes and lagging, leading and unity power factor mode.

Unit 1: Diode rectifiers with passive filtering (6 Hours)
Half-wave diode rectifier with RL and RC loads; 1-phase full-wave diode rectifier with L, C and LC filter; 3-phase diode rectifier with L, C and LC filter; continuous and discontinuousconduction, input current waveshape, effect of source inductance; commutation overlap.

Unit 2: Thyristor rectifiers with passive filtering (6 Hours)
Half-wave thyristor rectifier with RL and RC loads; 1-phase thyristor rectifier with L and LC filter; 3- phase thyristor rectifier with L and LC filter; continuous and discontinuous conduction, input current waveshape

Unit 3: Multi-Pulse converter (6 Lectures)
Review of transformer phase shifting, generation of 6-phase ac voltage from 3-phase ac, 6- pulse converter and 12-pulse converters with inductive loads, steady state analysis, commutation overlap, notches during commutation.

Unit 4: Single-phase ac-dc single-switch boost converter (6 Hours)
Review of dc-dc boost converter, power circuit of single-switch ac-dc converter, steady state analysis, unity power factor operation, closed-loop control structure.

Unit 5: Ac-dc bidirectional boost converter (6 Hours)

S S T M S School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Review of 1-phase inverter and 3-phase inverter, power circuits of 1-phase and 3-phase ac-dc boost converter, steady state analysis, operation at leading, lagging and unity power factors. Rectification and regenerating modes. Phasor diagrams, closed-loop control structure.

Isolated single-phase ac-dc flyback converter (10 Hours) Dc-dc flyback converter, output voltage as a function of duty ratio and transformer turns ratio. Power circuit of ac-dc flyback converter, steady state analysis, unity power factor operation, closed loop control structure.

Text / References:

1. G. De, "Principles of Thyristorised Converters", Oxford & IBH Publishing Co, 1988.
2. J.G. Kassakian, M. F. Schlecht and G. C. Verghese, "Principles of Power Electronics", Addison- Wesley, 1991.
3. L. Umanand, " Power Electronics: Essentials and Applications", Wiley India, 2009.
4. N. Mohan and T. M. Undeland, " Power Electronics: Converters, Applications and Design", John Wiley & Sons, 2007. 5. R. W. Erickson and D. Maksimovic, "Fundamentals of Power Electronics", Springer Science & Business Media, 2001

SSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Open Core Elective-I

EEA-505 (A) Electrical Materials

EEA-505 (A)	**Electrical Materials**	**3L:1T:0P**	**4 Credits**	**4Hrs/Week**

Preamble: To make students understands the insulating, conducting and magnetic materials used in electrical machines and their properties and application .

Outcomes: At the end of the course the students will be able to evaluate and classify insulating, conducting and magnetic materials used in electrical machines. Understand the properties of liquid, gaseous and solid insulating materials.

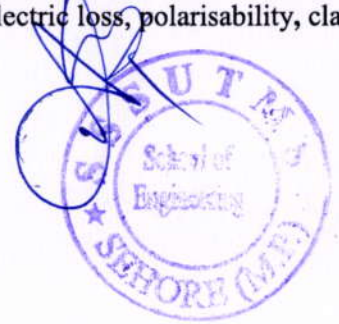
Unit I Conducting Material and Their Properties (10 Hrs)

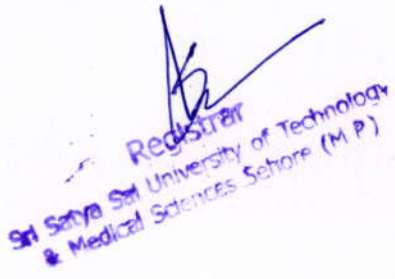
Classification, properties, highresistivity alloy: constant mangann,nichrome, electrochemical, properties of copper,aluminum, steel tungsten, molybdenum, platinum, tantalum, niobium, mercurry, nickel,titanum, carbon, lead, thermal, bitmetals, thermocouple, materials, specific resistance,conductance, super conductors, variation of resistance with temperature.

Unit II Semi Conductor Materials: (10 Hrs)
Electrical conductivity, elements having semiconductor properties, general application, hall effect, energy levels, conduction in semiconductors, intrinsic conduction, impurity conduction, p and n type impurities, electrical change, neutrality, drift, mobility current flow in semi conductors p-n junction formation by alloying, elasing (forward and reverse) of p-n junction, reverse separation current, zener effect, junction, capacitance, hall defects and hall coeffiecient.

Unit III Magnetic Materials: (10 Hrs)
B.H. curve, soft and hard magnetic materials, di-magnetic, para magnetic and ferromagnetic materials, electrical sheet steel, cast iron, permanent magnetic materials, dynamic and static hysteresis loop, hysterisis loss, eddy current loss, magnetisation, magnetic susceptibility, coercive force, rectangular hysteresia loop, magnet rest square loop core materials, iron silicon, iron alloys.

Unit IV Insulating Materials: (6 Hrs)
Electrical, mechanical and chemical properties of insulating material, electrical characteristics, volume and surface resistivity, permitivity loss, and dielectric loss, polarisability, classification of dielectric.





Unit V Mechanical Properties: (6 Hrs)

Classification of insulating materials on the basis of temperature rise, general properties of transformer oil, varnishes, solidifying insulating materials, resins, bituminous waxes, drying oils, fibrous insulating materials, wood, paper and cardboard, insulating textiles, varnished adhesive tapes, inorganic fibrous material and other insulating materials, such as mica, ceramic, bakelite, ebonite, glass, PVC, rubber, other plastic molded materials.

References:

1. TTTI Madras; Electrical Engineering Materials; TMH.
2. Electrical Engineering Material s & Devices; John Allison ;TMH
3. Electrical Engineering Materials: Indulkar and S. Thruvengadem;
4. Electrical Engineering Materials; S. Chand
5. Dekkor AK; Electrical Engineering Materials; PHI

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-505 (B) Embedded Systems

EEA-505 (B)	**Embedded Systems**	**3L:1T:0P**	**4 Credits**	**4Hrs/Week**

Preamble: Discuss the major components that constitute an embedded system.2. Implement small programs to solve well-defined problems on an embedded platform.3. Develop familiarity with tools used to develop in an embedded environment.

Outcomes: At the end of content students will be able to

1. Understand microcontroller, microcomputer,embedded system.
2. Understand different components of a micro-controller andtheir interactions.
3. Become familiar with programming environment used todevelop embedded systems
4. Understand key concepts of embedded systems like IO,timers, interrupts, interaction with peripheral devices
5. Learn debugging techniques for an embedded system

Unit1. Introduction: (10- Hours):
Different types of Micro-controllers, embedded micro-controller, external memory micro-controller, Processor architectures: Harvard vs Princeton, CISC vs. RISC, Micro-controller memory types. Development tools/environment, Intel Hex Format object files, debugging.

Unit2 Architecture of 8051: (10- Hours):
Block diagram, pin Configuration, Functional descriptions of internal Units-- registers, PSW, internal RAM, ROM, Stack, Oscillator and Clock. Other features--I/O Pins, Ports and Circuits, Counters and timers, Serial data transmission /reception. Interrupts--Timer flag interrupt, serial communication interrupt, External interrupt, software generated interrupts.

Unit3. Programming of 8051: (10- Hours):
Instruction format, addressing modes, Data transfer instructions, logical instructions, arithmetic instructions, Jump and Call instructions. Interrupts and interrupt handler subroutines. Development of assembly Language programs

Unit4. Architecture Of Pic: (6- Hours):
Block diagram, pin Configuration, Functional descriptions of internal blocks—program memory considerations, register file structure. registers, oscillators and clock. Other features--I/O Pins, Counters and timers, Watchdog timer, SPI port USART. Interrupts—Interrupt structure.

Unit5. Application Design & Hardware Interfacing With 8051 & Pic: (6- Hours):

School of Engineering
SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Hardware Interfacing with LED, Seven segment LED, LCD, Switches and stepper motor.

References:

1. Design with PIC Micro-controller by John B. Peatman, Pearson.
2. The 8051 microcontroller and embedded system by M.A.Mazidi, PHI
3. Programming and customizing the 8051 micro-controller- Predko, TMH.
4. Designing Embedded Hardware: John Catsoulis: Shroff Pub and Dist.
5. Programming embedded systems in C and C++: Michael Barr: Shroff Pub and distr

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-506 Industrial Training-I

EEA-506	**Industrial Training-I**	**0L:0T:2P**	**2 credits**	**4Hrs/Week**

Preamble

1. To expose the students to actual working environment of electrical engineering and enhance their knowledge and skill from what they have learned in the classes.
2. Another purpose of this program is to instill the good qualities of integrity, responsibility and self-confidence.
3. To persue students with the electrical field ethics and rules in terms of the society.

Outcomes:

Ability to communicate efficiently. Acquired to be a multi-skilled engineer with good technical knowledge of electrical and electronics components and their processing, management, leadership and entrepreneurship skills. Ability to identify, formulate and model problems and find engineering solution based on a systems approach.

Students must observe following points to enrich their learning in electrical engineering during industrial training:

- Industrial environment and work culture.
- Organisational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Roles and responsibilities of different categories of personnel.
- Customer services.
-Problems related to various areas of Work etc.
- Layout if any

To be submitted : The students has to submit the power point presentation of minimum15 slides of the training performed(comprising of points stated above) along with the original certificate of training performed with proper seal and signature of the authorized person.

SSSUTMS School of Engineering SEHORE (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Scheme of Studies:

Duration: Minimum 2 weeks in summer break after IV semester, assessment to be done in V Semester

Scheme of Examination:

For the assessment of industrial training undertaken by the students, following components are considered with their weightage.

(a) Term Work in Industry Marks Allotted

Attendance and General Discipline 20

Daily diary Maintenance 20

Initiative and participative attitude during training 30

Assessment of training by Industrial Supervisor 30

Total 100*

(b) Practical/Oral Examination (Viva-Voce) in Institution Marks Allotted

1. Training Report 50

2. Seminar and cross questioning (defense) 100

Total 150

---

* - Marks of various components in industry should be awarded by the I/c of training in Industry but in special circumstances if not awarded by the industry then faculty in charge /T.P.O. will give the marks.

During training students will prepare a first draft of training report in consultation with section In charge. After training they will prepare final draft with the help of T.P.O. /Faculty of the Institute. Then they will present a seminar on their training and they will face viva-voce on training in the Institute.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - AICTE Pattern

Academic Year 2020- 2021

Branch : Electrical Engineering **Semester - VI**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	EEA-601	Power Systems – II	60	30	10	30	20	150	2	1	2	4
2	EEA-602	Measurements and Instrumentation	60	30	10	30	20	150	2	1	2	4
3	EEA-603	Program Elective-II	60	30	10			100	3	1	0	4
4	EEA-604	Program Elective-III	60	30	10	-		100	3	0	0	3
5	EEA-605	Open Core Elective - II	60	30	10	-		100	3	0	0	3
6	EEA-606	Minor Project	-	-	-	180	120	300	-	-	4	2
		TOTAL	**300**	**150**	**50**	**240**	**160**	**900**	**13**	**3**	**8**	**20**

Program Elective - II	
EEA-603	EEA-603(A) Electrical and Hybrid Vehicles
	EEA-603 (B)Digital Signal Processing
	EEA-603 (C)Industrial Electrical Systems

Program Elective - III	
EEA-604	EEA-604 (A)Computer Architecture
	EEA-604 (B) Wind and Solar Energy Systems
	EEA-604 (C) Computational Electromagnetics

Open Core Elective-II	
EEA-605	EEA-605 (A) Internet of Things
	EEA-605 (B)Power Plant Engineering
	EEA-605 (C)Modern Manufacturing Processes

SSSUTMS ★ School of Engineering ★ SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Syllabus VIth Semester

EEA-601 Power Systems – II

EEA-601	Power Systems – II	2L:1T:0P	3 credits	3 Hrs/Week

Preamble:

- To introduce the students to the general structure of the network for transferring power from generating stations to the consumers.
- To expose the students to the different electrical & mechanical aspects of the power network along with its environmental and safety constraints.
- To familiarize the students with the price structure of Indian power market

Outcomes:

At the end of this course, students will demonstrate the ability to

- Use numerical methods to analyse a power system in steady state.
- Understand stability constraints in a synchronous grid.
- Understand methods to control the voltage, frequency and power flow.
- Understand the monitoring and control of a power system.
- Understand the basics of power system economics.

Unit 1: Power Flow Analysis (7 hours)

Review of the structure of a Power System and its components. Analysis of Power Flows: Formation of Bus Admittance Matrix. Real and reactive power balance equations at a node. Load and Generator Specifications. Application of numerical methods for solution of non-linear algebraic equations – Gauss Seidel and Newton-Raphson methods for the solution of the power flow equations. Computational Issues in Large-scale Power Systems.

Unit 2: Stability Constraints in synchronous grids (8 hours)

Swing Equations of a synchronous machine connected to an infinite bus. Power angle curve. Description of the phenomena of loss of synchronism in a single-machine infinite bus system following a disturbance like a three--phase fault. Analysis using numerical integration of swing equations (using methods like Forward Euler, Runge-Kutta 4th order methods), as well as the Equal Area Criterion. Impact of stability constraints on Power System Operation. Effect of generation rescheduling and series compensation of transmission lines on stability.

SSSUTMS School of Engineering SRIKAKULAM (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit 3: Control of Frequency and Voltage (9 hours)

Turbines and Speed-Governors, Frequency dependence of loads, Droop Control and Power Sharing. Automatic Generation Control. Generation and absorption of reactive power by various components of a Power System. Excitation System Control in synchronous generators, Automatic Voltage Regulators. Shunt Compensators, Static VAR compensators and STATCOMs. Tap Changing Transformers.Power flow control using embedded dc links, phase shifters

Unit 4: Monitoring and Control (8 hours)

Overview of Energy Control Centre Functions: SCADA systems. Phasor Measurement Units and Wide-Area Measurement Systems. State-estimation. System Security Assessment. Normal, Alert, Emergency, Extremis states of a Power System. Contingency Analysis. Preventive Control and Emergency Control.

Unit 5: Power System Economics and Management (10 hours)

Basic Pricing Principles: Generator Cost Curves, Utility Functions, Power Exchanges, Spot Pricing. Electricity Market Models (Vertically Integrated, Purchasing Agency, Whole-sale competition, Retail Competition), Demand Side-management, Transmission and Distributions charges, Ancillary Services. Regulatory framework.

References:

1. J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw Hill Education, 1994.
2. O. I. Elgerd, "Electric Energy Systems Theory", McGraw Hill Education, 1995.
3. A. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999.
4. D. P. Kothari and I. J. Nagrath, "Modern Power System Analysis", McGraw Hill Education, 2003.
5. B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012.

Registrar
Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-601	**Power Systems-II Laboratory**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

List of experiments (Extendable):

1. To develop a program in Matlab for information of Y-bus matrix for N bus system.
2. Load flow solution for 3-bus system using Gauss- Seidel, Newton Raphson and FDLF methods up to 3 iteration.
3. Load flow solution for IEEE 6-bus and 30-bus system in Matlab using Newton Raphson method.
4. Assessment of transient stability of a single machine system.
5. Effect of compensation on voltage profile of IEEE 6-bus system.
6. Study of any software tools (PSCAD,EDSA, Mi POWER, ETAP etc)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-602 Measurements and Instrumentation

EEA-602	**Measurements and Instrumentation**	**2L:1T:0P**	**3 credits**	**3Hrs/Week**

Preamble:
The objective of the course is to provide a brief knowledge of measurements and measuring instruments related to engineering. To give the sufficient information of measurements and error related to instruments and their minimization in any kind of industry viz. electrical, electronics, mechanical etc.and basic knowledge of AC bridges.

Outcomes:

At the end of this course, students will demonstrate the ability to

- Design and validate DC and AC bridges.
- Analyze the dynamic response and the calibration of few instruments.
- Learn about various measurement devices, their characteristics, their operation and their limitations.
- Understand statistical data analysis.
- Understand computerized data acquisition.

Unit I-Philosophy of Measurement(8 Hrs): Methods of measurement, measurement system, classification of instrument systems, characteristics of instruments & measurement systems, Accuracy and precision, sensitivity resolution, errors in measurement & its analysis, standards, operating force, types of supports, damping, controlling.

Unit II- Analog Measurement of Electrical Quantities(10Hrs):: PMMC, MI, electrodynamic, thermocouple, electrostatic & rectifier type ammeters & voltmeters, electrodynamic type wattmeter, three phase wattmeter, power in three phase systems, low power factor & UPF wattmeter, errors & remedies in wattmeter, energy meter, D'arsonal galvanometer.
Instrument TransformersCT and PT; their errors, applications of CT and PT in the extension of instrument range, measurement of speed, frequency and power factor.

Unit III- Measurement of Parameters (6Hrs)::: Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q meter, Megger.

Unit IV- AC Potentiometers(10Hrs): Polar type & Co-ordinate type AC potentiometers, application of AC Potentiometers in electrical measurement.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Magnetic Measurement- Ballistic galvanometer, flux meter, determination of hysteresis loop, measurement of iron losses, Lloyd Fischer square for measurement of power loss.

Unit V- Digital Measurement of Electrical Quantities(10Hrs):: Concept of digital measurement, block diagram, analog & digital instruments, digital voltmeter, frequency meter, spectrum analyzer, electronic multimeter.

Cathode Ray Oscilloscope: CRO block diagram, Cathode Ray Tube & its components, applications of CRO, lissajous pattern, dual trace & dual beam oscilloscopes.

References:

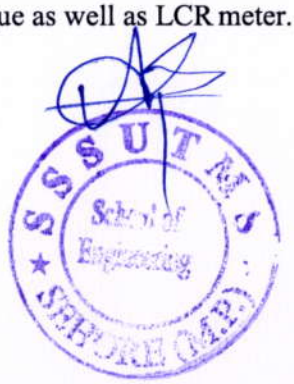
1. E. W. Golding & F. C. Widdis, "Electrical Measurement &Measuring Instrument", A. W. Wheeler & Co. Pvt. Ltd. India
2. A. K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India
3. Purkait, "Electrical & Electronics Measurement & Instrumentation", TMH
4. Forest K. Harris, "Electrical Measurement", Willey Eastern Pvt. Ltd. India
5. M. B. Stout , "Basic Electrical Measurement", Prentice Hall of India
6. W. D. Cooper, "Electronic Instrument & Measurement Technique", Prentice Hall International
7. J. B. Gupta, "Electrical Measurement & Measuring Instrument", S. K. Kataria & Sons

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-602	**Measurements and Instrumentation**	**0L:0T:0P**	**1 credits**	**2Hrs/Week**

List of Experiments:

1. Measurement of low resistance using Kelvin's Double Bridge.
2. Measurement of medium resistance using Wheatstone's bridge.
3. Measurement of high resistance by loss of charge method.
4. Measurement of Insulation resistance using Megger.
5. Measurement of power in a single phase ac circuit by 3 voltmeter/ 3 Ammeter method
6. Calibration of a induction type single phase energy meter
7. Calibration of a dynamometer type of wattmeter by Phantom Loading method.
8. Measurements using Instrument Transformers.
9. Study of various types of Indicating Instruments.
10. Measurement of Power in three phase circuit by one, two & three wattmeters.
11. Measurement of a batch of resistors and estimating statistical parameters.
12. Measurement of L using a bridge technique as well as LCR meter.
13. Measurement of C using a bridge technique as well as LCR meter.



SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Program Elective - II

EEA-603 (A) Electrical and Hybrid Vehicles

EEA-603 (A)	**Electrical and Hybrid Vehicles**	**3L:1T:0P**	**4 credits**	**4Hrs/Week**

Preamble:

The students will be able to, explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals. Analyse different energy storage technologies and Demonstrate different configurations of electric vehicles and its components

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

- Understand the models to describe hybrid vehicles and their performance.
- Understand the different possible ways of energy storage and strategies related to energy storage systems.
- Analyze various electric drives suitable for hybrid electric vehicles

Unit 1: Introduction (6 hours)

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance. History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

Unit 2 Hybrid Electric Drive-trains(6 hours):

Basic concept of hybrid traction, introduction to various hybrid drive- train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Unit 3: Electric Trains (10 hours)

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC

Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

Unit 4: Energy Storage (10 hours)

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems

Unit 5: Energy Management Strategies (10 hours)

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

Case Studies: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV)

References:

1. C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons, 2011.
2. S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management Strategies", Springer, 2015.
3. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design", CRC Press, 2004.
4. T. Denton, "Electric and Hybrid Vehicles", Routledge, 2016

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SSSUTMS * SEHORE (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-603 (B) Digital Signal Processing

EEA-603 (B)	Digital Signal Processing	3L:1T:0P	4 credits	4Hrs/Week

Preamble:
To make students familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors. To make students aware about the meaning and implications of the properties of systems and signals.

Outcomes:
At the end of this course students will demonstrate the ability to

1. Represent signals mathematically in continuous and discrete time and frequency domain
2. Get the response of an LSI system to different signals
3. Design of different types of digital filters for various application

Unit -1 Discrete time signals (10Hrs):
Sequences; representation of signals on orthogonal basis; Samplingand reconstruction of signals; Discrete systems attributes, Z-Transform,

Unit -2 Analysis of LSI systems (6Hrs):
Analysis of LSI systems, frequencyAnalysis, Inverse Systems, Discrete Fourier Transform (DFT),Fast Fourier Transform Algorithm, Implementation of Discrete Time Systems

Unit -3 Designof FIR Digital filters(10Hrs):
: Windowmethod,Park-McClellan's method.Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations;Lowpass, Bandpass, Bandstop and High pass filters.

Unit -4(10Hrs) Analysis of FIR:
Effect of finite register length in FIR filter design.Parametric and non-parametric spectral estimation.

Unit -5 Signal Processing (6Hrs):
Introduction to multirate signalprocessing. Application of DSP.

Text/Reference Books:

1. S.K.Mitra, Digital Signal Processing: A computer based approach.TMH
2. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
3. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms And Applications, Prentice Hall, 1997.
4. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall, 1992.
5. J.R. Johnson, Introduction to Digital Signal Processing, Prentice Hall, 1992.
6. D.J.DeFatta, J. G. Lucas andW.S.Hodgkiss, Digital Signal Processing, John Wiley& Sons, 1988.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

S S S U T M S School of Engineering SEHORE (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-603 (C) Industrial Electrical Systems

EEA-603 (C)	Industrial Electrical Systems	3L:1T:0P	4 credits	4Hrs/Week

Preamble:

To equip learners with the skills and knowledge necessary to successfully carry out basic service and maintenance of Industrial Electrical Systems in a safe and environmentally sound manner.

Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
- Understand various components of industrial electrical systems.
- Analyze and selectthe proper size of various electrical system components.

Unit 1: Electrical System Components (10 Hours)

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices

Unit 2: Residential and Commercial Electrical Systems (12 Hours)

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

Unit 3: Illumination Systems (6 Hours)

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

Unit 4: Industrial Electrical Systems I (8 Hours)

HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of

motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

Unit 5: Industrial Electrical Systems II (6 Hours)

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

Industrial Electrical System Automation Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

Text/Reference Books

2. S.L. Uppal and G.C. Garg, "Electrical Wiring, Estimating & Costing", Khanna publishers, 2008.
3. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2007.
4. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 1997.
5. Web site for IS Standards.
6. H. Joshi, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008.

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Program Elective - III

EEA-604 (A) Computer Architecture

EEA-604 (A)	Computer Architecture	3L:0T:0P	3 credits	3Hrs/Week

Preamble:

To study the basic organization and architecture of digital computers (CPU, memory, I/O, software). Discussions will include digital logic and microprogramming. Such knowledge leads to better understanding and utilization of digital computers, and can be used in the design and application of computer systems or as foundation for more advanced computer-related studies

Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concepts of microprocessors, their principles and practices.
- Write efficient programs in assembly language of the 8086 family of microprocessors.
- Organize a modern computer system and be able to relate it to real examples.
- Develop the programs in assembly language for 80286, 80386 and MIPS processors in real and protected modes.
- Implement embedded applications using ATOM processor

Unit 1: Introduction to computer organization (10 hours)

Architecture and function of general computer system, CISC Vs RISC, Data types, Integer Arithmetic - Multiplication, Division, Fixed and Floating point representation and arithmetic, Control unit operation, Hardware implementation of CPU with Micro instruction, microprogramming, System buses, Multi-bus organization.

Unit 2: Memory organization (6 hours)

System memory, Cache memory - types and organization, Virtual memory and its implementation, Memory management unit, Magnetic Hard disks, Optical Disks.

Unit 3: Input – output Organization (6 hours)

Accessing I/O devices, Direct Memory Access and DMA controller, Interrupts and Interrupt Controllers, Arbitration, Multilevel Bus Architecture, Interface circuits - Parallel and serial port, Features of PCI and PCI Express bus.

Unit 4: 16 and 32 microprocessors (10hours)

80x86 Architecture, IA – 32 and IA – 64, Programming model, Concurrent operation of EU and BIU, Real mode addressing, Segmentation, Addressing modes of 80x86, Instruction set of 80x86, I/O addressing in 80x86

Unit 5: Pipelining (10 hours)

Introduction to pipelining, Instruction level pipelining (ILP), compiler techniques for ILP, Data hazards, Dynamic scheduling, Dependability, Branch cost, Branch Prediction, Influence on instruction set. VLIW Architecture, DSP Architecture, SoC architecture, MIPS Processor and programming

Text/Refence Books

1. V. Carl, G. Zvonko and S. G. Zaky, "Computer organization", McGraw Hill, 1978.
2. B. Brey and C. R. Sarma, "The Intel microprocessors", Pearson Education, 2000.
3. J. L. Hennessy and D. A. Patterson, "Computer Architecture A Quantitative Approach", Morgan Kauffman, 2011.
4. W. Stallings, "Computer organization", PHI, 1987.
5. P. Barry and P. Crowley, "Modern Embedded Computing", Morgan Kaufmann, 2012.
6. N. Mathivanan, "Microprocessors, PC Hardware and Interfacing", Prentice Hall, 2004.
7. Y. C. Lieu and G. A. Gibson, "Microcomputer Systems: The 8086/8088 Family", Prentice Hall India, 1986.
8. J. Uffenbeck, "The 8086/8088 Design, Programming, Interfacing", Prentice Hall, 1987.
9. B. Govindarajalu, "IBM PC and Clones", Tata McGraw Hill, 1991.
10. P. Able, "8086 Assembly Language Programming", Prentice Hall IndiA

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-604 (B) Wind and Solar Energy Systems

EEA-604 (B)	**Wind and Solar Energy Systems**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preamble:

To study clean and *renewable energy* sources, i.e. *wind energy turbines* and *systems, solar* photovoltaic devices and *systems* and to practice *system*-level designs, analytical design and analysis and modeling and simulation.

Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the energy scenario and the consequent growth of the power generation from renewable energy sources.
- Understand the basic physics of wind and solar power generation.
- Understand the power electronic interfaces for wind and solar generation.
- Understand the issues related to the grid-integration of solar and wind energy systems.

Unit 1: Physics of Wind Power: (6 Hours)

History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power-cumulative distribution functions.

Unit 2: Wind generator topologies: (10 Hours)

Review of modern wind turbine technologies,Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent-Magnet Synchronous Generators, Power electronics converters. Generator-Converter configurations, Converter Control.

Unit 3: The Solar Resource: (6 Hours)

Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

Unit 4: Solar photovoltaic: (10 Hours)

Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell, PV Unit , array, Power Electronic Converters for Solar Systems, Maximum Power Point Tracking (MPPT) algorithms.Converter Control.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit 5: Network Integration Issues: (10 Hours)

Overview of grid code technical requirements. Fault ride-through for wind farms - real and reactive power regulation, voltage and frequency operating limits, solar PV and wind farm behavior during grid disturbances. Power quality issues. Power system interconnection experiences in the world. Hybrid and isolated operations of solar PV and wind systems.

Solar thermal power generation:

Technologies, Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, elementary analysis.

References:

1. T. Ackermann, "Wind Power in Power Systems", John Wiley and Sons Ltd., 2005.
2. G. M. Masters, "Renewable and Efficient Electric Power Systems", John Wiley and Sons, 2004.
3. S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 1984.
4. H. Siegfried and R. Waddington, "Grid integration of wind energy conversion systems" John Wiley and Sons Ltd., 2006.
5. G. N. Tiwari and M. K. Ghosal, "Renewable Energy Applications", Narosa Publications, 2004.
6. J. A. Duffie and W. A. Beckman, "Solar Engineering of Thermal Processes", John Wiley & Sons, 1991.

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-604 (C) Computational Electromagnetics

EEA-604 (C)	Computational Electromagnetics	3L:0T:0P	3 credits	3Hrs/Week

Preamble:
To provide the deep knowledge of Conventional and Analytical design methodology of solving field equations and Field plotting

Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the advanced concepts of electromagnetics.
- Understand computational techniques for computing fields.
- Apply the techniques to simple real-life problems.

Unit 1: Introduction (6 hours)

Conventional design methodology, Computer aided design aspects – Advantages. Review of basic fundamentals of Electrostatics and Electromagnetics. Development of Helmhotz equation, energy transformer vectors- Poynting and Slepian, magnetic Diffusion-transients and time-harmonic.

Unit 2: Analytical Methods (6 hours)

Analytical methods of solving field equations, method of separation of variables, Roth's method, integral methods- Green's function, method of images.

Unit 3: Finite Difference Method (FDM) (10 hours)

Finite Difference schemes, treatment of irregular boundaries, accuracy and stability of FD solutions, Finite-Difference Time-Domain (FDTD) method- Uniqueness and convergence.

Unit 4: Finite Element Method (FEM) (10 hours)

Overview of FEM, Variational and Galerkin Methods, shape functions, lower and higher order elements, vector elements, 2D and 3D finite elements, efficient finite element computations.

Unit 5: Special Topics(10 hours)

{Background of experimental methods-electrolytic tank, R-C network solution, Field plotting (graphical method)}, hybrid methods, coupled circuit - field computations, electromagnetic - thermal and electromagnetic - structural coupled computations, solution of equations, method of moments, Poisson's field Low frequency electrical devices, static / time-harmonic / transient problems in

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

transformers, rotating machines, actuators. CAD packages.

References

1. P. P. Silvester and R. L. Ferrari "Finite Element for Electrical Engineers", Cambridge University press, 1996.
2. M. N. O. Sadiku, "Numerical Techniques in Electromagnetics", CRC press, 2001

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Open Core Elective-II

EEA 605 (A) Internet of Things

EEA 605 (A)	**Internet of Things**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preamble:

1. To assess the vision and introduction of IoT.
2. To Understand IoT Market perspective.
3. To Implement Data and Knowledge Management and use of Devices in IoT Technology.
4. To Understand State of the Art - IoT Architecture.
5. To classify Real World IoT Design Constraints, Industrial Automation in IoT.

Outcomes:

On successful completion of the course, the student will: • Understand the concepts of Internet of Things • Analyze basic protocols in wireless sensor network • Design IoT applications in different domain and be able to analyze their performance • Implement basic IoT applications on embedded platform

Unit 1 Introduction to IoT - (10 hHrs)
Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT,Functional blocks of IoT, Communication models & APIs

Unit 2 IoT & M2M - (10 hHrs)
Machine to Machine, Difference between IoT and M2M, Software define Network

Unit 3 Network & Communication (10 hHrs)
Network & Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination
Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges

Unit 4 Domain specific applications(6 hHrs)
Domain specific applications of IoT Home automation, Industry applications, Surveillance applications,

Unit 5 Other IoT applications (6 hHrs)
Developing IoTs Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python

References:

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

EEC- 806- Industrial Training Project - II

Industrial Training Project - II should be the outcome of the training done/performed during 7th semester .It should be submitted in hardware form (proto type)or simulation form along with proper data and certificates issued during project training. It should cover the electrical engineering aspects learned during training. A Power point presentation should also be submitted at the time of submission. It can be in the form of major project.

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach"

2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-605 (B) Power Plant Engineering

EEA-605 (B)	Power Plant Engineering	3L:0T:0P	3 credits	3Hrs/Week

Preamble:

To provide an overview of power plants and the associated energy conversion issues

Outcomes:

Upon completion of the course, the students can understand the principles of operation for different power plants and their economics.

Unit 1 Coal based thermal power plants, (10 Hrs);

Basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam andheating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems

Unit 2 Gas turbine and combined cycle power plants(10 Hrs):

Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

Unit 3 Basics of nuclear energy conversion(10 Hrs):

, Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.

Unit 4 Hydroelectric power plants(6 Hrs):

classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems

Unit 5 Energy, economic and environmental issues(6 Hrs):

, power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

Referencs:

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.
3. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-605 (C) Modern Manufacturing Processes

EEA-605 (C)	**Modern Manufacturing Processes**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preamble:
To motivate and challenge students to understand and develop an appreciation of the processes in correlation with material properties which change the shape, size and form of the raw materials into the desirable product by conventional or unconventional manufacturing methods

Outcomes:
Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products

Unit 1 Conventional Manufacturing processes: (6Hrs)
Casting and moulding: Metal casting processes and equipment, Heat transfer and solidification, shrinkage, riser design, casting defects and residual stresses.

Unit 2 Introduction to bulk and sheet metal forming, (10Hrs)

plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk forming(forging, rolling, extrusion, drawing) and sheet forming (shearing, deep drawing, bending) principles of powder metallurgy.

Unit 3 Metal cutting: (10Hrs)
Single and multi-point cutting; Orthogonal cutting, various force components: Chip formation, Tool wear and tool life, Surface finish and integrity, Machinability, Cutting tool materials, Cutting fluids, Coating; Turning, Drilling, Milling and finishing processes, Introduction to CNC machining.

Unit 4 Additive manufacturing: (6Hrs)
Rapid prototyping and rapid tooling Joining/fastening processes: Physics of welding, brazing and soldering;design considerations in welding,Solid and liquid state joining processes;Adhesive bonding.

Unit 5 Unconventional Machining Processes: (10Hrs)
Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, principles and process parameters

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Electrical Discharge Machining, principle and processes parameters, MRR, surface finish, tool wear, dielectric, power and control circuits, wire EDM; Electro-chemical machining (ECM), etchant &maskant, process parameters, MRR and surface finish. Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining

References:

1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India, 2014

2. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems

3. Degarmo, Black &Kohser, Materials and Processes in Manufacturing

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA- 606 Minor Project

EEA 606	Minor Project	0L:0T:2P	2 credits	4 Hrs/Week

Preamble:
To prepare minor projects as per the need of real world and industries and validate their result using electrical, electronics and other computing technologies.

Outcomes:
At the end of this course students will demonstrate the ability to

1. Design and validate DC and AC bridges
2. Analyze the dynamic response and the calibration of few instruments
3. Learn about various measurement devices, their characteristics, their operation and their limitations
4. understand statistical data analysis
5. Understand computerized data acquisition.
6. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
7. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
8. Able to write comprehensive report on Minor project work.

Guidelines:

The Minor-project is a team activity having 3-4 students in a team. This is electronic product design work with a focus on electronic circuit design.
2. The Minor project may be a complete hardware or a combination of hardware and software. The software part in Minor project should be less than 50% of the total work.
3. Minor Project should cater to a small system required in laboratory or real life.
4. It should encompass components, devices, analog or digital ICs, micro controller with which functional familiarity is introduced.
5. After interactions with course coordinator and based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of Minorproject.
6. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
7. The student is expected to exert on design, development and testing of the proposed work as per the schedule.
8. Art work and Layout should be made using simulation software such as CAD based/ PCB simulation. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.

School of Engineering

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Working schedule:

The faculty and student should work according to following schedule:

Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff. The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.

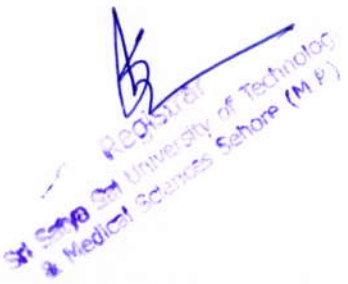
Action plan for Minor Project work and its evaluation scheme (Suggestive)

Task/Process	**Week**	**Evaluation**	**Marks For Term Work**
Orientation of students by HOD/Project Guide	1st	-	-
Literature survey and resource collection	2nd	-	-
Selection and finalization of topic before a Committee*	3rd	Seminar-I	20
(Detailing and preparation of Project) Modeling, Analysis and Design of Project work	4th to 5th	-	20
Testing, improvements, quality control of project	6th to 10th - 11th	-	25
Report Writing	12th to 15th		25
Presentation before a committee	16th	Seminar-II	30

(including user manual, if any)			

* Committee comprises of HOD, all project supervisions including external guide from Industry (if any)

Note: At every stage of action plan, students must submit a write up to the concerned guide.



SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

Minutes of Board of Studies Committee Meeting Dated : 06.7.2021

The Board of Studies Committee Meeting was held through online video conferencing(Google Meet) on 06.7.2021. Following members were present.

1. Ms. Alka Thakur
2. Dr. A A Ansari
3. Dr. Vijay Prakash Singh
4. Dr. Prabodh Khampariya
5. Mr. Devendra Patle
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EE-7th and 8th semester Scheme and Syllabus (AICTE)

Discussion (If any) : The following points were discussed in length.:

1. The **Internal members** of the Committee suggested that the Scheme and Syllabus should be prepared as per current demand in industry and academics.
2. The **External members (Academic Expert)** suggested for **multidisciplinary** subjects such as electronics, computer science based subject
3. The **External members (Industry Expert)** suggested for project work related to **Industry oriented and manufacturing and management streams** and few subjects related to advanced learning solutions imparting knowledge of advanced innovations like machine learning, and artificial intelligence.

Resolution of the Discussion:

On the basis of discussion the following amendments were made:

1. Scheme and Syllabus was prepared as per current demand in industries .
2. The **"Project Stage-I"** content has been revised as per the need of real world and industries.
3. **The Inter –Branch** subjects such as **"Data Structures and Algorithms", "VLSI circuits", and "Image Processing", "Big data Analysis"** etc.. have been added.
4. The Industry oriented project work in "" has been implemented for practical knowledge and **"Evolutionary Techniques"**, as machine learning subject has been added in the curriculum.

SSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences

5. As per the industry management and ethics requirement new subjects like "**Cyber Law and Ethics" and "Project Management"** has been introduced.

Final Resolution of the Discussion:

With the above amendments the Scheme and Syllabus was approved for forthcoming 7th and 8th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Ms. Alka Thakur
2. Dr. A A Ansari
3. Dr. Vijay Prakash Singh
4. Dr. Prabodh Khampariya
5. Mr. Devendra Patle
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - AICTE Pattern

Academic Year 2021- 2022

Branch : Electrical Engineering **Semester - VII**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	EEA-701	Power System Protection	60	30	10	30	20	150	3	0	2	4
2	EEA-702	Electrical Drives	60	30	10	30	20	150	3	0	2	4
3	EEA-703	Program Elective-IV	60	30	10			100	3	0	0	3
4	EEA-704	Open Core Elective - III	60	30	10		-	100	3	0	0	3
6	EEA-705	Project Stage-I	-	-	-	120	80	200	-	-	10	5
7	EEA-706	Self Study/GD/Seminar					200	200			2	1
		TOTAL	**240**	**120**	**40**	**180**	**320**	**900**	**12**	**0**	**16**	**20**

Program Elective - IV	
EEA-703	EEA-703 (A)High Voltage Engineering
	EEA-703 (B)Power Quality and FACTS
	EEA-703(C) Image Processing

Open Core Elective-III	
EEA-704	EEA-704 (A)VLSI circuits
	EEA-704 (B) Evolutionary Techniques
	EEA-704(C) Data Structures and Algorithms

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Syllabus VIIth Semester

EEA-701 Power System Protection

EEA-701	Power System Protection	3L:0T:0P	3 credits	3Hrs/Week

Preamble:

Toprovide an overview of the principles and schemes for protecting **power** lines, transformers, buses, generators and introduces the fundamentals of wide-area monitoring and control

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

- Understand the different components of a protection system.
- Evaluate fault current due to different types of fault in a network.
- Understand the protection schemes for different power system components.
- Understand the basic principles of digital protection.
- Understand system protection schemes, and the use of wide-area measurements.

Unit 1: Introduction and Components of a Protection System (6 hours)
Principles of Power System Protection, Relays, Instrument transformers, Circuit Breakers

Unit 2: Faults and Over-Current Protection (6 hours)
Review of Fault Analysis, Sequence Networks. Introduction to Overcurrent Protection and overcurrent relay co-ordination.

Unit 3: Equipment Protection Schemes(10 hours)
Directional, Distance, Differential protection. Transformer and Generator protection. Busbar Protection, Bus Bar arrangement schemes,
Digital Protection Computer-aided protection, Fourier analysis and estimation of Phasors from DFT. Sampling, aliasing issues.

Unit 4: Modeling and Simulation of Protection Schemes (10 hours)
CT/PT modeling and standards, Simulation of transients using Electro-Magnetic Transients (EMT) programs. Relay Testing.

Unit 5: System Protection (10hours)
Effect of Power Swings on Distance Relaying. System Protection Schemes. Under-frequency, under-voltage and df/dt relays, Out-of-step protection, Synchro-phasors, Phasor Measurement Units and Wide-Area Measurement Systems (WAMS). Application of WAMS for improving protection systems.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

References:

1. J. L. Blackburn, "Protective Relaying: Principles and Applications", Marcel Dekker, New York, 1987.
2. Y. G.Paithankar and S. R. Bhide, "Fundamentals of power system protection", Prentice Hall, India, 2010.
3. A. G. Phadke and J. S. Thorp, "Computer Relaying for Power Systems", John Wiley & Sons, 1988.
4. A. G. Phadke and J. S. Thorp, "Synchronized Phasor Measurements and their Applications", Springer, 2008.
5. D. Reimert, "Protective Relaying for Power Generation Systems", Taylor and Francis, 2006.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-701 Power System Protection

EEA-701	**Power System Protection**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

List of Experiments :(Extendable)

1. Determination of drop out factor of an instantaneous over current relay.
2. Determination of operating characteristic of IDMT relay.
3. Determination of operating characteristic of differential relay.
4. Study and operation of gas actuated protective relay.
5. Study and operation of static over current relay
6. Analysis of power system faults (Symmetrical & Asymmetrical) using MATLAB.
7. Study of SF6 circuit breaker
8. Protectional simulation study of generator, Transformer, Feeder & Motor protection.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-702 Electrical Drives

EEA-702	Electrical Drives	3L:0T:0P	3 credits	3Hrs/Week

Preamble:

To provide fundamental knowledge in dynamics and control of Electric Drives. To justify the selection of Drives for various applications. To familiarize the various semiconductor controlled drives employing various motors.

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

- Understand the characteristics of dc motors and induction motors.
- Understand the principles of speed-control of dc motors and induction motors.
- Understand the power electronic converters used for dc motor and induction motor speed control.

Unit 1: DC motor characteristics (6 hours)
Review of emf and torque equations of DC machine, review of torque-speed characteristics of separately excited dc motor, change in torque-speed curve with armature voltage, example load torque-speed characteristics, operating point, armature voltage control for varying motor speed, flux weakening for high speed operation.

Unit 2: Chopper fed DC drive (6 hours)
Review of dc chopper and duty ratio control, chopper fed dc motor for speed control, steady state operation of a chopper fed drive, armature current waveform and ripple, calculation of losses in dc motor and chopper, efficiency of dc drive, smooth starting.

Unit 3: Multi-quadrant DC drive (6 hours)
Review of motoring and generating modes operation of a separately excited dc machine, four quadrant operation of dc machine; single-quadrant, two-quadrant and four-quadrant choppers; steady-state operation of multi-quadrant chopper fed dc drive, regenerative braking.

Unit 4: Closed-loop control of DC Drive (12 hours)
Control structure of DC drive, inner current loop and outer speed loop, dynamic model of dc motor – dynamic equations and transfer functions, modeling of chopper as gain with switching delay, plant transfer function, for controller design, current controller specification and design, speed controller specification and design.

Induction motor characteristics

Review of induction motor equivalent circuit and torque-speed characteristic, variation of torque-speed curve with (i) applied voltage, (ii) applied frequency and (iii) applied voltage and frequency, typical torque-speed curves of fan and pump loads, operating point, constant flux operation, flux weakening operation.

Unit 5: Scalar control or constant V/f control of induction motor (12 hours)

Review of three-phase voltage source inverter, generation of three-phase PWM signals, sinusoidal modulation, space vector theory, conventional space vector modulation; constant V/f control of induction motor, steady-state performance analysis based on equivalent circuit, speed drop with loading, slip regulation.

Control of slip ring induction motor

Impact of rotor resistance of the induction motor torque-speed curve, operation of slip-ring induction motor with external rotor resistance, starting torque, power electronic based rotor side control of slip ring motor, slip power recovery.

References:

1. G. K. Dubey, "Power Semiconductor Controlled Drives", Prentice Hall, 1989.
2. R. Krishnan, "Electric Motor Drives: Modeling, Analysis and Control", Prentice Hall, 2001.
3. G. K. Dubey, "Fundamentals of Electrical Drives", CRC Press, 2002.
4. W. Leonhard, "Control of Electric Drives", Springer Science & Business Media, 2001.

EEA-702	**Electrical Drives**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

List of experiments:

1.To study the starting and running characteristics of converter fed DC traction motor.
2. To study the energy recovery systems and braking of a DC drive.
3. To study the braking methods of a three-phase induction motor.
4. To study the performance of VSI fed three-phase induction motor using PWM technique.
5. To control the speed of a three phase slip ring Induction motor using rotor impedance control.
6. To study the performance of Vector Controlled three phase Induction motor drive.
7. To Study frequency Controlled Synchronous motor drive.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Program Elective – IV

EEA-703(A) High Voltage Engineering

EEA-703(A)	High Voltage Engineering	3L:0T:0P	3 credits	3Hrs/Week

Preambles:
To understand the principles of theory of high voltage generation and measurements. 2- To understand the operation of high voltage power supplies for ac, dc, and impulse voltages 3- To get familiar with various applications where high voltage field is used.

Outcomes:
At the end of the course, the student will demonstrate

- Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
- Knowledge of generation and measurement of D. C., A.C., & Impulse voltages.
- Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.
- Knowledge of how over-voltages arise in a power system, and protection against these over-voltages.

Unit 1: Breakdown in Gases (6 Hours)
Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge

Unit 2: Breakdown in liquid and solid Insulating materials (6 Hours)
Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

Unit 3: Generation of High Voltages (10 Hours)
Generation of high voltages, generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

Measurements of High Voltages and Currents
Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillographs for impulse voltage and current measurement, measurement of dielectric constant and loss factor, partial discharge measurements.

Unit 4: Lightning and Switching Over-voltages (10 Hours)
Charge formation in clouds, Stepped leader, Dart leader, Lightning Surges. Switching over-voltages, Protection against over-voltages, Surge diverters, Surge modifiers.

SSSUTMS School of Engineering PUTTAPARTHI

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit 5: High Voltage Testing of Electrical Apparatus and High Voltage Laboratories (10 Hours)

Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

References:

1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering", McGraw Hill Education, 2013.
2. C. L. Wadhwa, "High Voltage Engineering", New Age International Publishers, 2007.
3. D. V. Razevig (Translated by Dr. M. P. Chourasia), "High Voltage Engineering Fundamentals", Khanna Publishers, 1993.

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-703 (B) Power Quality and FACTS

EEA-703 (B)	**Power Quality and FACTS**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preambles:

To give important operating principle, design and planning of power system operation and the effect of different *FACTs* devices to the operation and control of power system will be presented.

Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the characteristics of ac transmission and the effect of shunt and series reactive compensation.
- Understand the working principles of FACTS devices and their operating characteristics.
- Understand the basic concepts of power quality.
- Understand the working principles of devices to improve power quality

Unit 1: Transmission Lines and Series/Shunt Reactive Power Compensation (6 hours)

Basics of AC Transmission. Analysis of uncompensated AC transmission lines. Passive Reactive Power Compensation. Shunt and series compensation at the mid-point of an AC line. Comparison of Series and Shunt Compensation.

Unit 2: Thyristor-based Flexible AC Transmission Controllers (FACTS) (6 hours)

Description and Characteristics of Thyristor-based FACTS devices: Static VAR Compensator (SVC), Thyristor Controlled Series Capacitor (TCSC), Thyristor Controlled Braking Resistor and Single Pole Single Throw (SPST) Switch. Configurations/Modes of Operation, Harmonics and control of SVC and TCSC. Fault Current Limiter.

Unit 3: Voltage Source Converter based (FACTS) controllers (10 hours)

Voltage Source Converters (VSC): Six Pulse VSC, Multi-pulse and Multi-level Converters, Pulse-Width Modulation for VSCs. Selective Harmonic Elimination, Sinusoidal PWM and Space Vector Modulation. STATCOM: Principle of Operation, Reactive Power Control: Type I and Type II controllers, Static Synchronous Series Compensator (SSSC) and Unified Power Flow Controller (UPFC): Principle of Operation and Control. Working principle of Interphase Power Flow Controller. Other Devices: GTO Controlled Series Compensator. Fault Current Limiter.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit 4: Application of FACTS (10 hours)

Application of FACTS devices for power-flow control and stability improvement. Simulation example of power swing damping in a single-machine infinite bus system using a TCSC. Simulation example of voltage regulation of transmission mid-point voltage using a STATCOM.

Unit 5: Power Quality Problems in Distribution Systems (10 hours)

Power Quality problems in distribution systems: Transient and Steady state variations in voltage and frequency. Unbalance, Sags, Swells, Interruptions, Wave-form Distortions: harmonics, noise, notching, dc-offsets, fluctuations. Flicker and its measurement. Tolerance of Equipment: CBEMA curve.

DSTATCOM : Reactive Power Compensation, Harmonics and Unbalance mitigation in Distribution Systems using DSTATCOM and Shunt Active Filters. Synchronous Reference Frame Extraction of Reference Currents. Current Control Techniques in for DSTATCOM. **Dynamic Voltage Restorer and Unified Power Quality Conditioner** Voltage Sag/Swell mitigation: Dynamic Voltage Restorer – Working Principle and Control Strategies. Series Active Filtering. Unified Power Quality Conditioner (UPQC): Working Principle. Capabilities and Control Strategies.

References:

2. N. G. Hingorani and L. Gyugyi, "Understanding FACTS: Concepts and Technology of FACTS Systems", Wiley-IEEE Press, 1999.
3. K. R. Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International (P) Ltd. 2007.
4. T. J. E. Miller, "Reactive Power Control in Electric Systems", John Wiley and Sons, New York, 1983.
5. R. C. Dugan, "Electrical Power Systems Quality", McGraw Hill Education, 2012.
6. G. T. Heydt, "Electric Power Quality", Stars in a Circle Publications, 1991

Registrar
Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-703 (C) Image Processing

EEA-703 (C)	Image Processing	3L:0T:0P	3 credits	3Hrs/Week

Preambles:
to give an introduction to basic concepts and methodologies for digital image processing , to develop a foundation that can be used as the basis for further study and research in this field.

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

1. Mathematically represent the various types of images and analyze them.
2. Process these images for the enhancement of certain properties or for optimized use of the resources.
3. Develop algorithms for image compression and coding

Unit 1 Digital Image Fundamentals(6 Hrs)-
Elements of visual perception, image sensing andacquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

Unit 2 Image Enhancements and Filtering(6 Hrs)
-Gray level transformations, histogramequalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.

Unit 3 Color Image Processing-Color models (10 Hrs):
RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation. Image Segmentation- Detection of discontinuities, edge linking and boundarydetection, thresholding, global and adaptive, region-based segmentation.
Wavelets and Multi-resolution image processing- Uncertainty principles of FourierTransform, Time-frequency localization, continuous wavelet transforms, wavelet bases and multi-resolution analysis, wavelets and Subband filter banks, wavelet packets.

Unit 4 Image Compression-Redundancy (10 Hrs):

inter-pixel and psycho-visual; Losslesscompression – predictive, entropy; Lossy compression-predictive and transform coding; Discrete Cosine Transform; Still image compression standards– JPEG and JPEG-2000.

Unit 5 Fundamentals of Video Coding(10 Hrs):
-Inter-frame redundancy, motion estimationtechniques – full-search, fast search strategies, forward

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

and backward motion prediction, frame classification – I, P and B; Video sequence hierarchy–Group of pictures, frames, slices, macro-blocks and blocks; Elements of a video encoder and decoder; Video coding standards – MPEG and H.26X.

Video Segmentation-Temporal segmentation–shot boundary detection, hard-cutsand soft-cuts; spatial segmentation–motion-based; Video object detection and tracking.

References:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004
3. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

Open Core Elective-III

EEA-704 (A) VLSI Circuits

EEA-704 (A)	VLSI Circuits	3L:0T:0P	3 credits	3Hrs/Week

Preambles:

To provide students with a sound knowledge of **VLSI** system **design** verification and testability, and system reliability. The emphasis of the **course** is on techniques for system **design**, testing, system noise and performance analysis.

Outcomes:

UNIT –I: Review of Microelectronics and Introduction to MOS Technologies: (10Hrs)
MOS, CMOS, BiCMOS Technology. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: Ids – Vds relationships, Threshold Voltage VT, Gm, Gds and ωo, Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Zpu/Zpd, MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT –II: Layout Design and Tools: (10Hrs)
Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools. Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT –III: Combinational Logic Networks: (6 Hrs)
Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT –IV: Sequential Systems: (10 Hrs)
Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT –V: Floor Planning: (6Hrs)
Floor planning methods, Global Interconnect, Floor Plan Design, Off-chip connections.

Reference:
1. Essentials of VLSI Circuits and Systems, K. Eshraghian Eshraghian. D, A. Pucknell, 2005, PHI.
2. Modern VLSI Design – Wayne Wolf, 3rd Ed., 1997, Pearson Education.
3. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.
4. Principals of CMOS VLSI Design – N.H.E Weste, K. Eshraghian, 2nd Ed., Addison Wesley.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-704 (B) Evolutionary Techniques

EEA-704 (B)	Evolutionary Techniques	3L:0T:0P	3 credits	3Hrs/Week

Preambles:

To be able to assess and understand the key commonalities and differences in various **evolutionary** and swarm-based models. To be able to apply **techniques** in **evolutionary** computation and swarm intelligence to problems such as optimization, automatic programming, control, and biological modeling.

Outcomes:

to provide students with a deeper insight into the evolutionary processes - both selective and random - which can explain the genetic composition of populations, form, behaviour and distribution of organisms, and to teach students the basic methods of analysing the evolutionary relationships between species.

Unit –I: Introduction: (8 Hrs)
Approaches to intelligent control, architecture for intelligent control, symbolic reasoning system, rule-based systems, the AI approach, knowledge representation - expert systems.

Unit –II: Artificial Neural Networks: (6 Hrs)
Basic concept mathematical model, mcculloch-pitts neuron model, simple perceptron, Adaline and Madaline, feed-forward multilayer perceptron, learning and training the neural network, data processing, scaling, fourier transformation, principal-component analysis, wavelet transformations, hopfield network, self-organizing network and recurrent network, neural network based controller.

Unit –III: Fuzzy Logic System: (12 Hrs)
Crisp sets, fuzzy sets, basic fuzzy set operation and approximate reasoning, fuzzy logic modeling and control, fuzzification, inferencing and defuzzification, fuzzy knowledge and rule bases, fuzzy modeling and control schemes for nonlinear systems, self organizing fuzzy logic control.

Unit –IV: Genetic Algorithm: (10 Hrs)
Basic concept of genetic algorithm and detail algorithmic steps, adjustment of free parameters, solution of typical control problems using genetic algorithm, concept on some other search techniques like Tabu search and Ant-colony search techniques for solving optimization problems.

Unit –V: Applications: (10 Hrs)
GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-neural network toolbox, stability analysis of neural-network interconnection systems, implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, stability analysis of fuzzy control systems.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

References:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.
3. Fuzzy Sets, Uncertainty and Information - Klir G.J. & Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
4. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
5. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.
6. Elements of Artificial Neural Networks - Kishan Mehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International.
7. Artificial Neural Network –Simon Haykin, 2nd Ed., Pearson Education.
8. Introduction Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa,1/e, TMH, New Delhi.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-704 (C) Data Structures and Algorithms

EEA-704 (C)	**Data Structures and Algorithms**	**3L:0T:0P**	**3 Credits**	**3Hrs/Week**

Preambles:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures

Outcomes:

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

Unit 1 Introduction (6 Hours):

Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

Unit 2: Stacks and Queues: (6 Hours):

ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit 3:Linked Lists: (10 Hours):

Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Unit 4:Sorting and Hashing: (10- Hours):

Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

SSSUTMS School of Engineering PUTTAPARTHI (A.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit 5:Graph: : (10- Hours):

Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

References

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.
3. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

S S S U T M S
School of Engineering
PUTTAPARTHI (A.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA 705 Project Stage-I

EEA 705	Project Stage-I	0L:0T:5P	5 credits	10Hrs/Week

Preambles:

1. To be able to apply some of the techniques/principles as per the real life needs.
2. To carry out budget and time planning for the project.
3. To inculcate electronic hardware implementation skills by learning PCB artwork design using an appropriate tool

Outcomes:

At the end of this course students will demonstrate the ability to

- Design and validate electrical algorithms for optimum solution
- Analyze the dynamic response and the calibration of few instruments
- Build projects as per industry and society demands.

Guidelines:

1. To prepare the synopsys of the major project to be done in next semester.
2. The Project Stage-I is a team activity having 3-4 students in a team. This is electronic product design work with a focus on electronic circuit design.
3. The Project Stage-I may be a complete hardware or a combination of hardware and software.
4. The software part in Minor project should be less than 50% of the total work.
5. Project should cater to a small system required in laboratory or real life.
6. It should encompass components, devices, analog or digital ICs, micro controller with which functional familiarity is introduced.
7. After interactions with course coordinator and based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of Minorproject.
8. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
9. The student is expected to exert on design, development and testing of the proposed work as per the schedule.
10. Art work and Layout should be made using CAD based PCB simulation software.
11. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering

EEA-706 Self Study/GD/Seminar

EEA-706	**Self Study/GD/Seminar**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

Preambles:

The main objective is to improve the mass communication and convincing/understanding skills of students .And to give the students an opportunity to exercise their rights to express themselves. The evaluation will be done based on their presentation work and group discussion

Outcomes:

In terms of **content**, students will be able to

Presentation Skills

They will be able to make use of visual, audio and audio-visual material to support their presentation, and will be able to speak cogently with or without notes. Students will present either in groups or as individuals.

Discussion Skills

Students will be able to judge when to speak and how much to say, speak clearly and audibly in a manner appropriate to the subject, ask appropriate questions, use evidence to support claims, respond to a range of questions, take part in meaningful discussion

Listening Skills

Students will demonstrate that they have paid close attention to what others say and can respond constructively. Through listening attentively, they will be able to build on discussion fruitfully, supporting and connecting with other discussants. They will be able to follow academic discussions, infer meanings that are not overt, and take notes from a discussion or presentation.

Argumentative Skills and Critical Thinking

Students will develop persuasive speech, present information in a compelling, well-structured, and logical sequence, respond respectfully to opposing ideas, show depth of knowledge of complex subjects, and develop their ability to synthesize, evaluate and reflect on information.

Questioning

Through asking appropriate questions, students will demonstrate their understanding of discussions and spark further discussion.

Interdisciplinary Inquiry

Students will be able to reach across diverse disciplines to apply theories, methods and knowledge bases from multiple fields to a single question or problem.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Engaging with Big Questions

Students will engage with important questions that stimulate discussion and debate.

Studying Major Works

Students will engage with works that are widely held to be significant in the field of study, while recognizing cultural diversity and the ever-changing nature of what is regarded as important.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)

Scheme of Examination - AICTE Pattern

Academic Year 2021– 2022

Branch : Electrical Engineering **Semester - VIII**

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assign-ments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	EEA-801	Power System Dynamics and Control	60	30	10	30	20	150	3	0	2	4
3	EEA-802	Program Elective-V	60	30	10			100	3	0	0	3
4	EEA-803	Open Core Elective - IV	60	30	10	-		100	3	0	0	3
6	EEA-804	Project Stage-II	-	-	-	240	160	400	-	-	16	8
		TOTAL	**180**	**90**	**30**	**270**	**180**	**750**	**9**	**0**	**18**	**18**

Program Elective - V	
EEA-802	EEA-802 (A)Generalised Theory of Electrical Machines
	EEA-802 (B)HVDC Transmission Systems
	EEA-802(C)Advanced Electric Drives

Open Core Elective-IV	
EEA-803	EEA-803 (A) Cyber Law and Ethics
	EEA-803 (B) Project Management
	EEA-803 (C) Big data Analysis

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering
Syllabus VIII Semester

EEA 801 Power System Dynamics and Control

EEA 801	**Power System Dynamics and Control**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preambles:

To determine the dynamic characteristics of power system equipment, to recognize dynamic performance of power systems and to illustrate the system stability and controls. To analyse the model representation .

Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the problem of power system stability and its impact on the system.
- Analyse linear dynamical systems and use of numerical integration methods.
- Model different power system components for the study of stability.
- Understand the methods to improve stability.

Unit 1: Introduction to Power System Operations (4 hours)

Introduction to power system stability. Power System Operations and Control. Stability problems in Power System. Impact on Power System Operations and control.

Unit 2 : Analysis of Linear Dynamical System and Numerical Methods (6 hours)

Analysis of dynamical System, Concept of Equilibrium, Small and Large Disturbance Stability. Modal Analysis of Linear System, Analysis using Numerical Integration Techniques, Issues in Modeling: Slow and Fast Transients, Stiff System

Unit 3 : Modeling of Synchronous Machines and Associated Controllers (12 hours)

Modeling of synchronous machine: Physical Characteristics. Rotor position dependent model. D-Q Transformation. Model with Standard Parameters. Steady State Analysis of Synchronous Machine. Short Circuit Transient Analysis of a Synchronous Machine. Synchronization of Synchronous Machine to an Infinite Bus. Modeling of Excitation and Prime Mover Systems. Physical Characteristics and Models. Excitation System Control. Automatic Voltage Regulator. Prime Mover Control Systems. Speed Governors.

Unit 4 : Modeling of other Power System Components (10 hours)

Modeling of Loads. Load Models - induction machine model. HVDC and FACTS controllers, Wind Energy Systems.

Unit 5 : Stability Analysis (10 hours) Angular stability analysis in Single Machine Infinite Bus System.

Angular Stability in multi- machine systems – Intra- plant, Local and Inter-area modes. Frequency Stability: Centre of Inertia Motion. Load Sharing: Governor droop. Single Machine Load Bus System: Voltage Stability. Introduction to Torsional Oscillations and the SSR phenomenon. Stability Analysis Tools: Transient Stability Programs, Small Signal Analysis Programs.

SSSUTMS School of Engineering PUTTAPARTHI (A.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Enhancing System Stability Planning Measures. Stabilizing Controllers (Power System Stabilizers).Operational Measures-Preventive Control. Emergency Control.

References:

1. K.R. Padiyar, " Power System Dynamics, Stability and Control", B. S. Publications,2002.

2. P. Kundur, " Power System Stability and Control", McGraw Hill,1995.

3. P. Sauer and M. A. Pai, " Power System Dynamics and Stability" , Prentice Hall,1997.

EEA 801	**Power System Dynamics and Control**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

List of Experiments:

1. To develop a program in Matlab for information of Y-bus matrix for N bus system.
2. Load flow solution for 3-bus system using Gauss- Seidel, Newton Raphson and FDLF methods up to 3 iteration.
3. Load flow solution for IEEE 6-bus and 30-bus system in Matlab using Newton Raphson method.
4. Assessment of transient stability of a single machine system.
5. Effect of compensation on voltage profile of IEEE 6-bus system.
6. Study of any software tools (PSCAD,EDSA, Mi POWER, ETAP etc)

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering
Syllabus VIII Semester

Program Elective – V
EEA-802 (A) Generalized Theory of Electrical Machines

EEA-802 (A)	**Generalized Theory of Electrical Machines**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preambles:
To introduce the concepts of ideal synchronous machines and poly-phase induction machines.
- Applications which will be utilized in the electrical machines with its performance and theory of operation.
- Study of special machines.

Outcomes:
After the completion of the course, the students will be able to:
- Express the revolving field and reference frame theory.
- Develop mathematical model of three-phase AC machines and parameters in different reference frame.
- Simulate the transient performance of three-phase ac machines in different reference frames.
- Investigate the transient performance of different DC machines.
- Select special purpose small machines for different applications.

Unit I Generalized Theory: Conversions, basic two pole machines, transformer with movable secondary, transformer voltage and speed voltage, Kron's primitive machine , analysis of electrical machines, voltage and torque equation.

Unit II Linear Transformations: Invariance of power, transformations from displaced brush axis, three phases to two phase, rotating axes to stationary axes, transformed impedance matrix, torque calculations.

Unit III DC Machines: Generalized representation, generator and motor operation, operation with displaced brushes, steady state and transient analysis, sudden short circuit, sudden application of inertia load ,electric braking of dc motors.

Unit IV Synchronous Machines: Generalized representation, equivalent circuit, steady state analysis, transient analysis , phasor diagrams, electromechanical transients.

Unit V Special Machines: Generalized representation, steady state analysis of reluctance motor, brushless dc motor, variable reluctance motor & single phase series motor.

References:

1. B.Adkins & R.G.Harley, The General theory of AC Machines.
2. P.S.Bhimbra, Generalised theory of Electrical m/c
3. White & Woodson, Electro Mechanical Energy Conversion.
4. D. P. Kothari,B. S. Umre, "Laboratory Manual for Electrical Machines", IK International New Delhi.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering
Syllabus VIII Semester

EEA-802 (B) HVDC Transmission Systems

EEA-802 (B)	HVDC Transmission Systems	3L:0T:0P	3 credits	3Hrs/Week

Preambles:
To introduce students with the concept of HVDC Transmission system. To familiarize the students with the HVDC converters and their control system. To expose the students to the harmonics and faults occur in the system and their prevention

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

- Understand the advantages of dc transmission over ac transmission.
- Understand the operation of Line Commutated Converters and Voltage Source Converters.
- Understand the control strategies used in HVDC transmission system.
- Understand the improvement of power system stability using an HVdc system.

Unit 1:Dc Transmission Technology (6 hours)
Comparison of AC and dc Transmission (Economics, Technical Performance and Reliability). Application of DC Transmission. Types of HVdc Systems. Components of a HVdc system. Line Commutated Converter and Voltage Source Converter based systems.

Unit 2: Analysis of Line Commutated and Voltage Source Converters (10 hours)
Line Commutated Converters (LCCs): Six pulse converter, Analysis neglecting commutation overlap, harmonics, Twelve Pulse Converters. Inverter Operation. Effect of Commutation Overlap Expressions for average dc voltage, AC current and reactive power absorbed by the converters. Effect of Commutation Failure, Misfire and Current Extinction in LCC links. Voltage Source Converters (VSCs): Two and Three-level VSCs. PWM schemes: Selective Harmonic Elimination, Sinusoidal Pulse Width Modulation. Analysis of a six pulse converter. Equations in the rotating frame. Real and Reactive power control using a VSC.

Unit 3: Control of HVdc Converters: (10 hours)
Principles of Link Control in a LCCHVdc system. Control Hierarchy, Firing Angle Controls – Phase-Locked Loop, Current and Extinction Angle Control, Starting and Stopping of a Link. Higher level Controllers Power control, Frequency Control, Stability Controllers. Reactive Power Control. Principles of Link Control in a VSC HVdc system: Power flow and dc Voltage Control. Reactive Power Control/AC voltage regulation.

Unit 4: Components of HVdc systems: (6 hours)
Smoothing Reactors, Reactive Power Sources and Filters in LCC HVdc systems DC line: Corona Effects. Insulators, Transient Over-voltages. dc line faults in LCC systems. dc line faults in VSC systems. dc breakers. Monopolar Operation. Ground Electrodes.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit 5 :Stability Enhancement using HVdc Control (10 hours)

Basic Concepts: Power System Angular, Voltage and Frequency Stability. Power Modulation: basic principles – synchronous and asynchronous links. Voltage Stability Problem in AC/dc systems. MTdc Links Multi-Terminal and Multi-Infeed Systems. Series and Parallel MTdc systems using LCCs. MTdc systems using VSCs. Modern Trends in HVdcTechnology. Introduction to Modular Multi-level Converters.

References:

1. K. R. Padiyar, "HVDC Power Transmission Systems", New Age International Publishers, 2011.
2. J. Arrillaga, "High Voltage Direct Current Transmission", Peter Peregrinus Ltd., 1983.
3. E. W. Kimbark, "Direct Current Transmission", Vol.1, Wiley-Interscience, 1971.

EEA-802 (C) Advanced Electric Drives

EEA-802 (C)	**Advanced Electric Drives**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Preambles:

To give unified treatment of advance electrical drive systems with power electronic converters, including the mechanical parts, electrical machines, and power converters and control.

Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand the operation of power electronic converters and their controlstrategies.
2. Understand the vector control strategies for ac motordrives 3. Understand the implementation of the control strategies using digitalsignal processors.

Unit 1: Power Converters for AC drives (10 hours)

PWM control of inverter, selected harmonic elimination, space vector modulation, current control of VSI, three level inverter, Different topologies, SVM for 3 level inverter, Diode rectifier with boost chopper, PWM converter as line side rectifier, current fed inverters with self-commutated devices. Control of CSI, H bridge as a 4-Qdrive.

Unit 2: Induction motor drives (10 hours)

Different transformations and reference frame theory, modeling of induction machines, voltage fed inverter control-v/f control, vector control, direct torque and flux control(DTC).

Unit 3: Synchronous motor drives (6 hours)

Modeling of synchronous machines, open loop v/f control, vector control, direct torque control, CSI fed synchronous motor drives.

Unit 4: Permanent magnet motor drives (6 hours)

Introduction to various PM motors, BLDC and PMSM drive configuration, comparison, block diagrams, Speed and torque control in BLDC and PMSM.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit 5: Switched reluctance motor drives (10 hours)

Evolution of switched reluctance motors, various topologies for SRM drives, comparison, Closed loop speed and torque control of SRM. DSP based motion control (6hours) Use of DSPs in motion control, various DSPs available, realization of some basic blocks in DSP for implementation of DSP based motioncontrol.

References:

1. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Education, Asia,2003.
2. P. C. Krause, O. Wasynczuk and S. D. Sudhoff, "Analysis of Electric Machinery and Drive Systems", John Wiley & Sons,2013.
3. H. A. Taliyat and S. G. Campbell, "DSP based Electromechanical Motion Control", CRC press,2003.
4. R. Krishnan, "Permanent Magnet Synchronous and Brushless DC motor Drives", CRC Press,2009.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering
Syllabus VIII Semester

Open Core Elective-IV

EEA 803(A) Cyber Law and Ethics

EEA 803(A)	**Cyber Law and Ethics**	**3 L:0 T:0 P**	**3 credits**	**3Hrs/Week**

Preambles:
Understanding the Real Approach, Cyber Ethics, Cyber Jurisdiction, Cyber Laws of other rules.

Outcomes:
Students identify and analyze statutory, regulatory, constitutional, and organizational *laws* that affect the information technology professional.Students locate and apply case *law* and common *law* to current *legal* dilemmas in the technology field.

UNIT I History of Information Systems and its Importance, (10 hHrs)
basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles.

UNIT II Security Threats to E Commerce, (10 hHrs)
Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges

UNIT III Model of Cryptographic Systems, (6 hHrs)

Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies Network

Unit IV Security- (6 hHrs)
Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN

UNIT V Security metrics- (10 hHrs)
Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mIning Security, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of Cyber Crimes

SSUTMS School of Engineering SEHORE (M.P.)

Registrar Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

References:

1. Godbole,— Information Systems Securityl, Wille
2. Merkov, Breithaupt, — Information Securityl, Pearson Education
3. Yadav, —Foundations of Information Technologyl, New Age, Delhi 4. Schou, Shoemaker, — Information Assurance for the Enterprisel, Tata McGraw Hill
5. Sood,—Cyber Laws Simplifiedl, Mc Graw Hill
6. Furnell, —Computer Insecurityl, Springer 7. IT Act 2000

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering
Syllabus VIII Semester

EEA-803 (B) Project Management

EEA-803 (B)	Project Management	3L:0T:0P	3 credits	3Hrs/Week

Preambles:

1. To make them understand the concepts of Project Management for planning to execution of projects.
2. To make them understand the feasibility analysis in Project Management and network analysis tools for cost and time estimation.
3. To enable them to comprehend the fundamentals of Contract Administration, Costing and Budgeting.
4. Make them capable to analyze, apply and appreciate contemporary project management tools and methodologies in Indian context.

Outcomes:

On completion of this course, the students will be able to:

1. Understand project characteristics and various stages of a project.
2. Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial and Economic.
3. Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.
4. Apply the risk management plan and analyse the role of stakeholders.
5. Understand the contract management, Project Procurement, Service level Agreements and productivity.

Unit 1 Concepts of Project Management:(6Hrs) Meaning, definition and characteristics of a project, technical and socio-cultural dimensions, project life cycle phases, project planning, graphic presentation, work breakdown structure, manageable tasks, size of network, blow down NW, identity and logic dummy activity, Fulkerson rule for numbering NW, time-scaled NW

Unit-2 NW analysis (6Hrs): PERT network, mean time and variances, probability to complete PERT project in specified time, CPM network, Event Occurrence Time (EOT), activity start/ finish times, forward and reverse path calculations, concept and calculation of floats, resource allocation and critical-chain.

Unit-3 Project Duration And Control (10Hrs): Importance and options to accelerate project completion, timecost tradeoff, fixed variable and total costs, use of floats and cost optimization, project performance measures, project monitoring info and reports, project control process, Gant chart and control chart, cost-schedule S-graph, planned cost of work schedule (PV), budgeted/ earned cost of work completed (EV) and actual cost of work completed (AC), schedule and cost variances (SV, CV) forecasting final project costs.

Unit-4 Project Organization, Culture And Leadership(10Hrs): Projects within functional organization, dedicated project/ task-force teams, staff, matrix and network organization, choosing appropriate project organization, Organization culture, ten characteristics, cultural dimensions supportive to projects, social network and management by wandering around (MBWA), different traits of a manager and leader, managing

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

project teams, five stage team development model, shared vision, conflicts, rewards, rejuvenating project teams, project stakeholders, concept of project partnering.

Unit-5 Strategic Planning and Project Appraisal(10Hrs): Capital allocation key criteria, Porters competitive strategy model, BCG matrix, Strategic Position Action Evaluation (SPACE), time value of money, cash flows, payback period, IRR, cost of capital, NPV, social cost benefit analysis, UNIDO approach, project risks and financing.

References:

1. Prasana Chandra: Projects: planning Implementation control, TMH.
2. Gray Clifford F And Larson EW, Project The managerial Process, TMH
3. Panneerselven and Serthil kumar, Project management, PHI
4. Burke , Project Management-Planning and control technics, Wiley India
5. Kamaraju R, Essentials of Project Management, PHI Learning
6. Jack R. Meredith, Project Management: a managerial approach, Wiley.
7. Choudhary ,Project Management, TMH
8. Srinath LS, PERT And CPM Principles and Appl, East West Press
9. Richman L, Project Management: Step By Step, PHI Learning

SSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering
Syllabus VIII Semester

EEA-803 (C) Big data Analysis

EEA-803 (C)	Big data Analysis	3L:0T:0P	3 credits	3Hrs/Week

Preambles :

- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop
- Provide HDFS Concepts and Interfacing with HDFS
- Understand Map Reduce Jobs
- Provide hands on Hodoop Eco System
- Apply analytics on Structured, Unstructured Data.
- Exposure to Data Analytics with R.

Outcomes:

The students will be able to:

- Identify Big Data and its Business Implications.
- List the components of Hadoop and Hadoop Eco-System
- Access and Process Data on Distributed File System
- Manage Job Execution in Hadoop Environment
- Develop Big Data Solutions using Hadoop Eco System
- Analyze Infosphere BigInsights Big Data Recommendations.

UNIT I : Introduction To Big Data And Hadoop (8 Hrs)

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

UNIT II : HDFS (Hadoop Distributed File System) (4 Hrs)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III :Map Anatomy (10 Hrs)

Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Unit IV : Hadoop Eco System Pig (10 Hrs)

: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction

UNIT V : Data Analytics with R Machine Learning : (10 Hrs)

Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

References:

1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
3. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
4. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
5. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
6. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
7. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012. • Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
8. Pete Warden, "Big Data Glossary", O'Reily, 2011.
9. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
10. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012
11. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
SCHOOL OF ENGINEERING
Outcome Based Curriculum for
Undergraduate Degree Courses in Engineering & Technology
Department of Electrical Engineering
Syllabus VIII Semester

EEA 804 Project Stage-II

EEA 804	Project Stage-II	0L:0T:8P	8 credits	16Hrs/Week

Preambles:

The object of Project Stage-II is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work.

Outcomes:

At the end of this course students will demonstrate the ability to

- Design and validate real life industrial based projects
- Analyze the dynamic response and the calibration of few instruments
- Learn about various measurement devices, their characteristics, their operation and theirlimitations
- understand statistical data analysis
- Understand computerized data acquisition.
- Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
- Design, implement and test the prototype/algorithm in order to solve the conceived problem.
- Able to write comprehensive report on major project work.

Under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared under EEP1;
2. Review and finalization of the Approach to the Problem relating to the assigned topic;
3. Preparing an Action Plan for conducting the investigation, including team work;
4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed;
5. Final development of product/process, testing, results, conclusions and future directions;
6. Preparing a paper for Conference presentation/Publication in Journals, if possible;
7. Preparing a Dissertation in the standard format for being evaluated by the Department.
8. Final Seminar Presentation before a Departmental Committee.

Registrar
Sri Satya Sai University of Technology & Medical Sciences

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination

Third Semester –M.Tech. (Power Electronics)

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P.		End Sem. Exam.	Tests (Two)	Assignments/ Quiz	End Sem. Practical / Viva	Practical Record/ assignment/Quiz/Presentation	
1.	MEPE-301	Elective- I	3	1	-	4	70	20	10	-	-	100
2.	MEPE-302	Elective- II	3	1	-	4	70	20	10	-	-	100
3.	MEPE-303	Seminar			4	4				-	100	100
4.	MEPE-304	Dissertation Part I			8	8				120	80	200
		Total	6	2	12	20	140	40	20	120	180	500

L: Lecture- **T: Tutorial-** **P: Practical**

w.e.f. July- 2018

Elective-I (MEPE- 301)

MEPE-301 (A) Power Electronic Converters
MEPE-301 (B) Micro-Controllers Based Power Electronics
MEPE-301 (C) Artificial Intelligence & Machine Learning

Elective-II (MEPE - 302)

MEPE-302 (A) EHV AC and DC transmission
MEPE-302 (B) Energy Efficient Electrical systems
MEPE-302 (C) Economics of Regulation and Restructuring of Energy Industries

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)

Artificial Intelligence & Machine Learning
MEPS/MEPE – 301(C)

Unit I Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Unit II Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search, A* search Game Playing: Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

Unit III Introduction: Introduction to Machine Learning: Introduction. Different types of learning, Hypothesis space and inductive bias, Evaluation. Training and test sets, cross validation, Concept of over fitting, under fitting, Bias and Variance.
Linear Regression: Introduction, Linear regression, Simple and Multiple Linear regression, Polynomial regression, evaluating regression fit.

Unit IV Decision tree learning: Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning, Python exercise on Decision Tree.

Unit V Instance based Learning: K nearest neighbor, the Curse of Dimensionality, Feature Selection: forward search, backward search, univariate , multivariate feature selection approach, Feature reduction (Principal Component Analysis) , Python exercise on kNN and PCA.
Recommender System: Content based system, Collaborative filtering based.

References:

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2. Alpaydin, Ethem. Introduction to machine learning. MIT press, 2020.
3. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education.
4. Artificial Intelligence, Kevin Knight, Elaine Rich, B. Shivashankar Nair, 3rd Edition,2008
5. Artificial Neural Networks B. Yagna Narayana, PHI.
6. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight (TMH).

SSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

wef 2018-19

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)

Economics of Regulation and Restructuring of Energy Industries

MEPS/MEPE – 302(C)

Course Preamble:

- To impart knowledge on the energy sector restructuring, policy and regulatory aspects.
- To provide understanding of regulatory and legal framework for network industries.

Course Outcomes:

Learning of Economic Reforms and Sectoral Restructuring, Public policy for operation, development and management of Power Systems

Unit 1 : Economic Reforms and Sectoral Restructuring: Rationale and Mechanisms of the Economic Reform Process, Liberalization, Privatization, and Globalization, Restructuring of Infrastructure Sectors. Public Policy and Governance: Good Governance, Social Development and Social Accountability. Post-Reform Policy-Making and Governance in Monopoly Sectors: Restructuring, New Independent Regulatory Agencies and other Governance Arrangements, New Policies in these Sectors.

Unit 2 : Public policy for operation, development and management of Power Systems: Hydro Policy, Wind Policy, Solar Energy Policy, Distributed Generation Policy, Renewable generation policy. Public policy options in the International Perspective.

Unit 3 : Environment: The policy debate, Regulation and incentive for restricting emissions and other impacts, Other policy tools for environmental enhancement, Fuel labelling and power content labelling, Valuation of environmental factors. Electricity generation and climate change agreements, Environmental acts, PAT, Carbon Credits. Energy conservation, audit and accounting: Energy Conservation, Energy Accounting, Energy Auditing. Aims and approaches of auditing, types of energy audit, energy indices in residential, commercial and industrial sector.

Unit 4 : Regulation of network industries: Liberalization, competition, regulation, the role of regulators, regulator/market/user interaction in network industries; interconnection and costing of network services. Electricity regulation: Introduction, Rate-of-return regulation, price cap regulation, revenue cap regulation, Revenue Reconciliation, Performance based ratemaking, Rate structure. Power system regulation in India: Stakeholders in the power sector, Role of regulation and evolution of regulatory commissions in India, Types and methods of economic regulation, Regulatory process in India. Non price issues in electricity regulation: Quality of supply and service, Standards of performance by utility, Environmental and social considerations.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Shri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

wef 2018-19

Unit 5 : Legal framework for power sector in India: Historical development and existing acts, regulations, laws pertaining to operation, management, and development of electrical power systems, Salient features of Electricity act 2003, Various guidelines and developments under this act.

References:

- Loi Lei Lai, "Power System Restructuring and Deregulation", John Wiley & Sons Ltd.
- Ross R. McKitrick , "Economic evaluation of Environmental policies".
- Pieter Glasbergen, "Environmental Policy in an international Context: Perspectives" The Open University.
- Draft National Energy policy, NITI Aayog, Govt of India. Avail: http://niti.gov.in/writereaddata/files/new_initiatives/NEP-ID_27.06.2017.pdf
- The Electricity Act 2003, Govt of India. Avai: http://www.cercind.gov.in/Act-withamendment.pdf.
- Energy Conservation Act 2001, Govt of India. Avail: http://powermin.nic.in/sites/default/files/uploads/ecact2001.pdf.
- Y. P. Abbi, et al, "Hand Book on Energy Audit and Environment Management", TERI.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

(M.Tech Power Electronics)

Minutes of Board of Studies Committee Meeting Dated : 05.6.2018

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 05.6.2018. Following members were present.

1. Prof. Sourav Namdev
2. Mr. Ajay Kumar
3. Mr. Nupur Jejurikar
4. Ms. Alka Thakur
5. Ms. Nidhi Sharma
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of PE-3rd semester Scheme and Syllabus **(Power Electronics)**

Discussion (If any) : The following points were discussed in length.:

1. The **Internal members** of the Committee suggested that the Scheme and Syllabus should be prepared as per current demand in industry and academics.
2. The **External members (Academic Expert)** suggested for **Artificial Intelligence & Machine** Learning based subjects should be added as an elective.
3. The **External members (Industry Expert)** suggested for **energy economics** based **subjects** should be added as an elective.

Resolution of the Discussion:

On the basis of discussion the following amendments were made:

1. Scheme and Syllabus was prepared as per current demand in industries.
2. The **Artificial Intelligence & Machine Learning and Economics of Regulation and Restructuring of Energy Industries** have been added as an elective Subjects.

Final Resolution of the Discussion:

SSSUTMS ★ SEHORE (M.P.) School of Engineering

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

With the above amendments the Scheme and Syllabus was approved for forthcoming 3rd semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Prof. Sourav Namdev
2. Mr. Ajay Kumar
3. Mr. Nupur Jejurikar
4. Ms. Alka Thakur
5. Ms. Nidhi Sharma
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

(M.Tech Electrical Power System)

Minutes of Board of Studies Committee Meeting Dated : 05.6.2018

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 05.6.2018. Following members were present.

1. Prof. Sourav Namdev
2. Mr. Ajay Kumar
3. Mr. Nupur Jejurikar
4. Ms. Alka Thakur
5. Ms. Nidhi Sharma
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EPS-3rd semester Scheme and Syllabus **(Electrical Power System)**

Discussion (If any) : The following points were discussed in length.:

1. The **Internal members** of the Committee suggested that the Scheme and Syllabus should be prepared as per current demand in industry and academics.
2. The **External members (Academic Expert)** suggested for **Artificial Intelligence & Machine Learning** based **subjects** should be added as an elective.
3. The **External members (Industry Expert)** suggested for **energy economics** based **subjects** should be added as an elective.

Resolution of the Discussion:

On the basis of discussion the following amendments were made:

1. Scheme and Syllabus was prepared as per current demand in industries.
2. The **Artificial Intelligence & Machine Learning** and **Economics of Regulation and** Restructuring of Energy Industries have been added as elective Subjects.

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Final Resolution of the Discussion:

With the above amendments the Scheme and Syllabus was approved for forthcoming 3rd semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Prof. Sourav Namdev
2. Mr. Ajay Kumar
3. Mr. Nupur Jejurikar
4. Ms. Alka Thakur
5. Ms. Nidhi Sharma
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

SSTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination

Third Semester –M.Tech. (Electrical Power System)

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assignments/ Quiz	End Sem. Practical / Viva	Practical Record/ assignment/Quiz/ Presentation	
1.	MEPS-301	Elective 1	3	1	-	4	70	20	10	-	-	100
2.	MEPS-302	Elective 2	3	1	-	4	70	20	10	-	-	100
3.	MEPS-303	Seminar			4	4				-	100	100
4.	MEPS-304	Dissertation Part I			8	8				120	80	200
		Total	6	2	12	20	140	40	20	120	180	500

L: Lecture- T: Tutorial- P: Practical

MEPS – 301(A) Power Controller,
MEPS – 301(B) Special Machines
MEPS – 301(C) Artificial Intelligence & Machine Learning

MEPS – 302(A) Power System Instrumentation
MEPS – 302(B) Advanced Electrical Drives
MEPS – 302(C) Economics of Regulation and Restructuring of Energy Industries

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

w.e.f 2018

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)

Artificial Intelligence & Machine Learning
MEPS/MEPE – 301(C)

Unit I **Introduction:** AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Unit II Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search, A* search Game Playing: Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

Unit III Introduction: Introduction to Machine Learning: Introduction. Different types of learning, Hypothesis space and inductive bias, Evaluation. Training and test sets, cross validation, Concept of over fitting, under fitting, Bias and Variance.
Linear Regression: Introduction, Linear regression, Simple and Multiple Linear regression, Polynomial regression, evaluating regression fit.

Unit IV Decision tree learning: Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning, Python exercise on Decision Tree.

Unit V Instance based Learning: K nearest neighbor, the Curse of Dimensionality, Feature Selection: forward search, backward search, univariate , multivariate feature selection approach, Feature reduction (Principal Component Analysis) , Python exercise on kNN and PCA.
Recommender System: Content based system, Collaborative filtering based.

References:

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2. Alpaydin, Ethem. Introduction to machine learning. MIT press, 2020.
3. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education.
4. Artificial Intelligence, Kevin Knight, Elaine Rich, B. Shivashankar Nair, 3rd Edition,2008
5. Artificial Neural Networks B. Yagna Narayana, PHI.
6. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight (TMH).

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

wef 2018-19

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)

Economics of Regulation and Restructuring of Energy Industries

MEPS/MEPE – 302(C)

Course Preamble:

- To impart knowledge on the energy sector restructuring, policy and regulatory aspects.
- To provide understanding of regulatory and legal framework for network industries.

Course Outcomes:

Learning of Economic Reforms and Sectoral Restructuring, Public policy for operation, development and management of Power Systems

Unit 1 : Economic Reforms and Sectoral Restructuring: Rationale and Mechanisms of the Economic Reform Process, Liberalization, Privatization, and Globalization, Restructuring of Infrastructure Sectors. Public Policy and Governance: Good Governance, Social Development and Social Accountability. Post-Reform Policy-Making and Governance in Monopoly Sectors: Restructuring, New Independent Regulatory Agencies and other Governance Arrangements, New Policies in these Sectors.

Unit 2 : Public policy for operation, development and management of Power Systems: Hydro Policy, Wind Policy, Solar Energy Policy, Distributed Generation Policy, Renewable generation policy. Public policy options in the International Perspective.

Unit 3 : Environment: The policy debate, Regulation and incentive for restricting emissions and other impacts, Other policy tools for environmental enhancement, Fuel labelling and power content labelling, Valuation of environmental factors. Electricity generation and climate change agreements, Environmental acts, PAT, Carbon Credits. Energy conservation, audit and accounting: Energy Conservation, Energy Accounting, Energy Auditing. Aims and approaches of auditing, types of energy audit, energy indices in residential, commercial and industrial sector.

Unit 4 : Regulation of network industries: Liberalization, competition, regulation, the role of regulators, regulator/market/user interaction in network industries; interconnection and costing of network services. Electricity regulation: Introduction, Rate-of-return regulation, price cap regulation, revenue cap regulation, Revenue Reconciliation, Performance based ratemaking, Rate structure. Power system regulation in India: Stakeholders in the power sector, Role of regulation and evolution of regulatory commissions in India, Types and methods of economic regulation, Regulatory process in India. Non price issues in electricity regulation: Quality of supply and service, Standards of performance by utility, Environmental and social considerations.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

wef 2018-19

Unit 5 : Legal framework for power sector in India: Historical development and existing acts, regulations, laws pertaining to operation, management, and development of electrical power systems, Salient features of Electricity act 2003, Various guidelines and developments under this act.

References:

- Loi Lei Lai, "Power System Restructuring and Deregulation", John Wiley & Sons Ltd.
- Ross R. McKitrick , "Economic evaluation of Environmental policies".
- Pieter Glasbergen, "Environmental Policy in an international Context: Perspectives" The Open University.
- Draft National Energy policy, NITI Aayog, Govt of India. Avail: http://niti.gov.in/writereaddata/files/new_initiatives/NEP-ID_27.06.2017.pdf
- The Electricity Act 2003, Govt of India. Avai: http://www.cercind.gov.in/Act-withamendment.pdf.
- Energy Conservation Act 2001, Govt of India. Avail: http://powermin.nic.in/sites/default/files/uploads/ecact2001.pdf.
- Y. P. Abbi, et al, "Hand Book on Energy Audit and Environment Management", TERI.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

(M.Tech Electrical Power System)

Minutes of Board of Studies Committee Meeting Dated : 05.6.2019

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 03.6.2019. Following members were present.

1. Prof. Prof. Sourav Namdev
2. Mr. Ajay Kumar
3. Mr. Nupur Jejurikar
4. Ms. Alka Thakur
5. Ms. Nidhi Sharma
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of EPS-3rd semester Scheme and Syllabus **(Electrical Power System)**

Discussion (If any) : The following points were discussed in length.:

1. The **Internal members** of the Committee suggested that the Scheme and Syllabus should be prepared as per current demand in industry and academics.
2. The **External members (Academic Expert)** suggested for inter branch based subjects should be added as an elective.
3. The **External members (Industry Expert)** suggested for Grid Technologies based subjects should be added as an elective.

Resolution of the Discussion:

On the basis of discussion the following amendments were made:

1. Scheme and Syllabus was prepared as per current demand in industries.
2. The **Smart Grid Technologies** and **DSP & its Applications** have been added as elective Subjects.

Final Resolution of the Discussion:

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M. P.)

With the above amendments the Scheme and Syllabus was approved for forthcoming 3rd semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Prof.. Sourav Namdev
2. Mr. Ajay Kumar
3. Mr. Nupur Jejurikar
4. Ms. Alka Thakur
5. Ms. Nidhi Sharma
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

SSSUTMS School of Engineering ★ SEHORE (M.P.)

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination

Third Semester –M.Tech. (Electrical Power System)

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assignments/ Quiz	End Sem. Practical / Viva	Practical Record/ assignment/Quiz/ Presentation	
1.	MEPS-301	Elective 1	3	1	-	4	70	20	10	-	-	100
2.	MEPS-302	Elective 2	3	1	-	4	70	20	10	-	-	100
3.	MEPS-303	Seminar			4	4				-	100	100
4.	MEPS-304	Dissertation Part I			8	8				120	80	200
		Total	6	2	12	20	140	40	20	120	180	500

w.e.f 2019

L: Lecture- T: Tutorial- P: Practical

MEPS – 301(A) Power Controller,
MEPS – 301(B) Special Machines
MEPS – 301(C) Artificial Intelligence & Machine Learning
MEPS- 301 (D) Smart Grid Technologies

MEPS – 302(A) Power System Instrumentation
MEPS – 302(B) Advanced Electrical Drives
MEPS – 302(C) Economics of Regulation and Restructuring of Energy Industries
MEPS-302 (D) DSP & its Applications

Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

SSSUTMS School of Engineering SEHORE (M.P.)

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)

Smart Grid Technologies
MEPS/MEPE- 301 (D)

Course Preamble: To enable students to learn the need for smart greed for power quality and monitoring.

Course Outcomes: After undergoing the course, the students would get acquainted with the smart technologies, smart meters and power quality issues in smart grids.

Unit 1 Evolution of Electric Grid: Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives.

Unit 2 Smart energy resources, Smart substations, Wide area monitoring, Protection and control,

Phasor Measurement Unit (PMU),

Unit 3 Intelligent Electronic Devices(IED) Intelligent Electronic Devices(IED) & their application for monitoring & protection Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration, Outage management, Phase Shifting Transformers.

Unit 4 Hybrid Electric Vehicles :Plug in Hybrid Electric Vehicles (PHEV). Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid.

Unit 5: Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, IP based Protocols, Cyber Security for Smart Grid.

Reference Books :

1. StuartBorlase, 'SmartGrid:Infrastructure,Technologyand Solutions', CRC Press 2012.
2. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, 'Smart Grid: Technology and Applications',Wiley, 2012.
3. Vehbi C. Güngör, DilanSahin, TaskinKocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, 'Smart Grid Technologies: Communication Technologies and Standards' IEEE Transactions On Industrial Informatics,Vol. 7, No.4, November 2011.
4. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang 'Smart Grid – The New and Improved Power Grid: A Survey', IEEE Transaction on Smart Grids, 2011.

School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

wef 2019-20

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)

DSP & its Applications

MEPS/MEPE-302 (D)

Unit 1 Architectural Overview: Architectural Overview & Central Processing Unit, Memory map, CPU Architecture of TMS320F2812, Details of CPU Registers & Accumulator,

Unit 2 Introduction to Interrupts : Introduction to Interrupts of TMS320F2812, Emulation Logic, CPU Interrupts Overview, CPU Interrupt Vectors and Priorities, Maskable Interrupts, Nonmaskable Interrupts,

Unit 3 Pipeline: Pipelining of Instructions, Instruction-Fetch Mechanism, Address Counters FC, IC, and PC, Pipeline Protection, Avoiding Unprotected Operations, Addressing Modes: Types of Addressing Modes, details of various

Unit 4 Addressing Modes : Alignment of 32-Bit Operations. Assembly Language Instructions and emulation: Instruction Set Summary (Organized by Function), Register Operations, Overview of Emulation Features, Debug Interface.

Unit 5 Applications of DSP for Power Electronics & Drives Control.

Reference Books:

1. W.D.Stanley, Digital Signal Processing
2. Ashok Ambardar, Analog & Digital Signal Processing
3. S. Mitra, Digital Signal Processing, 3rd, McGraw hill education, 2007
4. Reference manual from Texas Instruments
5. www.ti.com

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

wef 2019-20

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electrical Engineering

(M.Tech Power Electronics)

Minutes of Board of Studies Committee Meeting Dated : 05.6.2019

The Board of Studies Committee Meeting was held in the room of HOD (EE) at 1:30 PM on 05.6.2019. Following members were present.

1. Prof. Sourav Namdev
2. Mr. Ajay Kumar
3. Mr. Nupur Jejurikar
4. Ms. Alka Thakur
5. Ms. Nidhi Sharma
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of PE-3rd semester Scheme and Syllabus **(Power Electronics)**

Discussion (If any) : The following points were discussed in length.:

1. The **Internal members** of the Committee suggested that the Scheme and Syllabus should be prepared as per current demand in industry and academics.
2. The **External members (Academic Expert)** suggested for inter branch based **subjects** should be added as an elective.
3. The **External members (Industry Expert)** suggested for Grid Technologies based **subjects** should be added as an elective.

Resolution of the Discussion:

On the basis of discussion the following amendments were made:

1. Scheme and Syllabus was prepared as per current demand in industries.
2. The **Smart Grid Technologies** and **DSP & its Applications** have been added as elective Subjects.

Final Resolution of the Discussion:

SSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

With the above amendments the Scheme and Syllabus was approved for forthcoming 3rd semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Prof. Sourav Namdev
2. Mr. Ajay Kumar
3. Mr. Nupur Jejurikar
4. Ms. Alka Thakur
5. Ms. Nidhi Sharma
6. Dr. N.P. Patidar (External Academic Expert)
7. Mr. Amit Raje (External Industry Expert)

SSUTMS School of Engineering SEHORE (M.P.)

Registrar
Shri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination

Third Semester –M.Tech. (Power Electronics)

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assignments/ Quiz	End Sem. Practical / Viva	Practical Record/ assignment/Quiz/Presentation	
1.	MEPE-301	Elective- I	3	1	-	4	70	20	10	-	-	100
2.	MEPE-302	Elective- II	3	1	-	4	70	20	10	-	-	100
3.	MEPE-303	Seminar			4	4				-	100	100
4.	MEPE-304	Dissertation Part I			8	8				120	80	200
		Total	6	2	12	20	140	40	20	120	180	500

L: Lecture- **T: Tutorial-** **P: Practical**

w.e.f. July- 2019

Elective-I (MEPE- 301)

MEPE-301 (A) Power Electronic Converters
MEPE-301 (B) Micro-Controllers Based Power Electronics
MEPE-301 (C) Artificial Intelligence & Machine Learning
MEPE-301 (D) Smart Grid Technologies

Elective-II (MEPE - 302)

MEPE-302 (A) EHV AC and DC transmission
MEPE-302 (B) Energy Efficient Electrical systems
MEPE-302 (C) Economics of Regulation and Restructuring of Energy Industries
MEPE-302 (D) DSP & its Applications

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)

Smart Grid Technologies
MEPS/MEPE- 301 (D)

Course Preamble: To enable students to learn the need for smart greed for power quality and monitoring.

Course Outcomes: After undergoing the course, the students would get acquainted with the smart technologies, smart meters and power quality issues in smart grids.

Unit 1 Evolution of Electric Grid: Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives.

Unit 2 Smart energy resources, Smart substations, Wide area monitoring, Protection and control,

Phasor Measurement Unit (PMU),

Unit 3 Intelligent Electronic Devices(IED) Intelligent Electronic Devices(IED) & their application for monitoring & protection Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration, Outage management, Phase Shifting Transformers.

Unit 4 **Hybrid Electric Vehicles** :Plug in Hybrid Electric Vehicles (PHEV). Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid.

Unit 5: Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, IP based Protocols, Cyber Security for Smart Grid.

Reference Books :

1. StuartBorlase, 'SmartGrid:Infrastructure,Technologyand Solutions', CRC Press 2012.
2. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, 'Smart Grid: Technology and Applications',Wiley, 2012.
3. Vehbi C. Güngör, DilanSahin, TaskinKocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, 'Smart Grid Technologies: Communication Technologies and Standards' IEEE Transactions On Industrial Informatics,Vol. 7, No.4, November 2011.
4. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang 'Smart Grid – The New and Improved Power Grid: A Survey', IEEE Transaction on Smart Grids, 2011.

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

wef 2019-20

Sri Satya Sai University of Technology and Medical Sciences, Sehore(M.P.)

DSP & its Applications

MEPS/MEPE-302 (D)

Unit 1 Architectural Overview: Architectural Overview & Central Processing Unit, Memory map, CPU Architecture of TMS320F2812, Details of CPU Registers & Accumulator,

Unit 2 Introduction to Interrupts : Introduction to Interrupts of TMS320F2812, Emulation Logic, CPU Interrupts Overview, CPU Interrupt Vectors and Priorities, Maskable Interrupts, Nonmaskable Interrupts,

Unit 3 **Pipeline:** Pipelining of Instructions, Instruction-Fetch Mechanism, Address Counters FC, IC, and PC, Pipeline Protection, Avoiding Unprotected Operations, Addressing Modes: Types of Addressing Modes, details of various

Unit 4 Addressing Modes : Alignment of 32-Bit Operations. Assembly Language Instructions and emulation: Instruction Set Summary (Organized by Function), Register Operations, Overview of Emulation Features, Debug Interface.

Unit 5 Applications of DSP for Power Electronics & Drives Control.

Reference Books:

1. W.D.Stanley, Digital Signal Processing
2. Ashok Ambardar, Analog & Digital Signal Processing
3. S. Mitra, Digital Signal Processing, 3rd, McGraw hill education, 2007
4. Reference manual from Texas Instruments
5. www.ti.com

SSSUTMS School of Engineering SEHORE (M.P.)

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

wef 2019-20