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SRI SATYA SAI UNIVERSITY
OF TECHNOLOGY AND MEDICAL SCIENCES

SYLLABUS REVISION

Name of School-School of Engineering

Department/Program-Electronics and Communication Engineering/(BE & M.Tech)

2017-18 TO 2021-22

www.sssutms.co.in

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

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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
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(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electronics and Communication Engineering

Minutes of Board of Studies Committee Meeting Dated : 03.06.2017

The Board of Studies Committee Meeting was held in the room of HOD (EC) at 10:30 AM 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)

EMPLOYABILITY

ENTREPRENEURSHIP

SKILL DEVELOPMENT

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 EC-3 rd and 4 th 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 3 rd and 4 th 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)

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

SSSUTMS SEHORE (M.P.)

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

Scheme of Examination - CBCS Pattern(For B.E-2016 Batch)

Academic Year 2017– 2018

Branch : Electronics and Communications 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	ECC - 401	Linear Integrated Circuits	60	30	10	30	20	2	1	2	4	150
2	ECC - 402	Microprocessors and Microcontrollers	60	30	10	30	20	2	1	2	4	150
3	ECC - 403	Communication Networks and Transmission Lines	60	30	10	30	20	2	1	2	4	150
4	ECC - 404	Analog Communication	60	30	10	30	20	2	1	2	4	150
5	ECC - 405	Electromagnetic Theory	60	30	10	-	-	2	1	-	3	100
6	ECC - 406	Data Structure	60	30	10	30	20	2	1	2	4	150
TOTAL			**360**	**180**	**60**	**150**	**100**	**12**	**6**	**10**	**23**	**850**

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Scheme of Examination - CBCS Pattern

Academic Year 2017– 2018

Branch : Electronics and Communications 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 Techniqucs	60	30	10	-	-	2	1	-	3	100
2	ECC - 302	Electronics Devices & Circuits	60	30	10	30	20	2	1	2	4	150
3	ECC - 303	Digital Circuits	60	30	10	30	20	2	1	2	4	150
4	ECC - 304	Network Analysis and Synthesis	60	30	10	30	20	2	1	2	4	150
5	ECC - 305	Signals and Systems	60	30	10	30	20	2	1	2	4	150
6	ECC - 306	Instrumentation and Control	60	30	10	30	20	2	1	2	4	150
TOTAL			**360**	**180**	**60**	**150**	**100**	**12**	**6**	**10**	**23**	**850**

w.e.f. July 2017

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.,

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ECC-302
Electronic Devices And Circuits

Unit I : Types of Semiconductors :-Intrinsic and Extrinsic, p-type and n-type, energy band diagrams, majority and minority carriers, 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.

Unit II : Types of Semiconductor Diode: 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 cirucuit, Tunnel diode.

Unit III: Applications of Diode : P-N junction diode as rectifier, clipper and clamper ,The Load line concept, The Pieces wise linear diode modal, Clipping circuits, Clipping at two independent levels, Comparators, Sampling Gate, Rectifiers, Other full wave circuits, Capacitor filter additional diode circuits.

Unit IV : Bipolar Junction Transistor - Construction, basic operation, current components and equations,. CB,CE and 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 junctionTransistor (UJT) : Principle of operation, characteristics.

Unit V : FET construction- Construction, n channel and p channel, characteristics, parameters, Equivalent model and voltage gain, Enhancement and depletion MOSFET and 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 Experiment's:

1. V-I characteristics of various Diodes (p-n, Zener, Varactor, Schottky, Tunnel, Photodiode etc)
2. Characteristics of Transistors (BJT and FET)
3 Applications of diodes and Design of various clipping and clamping circuits
4 Design 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.

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ECC-303

Digital Circuits

Unit-I :Number Systems and codes: 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, DeMorgan's 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, .Decoders, Encoders, multiplexers and de-multiplexer

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, RAM,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

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. Multiplexers/Demultiplexer based Boolean function realization.

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ECC-304

Network Analysis and Synthesis

Unit I : Network Theory : Circuit Theory Concepts – Mesh and Node Analysis; Network Star – Delta Transformation. Steady State Analysis of AC Circuits- Sinusoidal and Phasor Representation of Voltage and Current, Single Phase AC circuit behavior of R, L & C, Combination of R, L & C in series and parallel. Network Topology : Graph of a Network, definitions, tree, co tree, link, basic loop and basic cut set.

Unit II : Network Theorems (Applications to ac networks): Super-position theorem, Thevenin's theorem,Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

Unit III: 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 network.

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 admittance functions using Foster and Cauer first and second forms.

References:

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

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.

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ECC-305
Signals and System

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 and Eigen functions, discrete convolution, properties of discrete and continuous LTI systems ,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: definition, 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, solving eq. using Z transform.

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 ,FFT.Sampling: Sampling theorem, ideal & real sampling, reconstruction of signal from its samples.

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.
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ECC-306

Instrumentation and Control

Unit I : Philosophy of Measurement- Methods of measurement, Measurement system, Classification of instrument systems, Characteristics of instruments & measurement systems, Errors in measurement & its analysis, Standards. Analog Measurement of Electrical Quantities- Electrodynamics, Thermocouple.

Unit II Instrument Transformers: CT and PT; their errors, Applications of CT and PT in the extension ofinstrument range, Introduction to 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.

Unit IV Introduction to Control System and Their 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.

Unit V 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.

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. Ogata K, "Modern Control Engineering ", Prentice Hall
5. KUO B.C, "Automatic Control System", Prentice Hall
6. Nagarath & Gopal," Control System Engineering," Wiley Eastern
7. Bakshi & Goyal. Feedback control system, Technical publication.

Experiment's:

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

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ECC-401 Linear Integrated Circuits

UNIT-I: Introduction to Operational Amplifiers and Characteristics
Introduction, Block diagram, characteristics and equivalent circuits of an ideal op-amp, various types of Operational Amplifiers and their applications, Power supply configurations for OPAMP applications, inverting and non-inverting amplifier configurations.

UNIT-II: The Practical op-amp
Introduction, Input offset voltage, offset current, thermal drift,Effect of variation in power supply voltage, common-mode rejection ratio, Slew rate and its Effect, PSRR and gain –bandwidth product.

UNIT-III: Amplifiers and Oscillators
Summing amplifier, Integrators and differentiators, Instrumentation amplifier, Differential input and differential output amplifier, Voltage-series feedback amplifier, Voltage-shunt feedback amplifier, Log/ Antilog amplifier, Triangular/rectangular wave generator, phase-shift oscillators.

UNIT-IV: Active Filters
Characteristics of filters, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter characteristics, Band reject filters.

UNIT-V: Comparators and Converters:
Comparator, Zero Crossing Detector, Monostable and Astable Multivibrator ,Schmitt Trigger, Voltage limiters, Clipper and clampers, Precision rectifiers, Voltage-to-current converter, Current-to-voltage converter.

UNIT-VI: Advanced applications
Applications as Frequency Divider, PLL, using op-AMP and analog multipliers,Amplitude modulation using analog multiplier, Frequency Shift Keying, simple OP-AMP
Voltage regulator.

List of Experiments
Tools Required –Function Generator, Power Supply,
Oscilloscopes, Connecting wires.
1. Study the characteristics of negative feedback amplifier
2. Design of an instrumentation amplifier.
3. Study the characteristics of regenerative feedback system with extension to design an astable multivibrator.
4. Study the characteristics of integrator circuit.
5. Design of Analog filters – I.
6. Design of Analog filters – II.

ECC- 402- Microprocessor 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.

References:

Hall Douglas V.,Microprocessor and interfacing, Revised second edition 2006, Macmillan, McGraw Hill .

A.K. Ray &K.M.Bhurchandi, Advanced Microprocessors and peripherals- Architecture, Programming and Interfacing, Tata McGraw – Hill, 2009 TMH reprint.

Kenneth J. Ayala, The 8086 microprocessor: programming and interfacing the PC, Indian - edition, CENGAGE Learning.

Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson education, 2005.

Kenneth J. Ayala, The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.

Microprocessor Architecture, Programming and Applications with the 8085 6/e October 2013, Ramesh Gaonkar.

List of Experiment(Extendable):

To study 8085 based microprocessor system.

To study 8086 based microprocessor system.

Write an Assembly Language Program to add two 16 bit numbers.

Write an Assembly Language Program to subtract two 16 bit numbers.

To perform multiplication/division of given numbers.

To perform computation of square root of a given number.

To obtain interfacing of RAM chip to 8085/8086 based system

To develop and run a program for finding out the largest/smallest number from a given set ofnumbers.

ECC-403 Communication Network and Transmission Lines

Unit – I

Characteristic Parameters of symmetrical and asymmetrical two port networks and their design: image impedance, iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient ,iterative transfer coefficient, Lattice and Bridged-T networks, reactive matching networks, matching techniques, Insertion Loss, symmetrical and asymmetrical attenuators and their design.

Unit – II

Passive LC Filters: Analysis and design of Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, Filter specifications, Butterworth approximation, Chebyshev approximation, elliptic function approximation, frequency transformation.

Unit – III

Positive real function, LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune' s method, Bott-Duffin method, Synthesis-Coefficient.

Unit – IV

Transmission line fundamentals: Lumped parameter equivalent, voltage and current on a transmission line, infinite line, characteristic impedance and propagation constant, waveform distortion, attenuation and phase equalizers,distortion-less line, loading, liner reflection on a line, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection loss, insertion loss, T and equivalents of a line, location of line fault.Construction and design of two wire line and coaxial cable.

Unit – V

Line at radio frequencies, parameters of line and coaxial cable at radio frequencies, dissipation-less line, voltage and current on a dissipation-less line, standing waves, standing wave ratio, input impedance of open circuit and short circuit, power and impedance measurement on lines, eighth-wave, quarter-wave and half wave line, circle diagram, Smith chart, solution of problems using Smith chart, single and double stub matching .introduction to micro-strip lines and its analysis.

References:

1. J.D. Ryder: Networks and Transmission Lines, 2nd edition, PHI
2. M.E. Valkenberg: Introduction to Modern Network synthesis, Wiley Eastern Ltd.
3. G.K. Mithal: Network Analysis, Khanna Publishers.
4. Umesh Sinha: Networks and Transmission Lines, Satya Prakashan.
5. Suresh: Electric Circuits and Networks, Pearson Education.

List of Experiments:

Following illustrative practical should be simulated with the help of any RF simulation software e.g.

FEKO / HFSS / IE3D / Microwave Office / Microwave Studio or any other similar software:-

1. To set up Transmission Line Analyzer for measurements.
2. To set up the standing waves formation on a transmission line and observe their maxima and minima using
frequency domain method.
3. To measure the characteristic impedance of transmission lines using frequency domain method and to
differentiate between the matched and unmatched lines.
4. To measure the VSWR, reflection coefficient and return loss in a transmission line.
5. To measure the dielectric constant of insulator in the transmission line.
6. To measure the velocity of propagation and wavelength in the given transmission line.
7. To study the attenuation characteristics of signal along a transmission line and observe its variation with
frequency. Also calculate the phase constant and propagation constant.
8. To study the effect of reactive loads on transmission lines.
9. To study the difference between lossy and loss less line.

ECC - 404 Analog Communication

Unit-I

Different types of Signals (Continuous, Discrete, Periodic), Time Domain and Frequency Domain Representation, Introduction to basic Transform Techniques applicable to these Signals.

Spectral Analysis: Fourier Technique, Fourier Transform and their Properties, Transform of Gate Signal, Impulse Function and Unit Step Function, Fourier Transform Technique for Periodic Signal, Transform of Train of Pulses and Impulses, Sine and Cosine wave.

Signal Energy and Power, Spectral Density of various types of signals, Spectra (Parseval's Theorem), Density Spectra of Periodic Gate and Impulse train.

Linear Time Invariant (LTI) Systems, Impulse Response, Convolution, Convolution with Impulse Function, Casual and Non Causal System, Distortion less System, Impulse Response of Distortion less System, Ideal Filter and Practical Filter.

Unit-II

Modulation Techniques: Need and types of modulation techniques, Amplitude Modulation, Frequency Spectrum, Power Distribution, Modulation by Complex Signal, Low Level and High Level AM Modulators, Linear Integrated Circuit AM Modulators, Suppressed Carrier Generation (Balance/Chopper and Square Law Modulation), SSB Generator (Phase and Frequency Discrimination Method), VSB Transmission and Application. Detection of AM signals: Envelope Detector Circuit, RC Time Constant, Synchronous Detection Technique, Error in Synchronous Detection, SSB signal detection, PLL and its use in demodulation.

Unit-III

Angle Modulation: Frequency and Phase Modulation Frequency spectrum, bandwidth requirement, Frequency and Phase Deviation, Modulation Index, NBFM and WBFM, Multiple frequencies FM. FM Modulators: Direct (Parameter Variation Method) and Indirect (Armstrong) Method of frequency modulation. FM Detector: Slope Detector, Foster Seely Discriminator, Ratio Detector and PLL detectors.

Unit-IV

Radio Transmitters: AM transmitter, block diagram and working of Low Level and High Level Transmitters, Trapezoidal Pattern and Carrier Shift, SSB Transmitters, FM transmitters Frequency Multiplication Applied to FM Signals, FM transmitters.

Radio Receivers: Block Diagram of Radio Receiver, Receiver Characteristics (Selectivity, Fidelity and Sensitivity), AM Receiver, RF Receiver, Super-heterodyne Receiver, RF Amplifier, Frequency Mixer, AVC and AFC, Image Signal, Intermediate Frequency Selection, Diversity Reception, FM Receiver.

Unit-V Noise :
Sources and types of noise and their power density, White Noise, Noise from Single and Multiple noise source for Linear Systems, Super Position of Power Spectrum, Equivalent Noise Bandwidth, Noise Figure, and Equivalent Noise Temperature, their Relationship, Calculation of Noise Figure and Noise Temperature for Cascade Systems, Noise Performance of Communication System, Band Pass Noise Representation in Terms of Low Pass, In-phase and Quadrature Phase Component and their Power Spectral Density, Figure of Merit, Calculation for AM, AM-SC and SSB System, Noise in Angle Modulated System, Figure of Merit for FM, Noise Density of Output of FM Detector, Pre-Emphasis and De-Emphasis, Phasor Representation of Noise, Capture Effect, Comparison of Noise Performance of AM and FM.

References:
1. B.P. Lathi : Modern Analog and Digital Communication System, Wiley Eastern limited
2. Taub and Schilling : Principles of communication Systems, TMH
3. Singh and Sapre : Communication Systems, TMH
4. S Haykin : Communication Systems, John Wiley and Sons Inc
5. S Ghose: Signals and Systems, Pearson Education.
6. A Bruce Carlson : Communication System, TMH
7. Steven : Communication Systems – Analysis and Design, Pearson Education

List of Experiments (Expandable):
All experiments (wherever applicable) should be performed through the following steps.
Step 1: Circuit should be designed/drafted on paper.
Step 2: The designed/drafted circuit should be simulated using simulation Software (TINAPRO/ PSPICE/ LABVIEW/ CIRCUIT MAKER).
Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.
Step 4: The bread board circuit should be fabricated on PCB by one batch using PCB machine.
1. Analysis of AM Modulation and Demodulation Techniques (Transmitter and Receiver), Calculation of Parameters
2. Analysis of FM Modulation and Demodulation (Transmitter and Receiver) and Calculation of Parameters
3. To Construct and Verify Pre-emphasis and De-emphasis and Plot the Waveforms.
4. Study of Super-heterodyne Receiver and Characteristics of Radio Receiver.
5. To Construct Frequency Multiplier Circuit and to Observe the Waveform
6. Study of AVC and AFC.
7. Study of PLL chip (566) and its use in various systems

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ECC- 405 Electromagnetic Theory

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, static and steady fields, differential & integral form.

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 and solution for material medium, uniform plane wave in dielectrics and conductors, pointing vector theorem, instantaneous, average and complex poynting vector, power loss in a plane conductor, , polarization of waves, reflection by conductors and dielectric -normal & oblique incidence, reflection at surface of a conducting medium, transmission line analogy.

References:

P.V. Gupta; Electromagnetic Fields; DhanpatRai
Mathew N.O Sadiku; Elements of Electromagnetic; Oxford
S.P. Seth; Electromagnetic Field ;DhanpaRai& Son
Sandeepwali ; Elements of Electromagnetic; Oxford
N.N. Rao; Element of Engineering Electromagnetic; PHI.
John D. Kraus; Electromagnetic; TMH.

ECC-406 DATA STRUCTURES

UNIT I

Introduction: Data structures, Type of Data structure, ordered lists, operations in ordered list, sparse matrices, , arrays multi - dimensional arrays, linked lists, operations on linked list, doubly linked list and its operations, storage pools, garbage collection.

UNIT II

Stack: Stacks and Its Operations, applications of Stacks and queues and operation of queues, difference between Stacks and queues, Circular queues, Mazing problem, Prefix, postfix, infix notations

UNIT III

Trees: Concept of Trees, Type of Trees, applications of Trees , AVL Trees, B -Trees, binary tree, operations on binary tree , Spanning tree, cut sets, graphs, properties of graph, Planner graphs and its applications, Hamiltonian path and circuits Eularian paths and circuits.

UNIT IV

Sorting & Searching : Sorting, Insertion Sort, Bubble Sort, selection sort Quick Sort, Merge Sort, Heap Sort, Radix sort, Searching & Hashing: Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Symbol Table, Static tree table, Dynamic Tree table.

UNIT V

Sorting & Searching Technique: Sequential Search, Binary Search, Other search techniques, Time complexity & memory requirements, Bubble Sort, Insertion sort, Quick sort, Selection sort, Merge sort, Heap sort, maxima and minima heap.

References:

1. Data Structure by Tanenbaum
2. Data Structure by Horowitz & Sahan

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YA 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
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(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electronics and Communication 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 (EC) at 10:30 AM 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 EC-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)

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SSSUTMS School of Engineering SEHORE (M.P.)

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

Scheme of Examination

SEVENTH Semester –BE (EC)

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	EC-701	Elective -I	70	20	10				100	3	1	-	4
2	EC-702	Satellite Communication	70	20	10				100	3	1	-	4
3	EC-703	Optical Communication	70	20	10	30	10	10	150	3	1	2	6
4	EC-704	Microwave Engineering.	70	20	10	30	10	10	150	3	1	2	6
5	EC-705	VLSI Design	70	20	10	30	10	10	150	3	1	2	6
6	EC-706	Minor Project & Seminar(Synopsis)	-	-	-	60	20	20	100	-	-	4	4
7	EC-707	Industrial Training (Two Week)	-	-	-	30	10	10	50	-	-	2	2
		Total	350	100	50	180	60	50	800	15	5	10	32

w.e.f.July 2017

Elective -I
EC-701(A) Wireless Communication
EC-701(B) Digital Image Processing
EC-701(C) Neural Network

EC 701 Elective – I
(EC – 701-A Wireless Communication)

Unit-I

Introduction

Applications and requirements of wireless services: history, types of services, requirements for the services, economic and social aspects.

Technical challenges in wireless communications: multipath propagation, spectrum limitations, limited energy, user mobility, noise and interference-limited systems.

Propagation mechanism: free space loss, reflection and transmission, diffraction, scattering by rough surfaces, wave guiding.

Unit-II

Wireless Propagation channels

Statistical description of the wireless channel: time invariant and variant two path models, small-scale fading with and without a dominant component, Doppler spectra, temporal dependence of fading, large scale fading.

Wideband and directional channel characteristics: causes of delay dispersion, system theoretic description of wireless channels, WSSUS model, condensed parameters, ultra wideband channels, directional description.

Unit-III

Channel models: Narrowband, wideband and directional models, deterministic channel-modeling methods.

Channel sounding: Introduction, time domain measurements, frequency domain analysis, modified measurement methods, directionally resolved measurements.

Antennas: Introduction, antennas for mobile stations, antennas for base stations.

Unit-IV

Transceivers and signal processing: Structure of a wireless communication link: transceiver block structure, simplified models. Modulation formats, demodulator structure, error probability in AWGN channels, error probability in flat-fading channels, error probability in delay and frequency-dispersive fading bchannels.

Unit V

Diversity: Introduction, microdiversity, macrodiversity and simulcast, combination of signals, error probability in fading channels with diversity reception, transmit diversity.

Equalizers: Introduction, linear equalizers, decision feedback equalizers, maximum likelihood sequence estimation (Viterbi detector), comparison of equalizer structures, fractional spaced equalizers, blind equalizers.

References:

1. Molisch: Wireless Communications, Wiley India.
2. Taub and Schilling: Principles of Communication Systems, TMH.
3. Haykin: Mordern Wireless Communication, Pearson Education.
4. Upena Dalal: Wireless Communication, Oxford University Press.
5. Rappaport: Wireless Communication, Pearson Education.
6. Price: Wireless Communication and Networks, TMH.

EC 701 Elective – I

(EC – 701(B) Digital Image Processing)

Unit-I

Digital Image Processing (DIP)

Introduction, examples of fields that use DIP, fundamental steps in DIP, components of an image processing system.

Digital Image Fundamentals: elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.

Unit-II

Image Transforms

Two-dimensional (2D) impulse and its shifting properties, 2D continuous Fourier Transform pair, 2D sampling and sampling theorem, 2D Discrete Fourier Transform (DFT), properties of 2D DFT.

Other transforms and their properties: Cosine transform, Sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform, KL transform.

Unit-III

Image Enhancement

Spatial domain methods: basic intensity transformation functions, fundamentals of spatial filtering, smoothing spatial filters (linear and non-linear), sharpening spatial filters (unsharp masking and high boost filters), combined spatial enhancement method.

Frequency domain methods: basics of filtering in frequency domain, image smoothing filters (Butterworth and Gaussian low pass filters), image sharpening filters (Butterworth and Gaussian high pass filters), selective filtering.

Unit-IV

Image Restoration

Image degradation/restoration, noise models, restoration by spatial filtering, noise reduction by frequency domain filtering, linear position invariant degradations, estimation of degradation function, inverse filtering, Wiener filtering, image reconstruction from projection.

Unit-V

Image Compression

Fundamentals of data compression: basic compression methods: Huffman coding, Golomb coding, LZW coding, Run-Length coding, Symbol based coding. Digital image watermarking, representation and description- minimum perimeter polygons algorithm (MPP).

References:

1. Gonzalez and Woods: Digital Image Processing, Pearson Education.
2. Anil Jain: Fundamentals of Digital Image Processing, PHI Learning.
3. Annadurai: Fundamentals of Digital Image Processing, Pearson Education.
4. Sonka, Hlavac and Boyle: Digital Image Processing and Computer Vision, Cengage Learning.
5. Chanda and Majumder: Digital Image Processing and Analysis, PHI Learning.
6. Jayaraman, Esakkirajan and Veerakumar: Digital Image Processing, TMH.
7. William K. Pratt, Digital Image Processing, Wiley India.

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EC 701 Elective – I

(EC – 701(3) Neural Networks)

Unit-I

Neural Network (NN)

Introduction, benefits of neural network, 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 nature of learning process, statistical learning theory.

Unit-II

Perceptrons

Single layer perceptrons: adaptive filtering problem, unconstrained optimization technique, linear least squares filter, least mean square algorithm (LMS), perceptron convergence theorem

Multi layer perceptron: architecture, back propagation algorithm, generalization, approximations of functions, network pruning techniques.

Unit-III

Radial Basis Function (RBF) Networks

Cover's theorem on the separability of patterns, interpolation problem, supervised learning as an Ill-posed hyper surface reconstruction problem, regularization theory, regularization 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, learning strategies.

Unit-IV

Information- Theoretic Models

Entropy, maximum entropy principle, mutual information, Kullback-Leibler divergence, mutual information as an objective function to be optimized, maximum mutual information principle, infomax and redundancy reduction, spatially coherent and incoherent features, independent components analysis, maximumlikelihood estimation, maximum entropy method.

Unit V

Dynamically Driven Recurrent Networks

introduction, 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, Kalman filter, decoupled Kalman filter, vanishing gradients in recurrent networks, system identification, model reference adaptive control.

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 programming techniques, Pearson Education.
4. Hagan, Demuth and Beale: Neural Network Design, Cengage Learning.
5. Anderson: An introduction to Neural Networks, PHI Learning.
6. Satish Kumar: Neural Networks, TMH.

EC-702
Satellite Communication

Unit-I

Overview of satellite systems: Introduction, Frequency allocations for satellite systems.
Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time.

Unit-II

The Geostationary orbit: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits.
Polarization: antenna polarization, polarization of satellite signals, cross polarization discrimination.
Depolarization: ionospheric, rain, ice.

Unit-III

The Space segment: introduction, power supply, attitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem, Morelos and Satmex 5, Anik-satellites, Advanced Tiros-N spacecraft.
The Earth segment: introduction, receive-only home TV systems, master antenna TV system, Community antenna TV system, transmit-receive earth station.

Unit-IV

The space link: Introduction, Equivalent isotropic radiated power (EIPR), transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, inter-satellite links.
Interference between satellite circuits.

Unit-V

Satellite services

VSAT (very small aperture terminal) systems: overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network.
Direct broadcast satellite (DBS) Television and radio: digital DBS TV, BDS TV system design and link budget, error control in digital DBS-TV, installation of DBS-TV antennas, satellite radio broadcasting.

References:

1. Roddy: Satellite Communications, TMH.
2. Timothy Prattt: Satellite Communications, Wiley India.
3. Pritchard, Suyderhoud and Nelson: Satellite Communication Systems Engineering, Pearson Education.
4. Agarwal: Satellite Communications, Khanna Publishers.
5. Gangliardi: Satellite Communications, CBS Publishers.
6. Chartrand: Satellite Communication, Cengage Learning.
7. Raja Rao: Fundamentals of Satellite communications, PHI Learning.

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EC-703
Optical Communication

Unit-I

Overview of Optical Fiber Communications (OFC): Motivation, optical spectral bands, key elements of optical fiber systems.

Optical fibers: basic optical laws and definitions, optical fiber modes and configurations, mode theory for circular waveguides, single mode fibers, graded-index fiber structure, fiber materials, photonic crystal fibers, fiber fabrication, fiber optic cables.

Unit-II

Optical sources: Light emitting diodes (LED): structures, materials, quantum efficiency, LED power, modulation of an LED. Laser diodes: modes, threshold conditions, laser diode rate equations, external quantum efficiency, resonant frequencies, structure and radiation patterns, single mode lasers, modulation of laser diodes.

Power launching and coupling: source to fiber power launching, fiber to fiber joints, LED coupling to single mode fibers, fiber splicing, optical fiber connectors.

Unit-III

Photo detectors: pin photo detector, avalanche photodiodes, photo detector noise, detector response time, avalanche multiplication noise.

Signal degradation in optical fibers: Attenuation: units, absorption, scattering losses, bending losses, core and cladding losses. Signal distortion in fibers: overview of distortion origins, modal delay, factors contributing to delay, group delay, material dispersion, waveguide dispersion, polarization-mode dispersion.

Characteristics of single mode fibers: refractive index profiles, cutoff wavelength, dispersion calculations, mode field diameter, bending loss calculation. Specialty fibers.

Unit-IV

Optical receivers: fundamental receiver operation, digital receiver performance, eye diagrams, coherent detection: homodyne and heterodyne, burst mode receiver, analog receivers.

Digital links: point to point links, link power budget, rise time budget, power penalties.

Analog links: overview of analog links, carrier to noise ratio, multi channel transmission techniques.

Unit-V

Optical technologies

Wavelength division multiplexing (WDM) concepts: operational principles of WDM, passive optical star coupler, isolators, circulators, active optical components: MEMS technology, variable optical attenuators, tunable optical filters, dynamic gain equalizers, polarization controller, chromatic dispersion compensators.

Optical amplifiers: basic applications and types of optical amplifiers, Erbium Doped Fiber Amplifiers (EDFA): amplification mechanism, architecture, power conversion efficiency and gain. Amplifier noise, optical SNR, system applications.

Performance Measurement and monitoring: measurement standards, basic test equipment, optical power measurements, optical fiber characterization, eye diagram tests, optical time-domain reflectometer, optical performance monitoring.

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References:

1. Keiser: Optical Fiber Communications, TMH.
2. Senior: Optical Fiber Communication- Principles and Practices, Pearson Education.
3. Agarwal: Fiber Optic Communication Systems, Wiley India.
4. Palais: Fiber Optics Communications, Pearson Education.
5. Satish Kumar: Fundamentals of optical Communications, PHI Learning.
6. Khare: Fiber Optics and Optoelectronics, Oxford University Press.
7. Ghatak and Thyagrajan: Fiber Optics and Lasers, Macmillan India Ltd.
8. Gupta: Optoelectronic Devices and Systems, PHI Learning.
9. Sterling: Introduction to Fiber Optics, Cengage Learning.

List of Experiments:

1. Launching of light into the optical fiber and calculate the numerical aperture and V-number.
2. Observing Holograms and their study.
3. Measurement of attenuation loss in an optical fiber.
4. Diffraction using gratings.
5. Construction of Michelson interferometer.
6. Setting up a fiber optic analog link and study of PAM.
7. Setting up a fiber optic digital link and study of TDM and Manchester coding.
8. Measurement of various misalignment losses in an optical fiber.

EC-704

Microwave Engineering

Unit-I

Microwave Transmission System

General representation of EM field in terms of TEM, TE and TM components, Uniform guide structures, rectangular wave guides, Circular Wave guides, Solution in terms of various modes, Properties of propagating and evanescent modes, Dominant modes, Normalized model voltages and currents, Power flow and energy storage in modes frequency range of operation for single mode working, effect of higher order modes, Strip line and micro strip lines general properties, Comparison of coaxial, Micro strip and rectangular wave guides in terms of band width, power handling capacity, economical consideration etc.

Unit-II

Microwave Networks and Component

Transmission line ports of microwave network, Scattering matrix, Properties of scattering matrix of reciprocal, Non reciprocal, loss less, Passive networks, Examples of two, three and four port networks, wave guide components like attenuator, Phase shifters and couplers, Flanges, Bends, Irises, Posts, Loads, Principle of operation and properties of E-plane, H-plane Tee junctions of wave guides, Hybrid T, Multi-hole directional coupler, Directional couplers, Microwave resonators- rectangular. Excitation of wave guide and resonators by couplers. Principles of operation of non reciprocal devices, properties of ferrites, Isolators and phase shifters.

Unit-III

Microwave Solid State Devices and Application

PIN diodes, Properties and applications, Microwave detector diodes, detection characteristics, Varactor diodes, parametric amplifier fundamentals, Manley-Rowe power relation MASER, LASER , Amplifiers, Frequency converters and harmonic generators using varactor diodes, Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT.

Unit-IV

Microwave Vacuum Tube Devices

Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavity and Reflex Klystrons, arrival time curve and oscillation conditions in reflex klystrons, modefrequency characteristics. Effect of repeller voltage variation on power and frequency of output. Principle of working of magnetrons. Electron dynamics in planar and cylindrical magnetrons, Cutoff magnetic field, Resonant cavities in magnetron, Π-mode operation Mode separation techniques, Rising sun cavity and strapping. Principle of working of TWT amplifier. Slow wave structures, Approximate gain relationship in forward wave TWT.

Unit-V

Microwave Measurements

Square law detection, Broadband and tuned detectors. Wave-guide probes, Probe and detector mounts, Slotted line arrangement and VSWR meter, Measurement of wave-guide impedance at load port by slotted line, Microwave bench components and source modulation. Measurement of scattering matrix parameters, High, Medium and low-level power measurement techniques, Characteristics of thermistor bolometer mounts, Power measurement bridges, Microwave frequency measurement techniques, calibrated resonators (transmission and absorption type). Network Analyzer and its use in measurements.

References:

1. Liao: Microwave Devices and Circuits, Pearson Education.
2. Das: Microwave Engineering, TMH.
3. Rao: Microwave Engineering, PHI Learning.
4. Collins: Foundations of Microwave Engineering, Wiley India.
5. Srivastava and Gupta: Microwave Devices and Circuits, PHI Learning.
6. Reich: Microwave Principles, East West Press.
7. Pozar: Microwave Engineering, Wiley India.
8. Roy and Mitra: Microwave Semiconductor Devices, PHI learning.

List of Experiments:

Following illustrative practical should be simulated with the help of any RF simulation software:-

1. Study the characteristics of Klystron Tube and to determine its electronic tuning range.
2. To determine the frequency and wavelength in a rectangular wave-guide working on TE10 mode.
3. To determine the Standing Wave-Ratio and reflection coefficient.
4. To measure an unknown impedance with Smith Chart.
5. To study the V-I characteristics of Gunn Diode.
6. To study the following characteristics of Gunn Diode.

(a) Output power and frequency as a function of voltage.
(b) Square wave modulation through PIN diode.

7. Study the function of Magic Tee by measuring the following parameters.

(a) Measurement of VSWR at different ports and
(b) Measurement of isolation and coupling coefficient.

8. Study the function of Isolator / Circulator by measuring the following parameters.

(a) Input VSWR measurement of Isolator / Circulator.
(b) Measurement of insertion loss and isolation.

9. Study the function of Attenuator (Fixed and Variable type) by measuring the following parameters.

(a) Input VSWR measurement.
(b) Measurement of insertion loss and attenuation.

10. Study the function of Multi Hole Directional Coupler by measuring the following parameters.

(a) To measure main line and auxiliary line VSWR.
(b) To measure the coupling factor and directivity.

11. Study of a network analyzer and measurements using it.

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SSSUTMS

EC-705

VLSI Design

UNIT I

Practical Consideration and Technology in VLSI Design

Introduction, Size and complexity of Integrated Circuits, The Microelectronics Field, IC Production Process, Processing Steps, Packaging and Testing, MOS Processes, NMOS Process, CMOS Process, Bipolar Technology, Hybrid Technology, Design Rules and Process Parameters.

UNIT II

Device Modeling

Dc Models, Small Signal Models, MOS Models, MOSFET Models in High Frequency and small signal, Short channel devices, Sub threshold Operations, Modeling Noise Sources in MOSFET's, Diode Models, Bipolar Models, Passive component Models.

UNIT III

Circuit Simulation

Introduction, Circuit Simulation Using Spice, MOSFET Model, Level 1 Large signal model, Level 2 Large Signal Model, High Frequency Model, Noise Model of MOSFET, Large signal Diode Current, High Frequency BJT Model, BJT Noise Model, Temperature Dependence of BJT.

UNIT IV

Structured Digital Circuits and Systems

Random Logic and Structured Logic Forms, Register Storage Circuits, Quasi Static Register Cells, A Static Register Cell, Micro coded Controllers, Microprocessor Design, Systolic Arrays, Bit-Serial Processing Elements, Algotronix.

UNIT V

CMOS Processing Technology

Basic CMOS Technology, A Basic n-well CMOS Process, Twin Tub Processes, CMOS Process Enhancement, Interconnects and Circuit Elements, Layout Design Rules, Latch up, Physical Origin, Latch up Triggering, Latch up Prevention, Internal Latch up Prevention Techniques.

References:

1. Geiger, Allen and Strader: VLSI Design Techniques for Analog and Digital Circuits, TMH.
2. Sorab Gandhi: VLSI Fabrication Principles, Wiley India.
3. Weste and Eshraghian: Principles of CMOS VLSI design, Addison-Wesley
4. Weste, Harris and Banerjee: CMOS VLSI Design, Pearson-Education.
5. Pucknell and Eshraghian: Basic VLSI Design, PHI Learning.
6. Sze: VLSI Technology, TMH.

EC-706 Major Project

The student should select a topic (from the subjects he has studied so far or any topic related to real life problem). He should do the literature survey, analyze the problem and propose some solution for the same.

He should prepare a detailed (typed) report regarding the topic and should present the same with the help of power point presentation at the end of the semester. The analysis of the problem may be done with the help of some software or any hardware (which may be made by the student).

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EC-707 Industrial Training

Duration: 4 weeks after the VI semester in the summer break. Assessment in VII semester.

SCHEME OF EXAMINATION

For the assessment of industrial training undertaken by the students, following components are considered with respective weightage.

A) **Term work In Industry Marks allotted**

1. Attendance and General Discipline 05
2. Daily diary Maintenance 05
3. Initiative and Participative attitude during training 05
4. Assessment of training by Industrial Supervisor/s 15

Total 30

(B) **Practical/Oral Examination (Viva-voce In Institution Marks allotted**

1. Training Report 20
2. Seminar and cross questioning (defense) 30

Total 50

Marks of various components in industry should be awarded to the student, in consultation with the Training and Placement Officer (TPO)/ Faculty of the institute, who must establish contact with the supervisor/ authorities of the organization where, students have taken training, to award the marks for term work. During training, students will prepare a first draft of the training report in consultation with the section incharge. After training they will prepare final draft with the help of the TPO/ faculty of the institute. Then, they will present a seminar on their training and will face viva-voce on training in the institute.

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EC-801 Computer Networks

Unit I

Computer Networks

Introduction, applications, types of networks, network software, reference models- OSI model, TCP/IP model, comparison of OSI and TCP/IP models, example networks.

The Physical layer

Design Issues, review of data communication concepts (configuration, topology, transmission mode, media guided and unguided, types of switching etc).

Unit II

The Data Link layer

Design issues, error detection and correction, data link protocols- stop and wait and sliding window ARQ, utilization of ARQ techniques, example of data link protocol- HDLC.

The Medium Access Control Layer

Static and dynamic channel allocation, multiple access protocols- Pure and slotted ALOHA, CSMA, Collision free protocols, limited contention protocols, CSMA/CD (ETHERNET), fast Ethernet, Gigabit Ethernet.

Unit III

Wireless Protocols

The 802.11, the 802.16, Bluetooth, RFID, Data link layer switching- uses of repeaters, hubs, bridges, switches, routers and gateways.

The Network Layer

Design Issues, Virtual Circuit and datagram networks, routing algorithms- adaptive and non-adaptive algorithms, congestion control algorithms, quality of service, internetworking, Network layer in the Internet- IPv4 protocol, IP addresses, IPv6 protocol, Internet control protocols, Mobile IP.

Unit IV

The Transport Layer

Design issues and services, Transport protocols, congestion control, UDP and TCP protocols, performance issues.

Unit V

The Application Layer

The Domain Name System, E-mail, World Wide Web, streaming audio and video, content delivery.

References:

1. Tanenbaum: Computer Networks, Pearson Education.
2. Bertsekas and Gallager: Data Networks, PHI Learning.
3. Black: Computer Networks, PHI Learning.
4. Forouzan: Computer Networks, TMH.
5. Stallings: Computer Networking and Internet Protocol, Pearson Education.
6. Keiser: Local Area Network, TMH.
7. Forouzan: Data Communication and Networking, TMH..

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List of Experiments:

Practical should be performed using Scilab/ Matlab simulation software based on the above contents.

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EC-802 TV and Radar Engineering

Unit I

Basic Television System

Introduction: Scanning principles: sound and picture transmission, scanning process, camera pick-up devices, video signal, transmission and reception of video signals, brightness perception and photometric quantities, aspect ratio and rectangular scanning, persistence of vision and flicker, vertical resolution, the Kell factor, horizontal resolution and video bandwidth, interlaced scanning.

Composite Video Signal: Lines and scanning, video signal components, horizontal sync and blanking standards, vertical sync and blanking standards, video modulation and vestigial side band signal, sound modulation and inter-carrier system.

Television Standards: Standard channel characteristics, reception of the vestigial side band signals, television broadcast channel, consolidated CCIR system-B standard, various television broadcast systems.

Television Pick-up devices and Cameras: Camera lenses, auto-focus systems, television camera pick-ups, Silicon Vidicon, CCD image sensors, video processing of camera pick-up signal.

Unit II

Colour Television

Colour fundamentals: mixing of colours and colour perception, chromaticity diagram, colour television camera, colour TV signals and transmission, NTSC, SECAM and PAL system, Trinitron picture tube, automatic degaussing, plasma, LCD displays.

Television transmission and reception: requirement of TV broadcast transmission, design principle of TV transmitters, IF modulation, power output stages, block diagram of TV transmitter, co-channel interference and ghost images during propagation of television signals, antenna requirements for television system, block schematic and function requirements for television receivers, trends in circuit design, colour television receiver.

Unit III

Digital Television Technology

Merits of digital technology, fully digital television system, digital television signals, digitized video parameters, digital video hardware, transmission of digital TV signals, bit rate reduction, digital TV receivers, video processor unit, audio processor unit.

Other television systems: Closed Circuit television system (CCTV), Cable television system (CATV), multiplexed analog component encoding television system (MAC TV), High definition television system (HDTV), High definition multiplexed analog component television (HD-MAC TV), High Performance Computer Controlled TV (HPCC TV), 3-D stereoscopic television techniques..

Unit IV

RADAR

The Radar range equation, block diagram and operation, performance factors: prediction of range performance, minimum detectable signal, receiver noise, probability density functions, signal to noise ratios. Radar cross section of targets, transmitter power, pulse repetition frequency and range ambiguities, antenna parameters.

The CW radar: the Doppler effect, FM-CW radar.
The Moving Target Indicator (MTI) Radar: delay line cancellers.

Unit V
Radar Receivers
The radar receiver, noise figure, mixers, low noise front ends, displays- type A and PPI representations, duplexer and receiver protectors.
Other Radar systems: Synthetic aperture radar, HF over the horizon radar, Air Surveillance Radar (ASR),
Bistatic radar.

References:
1. Dhake: Television and Video Engineering, TMH.
2. Skolnik: Introduction to Radar Systems, TMH, New Delhi.
3. Gupta: Television Engineering and Video Systems, TMH, New Delhi.
4. Gulati: Monochrome and Colour Television, New Age International.
5. Grob and Herndon: Basic Television and Video Systems, McGraw Hill International.
6. Peebles, Jr.: Radar Principles, Wiley India Pvt. LTD.
7. Edde: Radar- Principles, Technology Applications, Pearson Education.

List of Experiments:
Section A: Television Engineering
1. (a) To Study the Circuit Description of RF Tuner Section.
(b) To Study the RF Section by Measuring Voltages at Various Test Points.
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for RF Section.
2. (a) To Study the Circuit Description of VIF Tuner Section.
(b) To Study the VIF Section by Measuring Voltages at Various Test Points.
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for VIF Section.
3. (a) To Study the Circuit Description of Video and Chroma Section Tuner Section.
(b) To Study the Video and Chroma Section by Measuring Voltages at Various Test Points
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Video and Chroma
Section.
4. (a) To Observe the Horizontal Oscillator and Horizontal Output Section through Various Test Point.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Horizontal Oscillator
and
Horizontal Output Section.
5. (a) To Observe the Vertical Oscillator and Vertical Output Section through Various Test Point.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Vertical Oscillator and
Vertical Output Section.
6. To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Sound Output Section.

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7. To Study the Circuit Description of Audio and Video Section Tuner Section.
8. (a) To Study the System Control Section by Measuring Voltages at Various Test Points.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for System Control Section.

Section B: RADAR

1. Study of Doppler Effect.
2. To Measure Speed of a fan and various Other Objects (Pendulum, Tuning Fork, Plate etc.)
3. To Simulate the Variable Speed of Moving Objects using Velocity Simulator.

Elective–II
EC-803(A) Advanced Data Network

Unit-I

Principles of Wireless Networks

Network Planning: Introduction, wireless network topologies, cellular topology. Wireless network operation: introduction, mobility management, radio resources and power management, security in wireless networks.

Unit-II

Mobile Data Networks

Introduction, the data-oriented CDPD network, GPRS and higher data rates, short messaging services in GSM,mobile application protocols.

Wireless LANs (WLAN)

Introduction, historical overview of the LAN industry, evolution of the WLAN industry, new interest from militaryand service providers, a new explosion of market and technology, wireless home networking.

Unit-III

IEEE 802.11 WLANs

Introduction, what is IEEE 802.11? The PHY layer, MAC sublayer, MAC management sublayer.

HIPERLAN

Introduction HIPERLAN, HIPERLAN-2

Wireless Geolocation Systems

Introduction, Wireless geo location system architecture, technologies for wireless geolocation, geolocation standards for E-911 services, performance measures for geo location systems.

Unit-IV

Wireless Personal Area Network (WPAN)

Introduction- IEEE 802.15 WPAN, Home RF, Bluetooth? Interference between Bluetooth and 802.11.

Satellite Networks

Satellite navigation and global positioning system: Introduction, radio and satellite navigation, GPS position location principles, GPS time, GPS receivers and codes, the C/A code, Satellite signal acquisition, GPS signal levels, timing accuracy, GPS receiver operation, GPS C/A code accuracy, differential GPS.

Unit-V

Optical Networks

Network Concepts: terminology, categories, layers. Network topologies: performance of passive linear buses, performance of star architectures. SONET/SDH: transmission formats and speeds, optical interfaces, SONET/SDH rings, SONET/SDH networks.

High speed light-wave links: links operating at 10, 40 and 160 Gbps. Optical add/drop multiplexing (OADM): OADM configurations, reconfigurable OADM.

Optical switching: optical cross-connect, wavelength conversion, wavelength routing, optical packet switching,
optical burst switching. WDM network examples: wideband long-haul WDM networks, narrowband metro WDM networks, passive optical network. Mitigation of transmission impairments: chromatic dispersion compensating fiber, bragg grating dispersion compensators, polarization mode dispersion compensation, optical amplifier gain transients.

References:

1. Pahlavan and Krishnamurthy: Principles of Wireless Networks, PHI Learning.
2. Stallings: Wireless Communications and Networks, Pearson Education.
3. Keiser: Optical Fiber Communications, TMH.
4. Pratt, Bostian and Allnut: Satellite Communications, Wiley India.
5. Upena Dalal: Wireless Communications, Oxford University Press.

EC-803(B) Microwave Circuits

Unit I

Transmission lines: Impedance matching and transformation

Plane Electromagnetic waves, Transmission Lines: Line Equations and analysis, Smith Chart, Impedance Matching and transformation single stub, double stub matching, triple –stub tuner, impedance mismatch factor, quarter wave transformer, theory of small reflections, binomial and Chebyshev transformer, tapered transmission lines, triangular, exponential and Klopfenstein taper.

Unit II

Field analysis of transmission lines:

Analysis of general transmission line and terminated transmission line circuits, Planar Transmission lines, Micro strip lines. Strip lines: Characteristic Impedance, conductor losses, Dielectric losses, Radiation Losses, Higher order modes and dispersion, Micro strip attenuation ,high frequency properties , suspended and inverted micro strip lines, coplanar lines, slot lines, Fin-lines, Coupled Lines. Substrates for microwave printed circuits

Unit III

Microwave (solid state) Amplifiers:

BJT and FET, Power gains: definitions, Stability: stability circles, tests for unconditional stability, Constant Power Gain Circles, Constant Mismatch Circles, Single stage and multi stage transistor Amplifier design, Broadband transistor Amplifier Design, Power amplifiers. Basic Noise theory, Low noise amplifier designs, Microwave amplifier designs using S-parameters.

Unit IV

Microwave oscillators and mixers:

RF oscillators, Microwave oscillators, Oscillators Phase Noise, Frequency Multipliers, Gunn oscillators and circuits, Transistor oscillators, Oscillator circuits and design.

Mixers: Mixer characteristics, linear and non-linear mixer operation, Mixer noise figure, Balanced mixers, Single ended diode mixer, single ended FET mixer, image reject mixers, other mixers, Mixer analysis using Harmonic Balancing.

Unit V

Microwave Filters:

Periodic structures: analysis, Filter design : image parameter and insertion loss method. specification of power loss ratio, Filter transformations, Filter Implementations, Stepped-Impedance low –pass filters, coupled line filters, Filters using coupled resonators, Impedance and Admittance inverters, micro strip half-wave filter, Quarter –wave coupled cavity filters, direct –coupled cavity filters, Low-Pass filter designs, Frequency transformations and expansions, Narrowband and wideband microwave filters.

References:

1. Collin: Foundations for Microwave Engineering, Wiley India.
2. Rizzi: Microwave Engineering- Passive Circuits, PHI Learning.
3. Pozar: Microwave Engineering, Wiley India.

4. Vendelin, Pavid and Rohde, Microwave Circuit Design, Wiley India.
5. Srivastava and Gupta: Microwave Devices and Circuit Design, PHI

Elective–III

EC-804(A) Principles of Management and Managerial Economics

Unit I

Management Concept: Management, Administration and Organization Difference and Relationship between Organization Management and Administration. Importance of Management, Characteristics of Management.

Unit II

Management: Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management, Project Management.

Unit III

Decision Making: Introduction and Definition, Types of Decisions, Techniques of Decision Making, Decision making under certainty Decision making under uncertainty, Decision Making under risk.

Unit IV

Managerial Economics: Introduction, Factors Influencing Manager, Micro and Macro-economics, Theory of the Cost, Theory of the Firm, Theory of Production Function.

Unit V

Productivity: Input-Output Analysis, Micro-economics Applied to Plants and Industrial Undertakings, Production and Production system, Productivity, Factors affecting Productivity, Increasing Productivity of Resources.

References:

1. Peter Drucker, Harper and Row: The Practice of Management.
2. Koontz: Essentials of Management, PHI Learning.
3. Staner: Management, PHI Learning.
4. Daft: Principles of Management, Cengage Learning.
5. T. N. Chhabra: Principle and Practice of Management, Dhanpat Rai, New Delhi.
6. Hirschey: Managerial Economics, Cengage Learning.
7. T. R. Banga and S.C. Sharma: Industrial Organisation and Engineering Economics, Khanna Publishers.
8. O.P. Khanna: Industrial Engineering and Management, Dhanpat Rai.
9. Joel Dean: Managerial Economics, PHI learning.
10. V. L. Mote, Samuel Paul and G.S. Gupta: Managerial Economics Concepts & Cases, TMH, New Delhi.
11. V. L. Mote: Managerial Economics, TMH, New Delhi.

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Elective–III

EC-804(B) New (Introduction to Microcontrollers for Embedded systems)

UNIT-I: Introduction to Embedded systems
Embedded system overview and applications, features and architecture considerations-ROM, RAM, timers, data and address bus, Memory and I/O interfacing concepts, memory mapped I/O. CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture, instruction set, instruction formats, and various addressing modes of 32-bit. Fixed point and floating point arithmetic operations. Introduction ARM architecture and Cortex – M series, Introduction to the Tiva family viz. TM4C123x & TM4C129x and its targeted applications, Tiva block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics.

UNIT-II: Microcontroller Fundamentals for Basic Programming
I/O pin multiplexing, pull up/down registers, GPIO control, Memory Mapped Peripherals, programming System registers, Watchdog Timer, need of low power for embedded systems, System Clocks and control, Hibernation Module on Tiva, Active vs Standby current consumption. Introduction to Interrupts, Interrupt vector table, interrupt programming. Case Study: Tiva based embedded system application bringing up the salient features of GPIO, Watchdog timer, etc.

UNIT- IIITimers, PWM and Mixed Signals Processing Timer, Basic Timer, Real Time Clock (RTC), Timing generation and measurements, Analog interfacing and data acquisition: ADC, Analog Comparators, DMA, Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI). Case Study: Tiva based embedded system application using ADC & PWM.

UNIT-IV Communication protocols and Interfacing with external devices
Synchronous/Asynchronous interfaces (like UART, SPI, I2C, USB), serial communication basics, baud rate concepts, Interfacing digital and analog external device, I2C protocol, SPI protocol & UART protocol. Implementing and programming I2C, SPI & UART interface using Tiva. CAN & USB interfaces on Tiva platform. Case Study: Tiva based embedded system application using the interface protocols for communication with external devices "Sensor Hub BoosterPack"

UNIT V Embedded networking and Internet of Things
Embedded Networking fundamentals, Ethernet, TCP/IP introduction IoT overview and architecture, Overview of wireless sensor networks and design examples. Various wireless protocols and its applications: NFC, ZigBee , Bluetooth, Bluetooth Low Energy, Wi-Fi. Adding Wi-Fi capability to the Microcontroller, Embedded Wi-Fi, User APIs for Wireless andNetworking applications Building IoT applications using CC3100 user API: connecting sensor devices using Tivaware sensor library. Case Study: Tiva based Embedded Networking Application: "Smart Plug with Remote Disconnect and Wi- Fi Connectivity"

Lab

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1.Interfacing and programming GPIO ports in C using Tiva (blinking LEDs , push buttons)
2.Interrupt programming examples through GPIOs
3.Use Hibernation mode and wake on RTC interrupt
4.PWM generation using PWM Module on Tiva
5.Interfacing potentiometer with Tiva GPIO
6.PWM based Speed Control of Motor controlled by potentiometer connected to Tiva GPIO
7.Connect the Tiva to terminal on PC and echo back the data using UART
8.Interfacing an accelerometer with Tiva using I2C
9.Experiment on USB (Sending data back and forth across a bulk transfer-mode USB connection.)
10.Using IQmath Library for implementing Low pass FIR filter
11.Review of User APIs for TI CC3100 & Initialization and Setting of IP addresses
12.A basic Wi-Fi application – Communication between two Tiva based sensor nodes using TIVA sensor library in
TivaWare
13.Setting up the CC3100 as a HTTP server

TEXT Books:

1. John Davies, "MSP430 Microcontroller Basics", Newnes, 1st Edition
2. Ajit Pal, "Microcontrollers Principles and applications", PHI
3. B. Kanta Rao, "Embedded Systems", PHI
4. Rajkamal, "Embedded Systems Architecture Programming and design", McGraw Hill,

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EC-805 Major Project-II

The student should prepare a working system or some design or understanding of a complex system that he has selected from the previous semesters using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable.

Each student is required to prepare a project report based on the above points and present the same at the final examination with a demonstration of the working system.

EC-806

Software Lab – III

Xilinx ISE (Integrated Software Environment) is a software tool produced by Xilinx for synthesis and analysis of HDL designs, enabling the developer to synthesize ("compile") their designs, perform timing analysis, examine RTL diagrams, simulate a design's reaction to different stimuli, and configure the target device with the programmer. The Web Edition is a free version of Xilinx ISE that can be downloaded at no charge. It provides synthesis and programming for a limited number of Xilinx devices. In particular, devices with a large number of I/O pins and large gate matrices are disabled. The low-cost Spartan family of FPGAs is fully supported by this edition, as well as the family of CPLDs, meaning small developers and educational institutions have no overheads from the cost of development software.

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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

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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
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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

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8.	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	Non-credit
	Total	**160**

***Definition of Credit:**

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) perweek	0.5 Credit
2 HoursPractical(Lab)/week	1 Credit

(09) Scheme of Exanimation (Electronics and Communication Engineering) Academic Year 2019-20

I SEMESTER

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**

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Electronics and Communication Engineering

II Semester

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 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**	**150**	**100**	**750**	**13**	**1**	**1/2**	**20**

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(10) Course Content

SEMESTER- I

BEBSC-101 Mathematics-I

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

Preamble:-

The Preamble 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.

Outcome:-

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'stheorem,MeanValuetheorems,Expansionoffunctionsby Mc. Laurin'sand Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation,Maxima&Minima(twovariables),MethodofLagrange'sMultipliers.

Unit-II Integral (6 Hrs):

DefiniteIntegralasalimitofasumandItsapplicationinsummationof series;BetaandGammafunctionsandtheirproperties;Applicationsof definiteintegralstoevaluatesurface areas,MultipleIntegral,Changetheorderoftheintegration, Applicationsof multipleintegralforcalculatingareaandvolumesofthecurves.

Unit-III Sequencesandseries (6 Hrs):

Convergenceofsequenceandseries,testsforconvergence; Powerseries,Taylor'sseries,seriesforexponential,trigonometricandlogarithmfunctions;Fourierseries: Halfrangesineandcosineseries,Parseval'stheorem.

Unit-IV Vector Spaces (6 Hrs):

Vector Space,VectorSub Space, Linear Combination ofVectors, LinearlyDependent,LinearlyIndependent,BasisofaVectorSpace,LinearTransformations.

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Unit-V Matrices (10 Hrs):

Rank of a Matrix, Solution of Simultaneous Linear Equations by ElementaryTransformation,Consistencyof Equation,EigenValuesandEigenVectors,Diagonalizationof Matrices,Cayley-Hamiltontheoremanditsapplicationstofindinverse.

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.

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BEBSC-102 Engineering Chemistry

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

Preamble:

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 itsapplications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imagingsurface characterization 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)

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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 shashichawla.

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 PenskyMarten's apparatus.
8. To determine the total hardness of given water sample by titrating it against EDTA solution using EBT as an indicator.

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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

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BEHSMC-103 English for Communication

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

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.

Course Outcomes (CO):

At the end of this course students will have:

CO1: Ability to design a language component or process to meet desired need within Realistic, Constraints such as economic, environmental, social, political, ethical Scenario.
CO2: Ability to analyze the usage of English words in different contexts.
CO3: An understanding of technical and academic articles' comprehension.
CO4: 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 andPassive 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)

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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

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SSUTMS SEHORE (M.P.)

BEESC-104 Basic Electrical Engineering

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

Course 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.

Course 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

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.

Unit-IV Machines (10 Hrs):

DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems)

Three Phase Induction Motor: Principle & Construction, Types, Slip-torque characteristics,Applications (Numerical problems related to slip only)

Single Phase Induction motor: Principle of operation and introduction to methods of starting,applications.

Three Phase Synchronous Machines: Principle of operation of alternator and synchronousmotor and their applications.

Unit-V Components of LT Switchgear: (6 Hrs)

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.

Reference's: -

1. RituSahdev, "Basic Electrical Engineering",
2. S. Singh, P.V. Prasad, "Electrical Engineeri
3. D. P. Kothari andElectricalI.J.Nagrath,Engineering","Basic Tat
4. D. C. Kulshreshtha, "Basic Electrical Engine
5. E. Hughes, "Electrical and Electronics Techn
6. S. Bobrow, "Fundamentals of Electrical En
7 .V. D. Toro, "Electrical Engineering Fundamen

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

Laboratory Preambles:

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

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2. Verification of Superposition and Thevenin Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and studyimprovement 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.

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BEESC-105 Engineering Graphics and Design

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

Course 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.

Course 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 Venire 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):

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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-IVIsometric 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

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BEESC-106 Manufacturing Practices

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

Course 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

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BELC 207 Industrial Training

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

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

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BEBSC-201 Mathematics-II

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

Course 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

Course 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 OrdinaryDifferentialEquationsI (6 Hrs):

DifferentialEquationsofFirstOrderandFirst Degree(Leibnitzlinear,Bernoulli's,Exact),DifferentialEquationsof FirstOrderandHigherDegree,Higher order differentialequations with constantscoefficients,HomogeneousLinearDifferentialequations, SimultaneousDifferentialEquations.

UNIT-II OrdinarydifferentialEquationsII(6 Hrs):

Secondorderlineardifferentialequationswith variable coefficients, Method ofvariation ofparameters, Power series solutions; Legendre polynomials, Besselfunctionsofthefirstkindandtheirproperties.

Unit III PartialDifferential Equations (10 Hrs)

Formulation ofPartial Differential equations, LinearandNon-LinearPartialDifferentialEquations, Homogeneous LinearPartialDifferentialEquations withConstantsCoefficients.

Unit IV Functions ofComplex Variable (10 Hrs)

Functions of Complex Variables: Analytic Functions,HarmonicConjugate,Cauchy-RiemannEquations(withoutproof),Line Integral,theorem ,Cauchy Integral formula (without proof), Singular Points, Poles &Residues, ResidueTheorem,ApplicationofResiduestheremforEvaluationofRealIntegral

Unit V VectorCalculus(10 Hrs)

Differentiation ofVectors,Scalarandvectorpointfunction, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, SurfaceIntegralandVolumeIntegral,GaussDivergence, StokesandGreentheorems.

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, 9thEnd.,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 ManishGoyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

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

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BEBSC- 202 Engineering Physics

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

Course 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

Course Outcomes

- Explain fundamentals of quantum mechanics and apply to one dimensional motion of particles.
- To formulate and solve the engineering problems on Electromagnetisman ability to design a system, component, or process to meet desired needs within realistic constraints.
- To analyze the structural properties of elemental solids
- To calculate electronic conductivity of solids
- To apply distribution function to quantum and classical systems
- To evaluate thermal properties of solids using statistical approch
- To classify magnetic and supercounducting behavior of solids

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.

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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: FibreOptics(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**

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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.

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BTEESC-203 Basic Computer Engineering

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

Course Preamble:-

- 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.

Course Outcome:-

- 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):

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Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview- Preambles 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.

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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.

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BEESC-204 Basic Mechanical Engineering

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

Course Preamble:

- 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

Course 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 Carbondiagram. 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, Flowstrain, 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):

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Thermodynamic system, properties, state, process, Zeroth, First and second law ofthermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy.

Steam Engineering: Classification and working of boilers, mountings and accessories of boilers, Efficiencyand 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- AchuthanM , , 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.

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BEESC-205 Basic Civil Engineering & Mechanics

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

Course CoursePreamble:

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

Course 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

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EDMmethods, measurement of directions bydifferent methods, measurement of elevations bydifferent 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, DhanpatRai Pub.

2. Prasad I.B., Applied Mechanics, Khanna Publication.

3. Punmia, B.C., Surveying, Standard book depot.

4. SheshaPrakash 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 anddetermine corrected bearings and to balance the traverse by Bowditch's rule.

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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 bea

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BEHSMC-206 Language Lab and Seminar

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

CoursePreamble: This courseintends to impart practical trainingin theuseofEnglishLanguage for Communicativepurposes and aims to develop students' personalitythroughlanguageLaboratory.

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

Course Preamble

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.

Course Outcomes:

- Analytical thinking
- Lateral thinking
- constructive argument
- Communication skill

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- 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.

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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 PachamaOilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
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(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electronics and Communication 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 (EC) at 10:30 AM 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 EC-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)

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Electronics and Communication Engineering

III SEMESTER

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	ECA -302	Electromagnetic Theory	60	30	10			100	2	1	-	3
3	ECA -303	Measurement Science & Techniques	60	30	10	30	20	150	3		2	4
4	ECA -304	Electronic Devices	60	30	10	30	20	150	3		2	4
5	ECA -305	Network Analysis and Synthesis	60	30	10	30	20	150	2	1	2	4
6	ECA -306	Simulation Lab-I				30	20	50			2	1
7	ECA -307	Self Study /GD Seminar					50	50			2	1
		TOTAL	300	150	50	120	130	750	13	2	10	20

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Electronics and Communication Engineering

SEMESTER-IV

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	Assignments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	BEA-401	Energy,Ecology ,Environment and Society	60	30	10	-	-	100	3		-	3
2	ECA-402	Digital Electronics	60	30	10	30	20	150	2	1	2	4
3	ECA-403	Signals and System	60	30	10	30	20	150	3		2	4
4	ECA-404	Analog Communication	60	30	10	30	20	150	3		2	4
5	ECA-405	Electronics Instrumentation	60	30	10	30	20	150	2	1	2	4
6	ECA-406	Simulation Lab-II				30	20	50			2	1
7	ECA-407	Industrial Training-I	To be completed anytime during Third/Fourth semester. Credit to be added in fith semester									
		TOTAL	**300**	**150**	**50**	**150**	**100**	**750**	**13**	**2**	**10**	**20**

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MATHEMATICS-III

BEA-301

BEA-301	Mathematics-III	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

1. Mathematics fundamental necessary to formulate, solve and analyze engineering problems.
2. An understanding of Regula-Falsi and Laplace Transform to solve real world problems.
3. An understanding of Linear Algebra through matrices.
4. An understanding of Complex integration.

Course outcomes:

1. Solve problems in engineering domain related to Linear Algebra using matrices.
2. Analyze and solve engineering problems using Laplace Series.
3. Analyze and solve engineering problems using Regula-Falsi.
4. Solve engineering problems using Complex Integration.

UNIT 1: (10 hours)

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 2: (7 hours)

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 3: (10 hours)

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 4: (10hours)

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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 5: (5hours)

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.

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Electromagnetic Theory

ECA-302

ECA-302	Electromagnetic Fields	2L:1T:0P	3 credits	3Hrs/Week

Course Preambles:

1.To introduce students with different coordinate systems.
2. To familiarize the students with the different concepts of electrostatic, magneto static and time varying electromagnetic systems.
3.To expose the students to the ideas of electromagnetic waves and structure of transmission line.

Course Outcomes

1. Define and recognize different co-ordinate systems to describe the spatial variations of the physical quantities dealt in electromagnetic field theory as they are functions of space and time.Apply different techniques of vector calculus to understand different concepts ofelectromagnetic field theory.

2. Explain fundamental laws governing electromagnetic fields and evaluate the physical quantities of electromagnetic fields (Field intensity, Flux density etc.) in different media using the fundamental laws.

3. Determine the electromagnetic force exerted on charged particles, current elements, working principle of various electric and electromagnetic energy conversion devices are based on this force.

Unit I (10H)

Review of vector calculus: orthogonal coordinate systems, gradient, divergence and curl. Laplacian operator for scalar and vectors. Vector integral and differential identities and theorems. Phasor representation of harmonic variation of scalar and vectors Static electric fields, Columb's law, electric flux density and electric field intensity, permittivity, dielectric constant, field of distributed charges in free space, potential function, Laplace's and Poisson's equations, electric dipole, stored electric energy density.

Unit II (10H)

Solution of Laplace's equations in systems of dielectric and conducting boundaries, uniqueness theorem, two dimensional boundary condition problems, solution by symmetry, conformal transformation of functions, image theory etc. Fields in parallel wire, parallel plane and coaxial

systems. Static currents and magnetic fields- flow of charge in conductive media, lossy conductive medium, current density, specific conductivity, mobility, explanation of Ohm's law employing mobility. Magnetic effects of current flow, Biot-Savart's law in vector form magnetic field intensity, magnetic flux, and permeability, closed loop currents, Ampere's circuital law in integral and differential vector form, magnetic vector potential and related equations.

Unit III (10H)

Time varying fields – Faraday's law in integral and differential forms, displacement current concept, Maxwell's equations in differential and integral forms, wave equations in source free region electric and magnetic stored energy density, continuity equation, Poynting vector theorem. Time harmonic fields, r.m.s. phasor representation of field vectors, Maxwell's equations for TH field, average energy density, complex Poyntingvecto..

Unit IV (6H)

Circular and elliptic polarization, resolution in terms of linear polarized waves and vice- versa. Plane waves in lossy medium, low loss dielectric, good conducting and ionized media, complex permittivity, loss tangent, skin depth, transmission line analogy.

Unit V (6H)

Reflection and refraction of plane waves at dielectric media and conducting Surfaces, Brewster's angle, total internal reflection, resultant fields and power flow in both media. Frequency dispersive propagation, phase velocity and group velocity.

References:

1. Mathew N.O Sadiku: Elements of Electromagnetic, Oxford University Press

2. William H. Hayt: Engineering Electromagnetic, TMH.

3. John D. Kraus: Electromagnetics, Mc. Graw Hill.

4. Jordan Balmian: Electromagnetic wave and Radiating System, PHI.

5. David K. Cheng: Electromagnetic Fields and Wave, Addison Wesley.

6. Ramo, Whinnerry and VanDuzzer" Fields and waves in communication electronics ", Wiley 1984

7. Harrington RF, "Electromagnetic fields" McGraw Hill

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Measurement Science & Techniques

ECA-303

ECA-303	Measurement Science & Techniques	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

1. To understand concepts of various electrical and electronic measuring instruments.
2. To familiarize with different electromechanical and electronic instruments.
3. To introduce instruments for power and energy measurements.
4. To explain instrument transformers and magnetic measurements.
5. To be able to measure different physical parameters with the help of AC bridges.

Course Outcomes:

1. Explain the working of different electromechanical indicating instruments.
2. Elucidate the concept of several AC bridges for inductance and capacitance
3. Describe basic working of instrument transformers.
4. Measure power and energy with the help of wattmeter and energy meter.
5. Describe the construction and working of various electronic instruments.

Unit I (10H)

Introduction to measurement: Definition, application and types of measurement System, Accuracy, Precision, sensitivity, Resolution, introduction to static and Dynamic Characteristics, Error and uncertainty analysis, Loading effect.

Unit II (10H)

Electrical measurement: Construction and operation of moving coil, moving iron, hot iron instrument-Ammeter & voltmeter, Theory and Operation of D'arsonval, Ballistic and vibration Galvanometer, instrument transformers. Extension of instrument ranges.

Unit III (10H)

R, L, C Measurement: Bridges: Measurement of resistance using Wheatstone bridge, Kelvin's double bridge, Loss of charge method, ohm meter, megger Measurement of inductance and capacitance by A.C. bridges: Maxwell's bridge, Anderson bridge, Schering bridge, Hay's bridge, Wein's bridge, Shielding and grounding, Q meter.

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Unit IV (6H)

Digital instruments: Advantages of digital instruments, Over analog instruments, D-A, A-D conversion, Digital voltmeter, Ramp type DVM, Integrating DVM, successive approximation DVM, frequency meter. Display devices: CRO-construction and working, deflection, triggering & synchronization, Time, Phase, Frequency measurement. Storage CRO, Sampling CRO, Digital Oscilloscope. Displays (LED, LCD and seven segment etc)

Unit V (6H)

Signal generator: Function generator, sweep frequency generator, Pulse and square wave generator, Wave Analysers, Harmonic Distortion Analyser, Spectrum Analyser, frequency counter.

References:

1.Modem Electronics Instrumentation, Albert D. Cooper, PHI.

2. Electrical and electronic Measurement by A.K.Sawhney

3. Measurement system by Doebelin 4. Electronic Instrumentation – Kalsi – TMH List of

ECA-303	**Measurement Science & Techniques**	**0L:0T:2P**	**1 credits**	**2Hrs/Week**

Experiments (Expandable): All experiments (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/ drafted on paper.
Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).
Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.
Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. Experiments of study (Accuracy, precision, sensitivity, Resolution).
2. Experiments of Galvanometer.
3. Study of Bridge (Kalvin"s, Maxwell, Anderson, Hay"s, Wein).

Electronic Devices

ECA-304

ECA-304	Electronic Devices	03L:0T:0P	3 credits	3 Hrs/Week

Course Preambles:

1. To understand operation of semiconductor devices.
2. To understand DC analysis and AC models of semiconductor devices.
3. To apply concepts for the design of Regulators and Amplifiers
4. To verify the theoretical concepts through laboratory and simulation experiments.
5. To implement mini projects based on concept of electronics circuit concepts.

Course Outcomes:

1. Understand the current voltage characteristics of semiconductor devices,
2. Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation,
3. Design and analyze of electronic circuits,
4. Evaluate frequency response to understand behavior of Electronics circuits.

Unit-I (10H)

Introduction to Semiconductor Physics: Review of Quantum Mechanics, Electrons in periodicLattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon.

Unit-II (10H)

Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors.

Unit-III (10H)

Generation and recombination of carriers Poisson and continuity equation P-N junction characteristics, I-Vcharacteristics, and small signal switching models; Avalanche breakdown,Zener diode, Schottky diode.

Unit-IV(6H)

Bipolar Junction Transistor, I-V characteristics, Ebers-Moll Model,MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor, LED, photodiode and solar cell.

Unit-V (6H)

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Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography,etching, chemical vapor deposition, sputtering, twin-tub CMOS process.

Text /Reference Books:

1. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7th edition, Pearson,2014.
2. D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley &Sons, 2006.
4. C.T. Sah, "Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.
5. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ.Press, 2011.

ECA-304	Electronic Devices	0L:0T:2P	1 credits	2 Hrs/Week

List of Experiments (Expandable):

All experiments (wherever applicable)

.Step 1: Circuit should be designed / drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation Software

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB by one batch using PCB machine.

1. V-I characteristics of various Diodes (p-n, Zener, Varactor, Schottky, Tunnel, Photodiode etc)
2. Characteristics of Transistors (BJT and FET)

3. Study of Power electronic devices (Diac, Triac, SCR, Power MOSFET, IGBT etc

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Network Analysis and Synthesis

ECA-305

ECA-305	Network Analysis and Synthesis	2L:1T:0P	3 credits	2 Hrs/Week

Course Preambles:

1. To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
2. To introduce students with the fundamental concepts in graph theory.
3. To analyze circuits in time and frequency domain.
4. To explain concepts of driving point and transfer functions, poles and zeroes of network functions and their stability.
5. To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.
6. To synthesize the network using passive elements.

Course Outcomes:

1. Apply concepts of electric network topologydes, branches, loops to solve circuit problems including the use of computer simulation.
2. Understand the basic concepts of graph and analyze the basic electrical circuits using graph theory.
3. Apply time and frequency concepts of analysis.
4. Understand various functions of network and also the stability of network.
5. Learn the various parameters and the irinterrelationship, able to solve numericals with series, cascade, parallel connection using two port parameters.
6. Synthesize the network using passive elements.

Unit-I (10H)

Node and Mesh Analysis, matrix approach of network containing voltage and current sources,andreactances, source transformation and duality. Network theorems: Superposition, reciprocity,Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem asapplied to AC. circuits.

Unit-II(10H)

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Trigonometric and exponential Fourier series: Discrete spectra andsymmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs ,power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

Unit-III(10H)

Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

Unit-IV(6H)

Transient behavior, concept of complex frequency, Driving points and transfer functions polesand zeros of emittance function, their properties, sinusoidal response from pole-zero locations convolution theorem and Two four port network and interconnections.

Unit-V(6H)

Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters.

Text/Reference Books

1. Van, Valkenburg.; "Network analysis" ; Prentice hall of India, 2000
2. Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994
4. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education

ECA-305	**Network Analysis and Synthesis**	**0L:0T:2P**	**1credits**	**2 Hrs/Week**

List of experiments

1.To Verify Thevenin Theorem.

2. To Verify Superposition Theorem.

3. To Verify Reciprocity Theorem.

4. To Verify Maximum Power Transfer Theorem.

5. To Verify Millman's Theorem.

6. To Determine Open Circuit parameters of Two Port Network.

7. To Determine Short Circuit parameters of a Two Port Network.

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8. To Determine A,B, C, D parameters of a Two Port Network

9. To Determine h parameters of a Two Port Network

10. To Find Frequency Response of RLC Series Circuit.

11. To Find Frequency Response of RLC parallel Circuit.

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SIMULATION LAB

ECA-306

ECA-306	SIMULATION LAB	0L:0T:2P	1 credits	2Hrs/Week

Course Preambles:

1. Basic course for designing of PCB using software. The major objective is to select and use appropriate.
2. Test equipment and This is a procedures from a wide range of possibilities; to analyse and interpret test results and measurements on electric base.
3. Circuits, in terms of theoretical models, to predict the performance of electric circuits from device characteristics and to design .
4. Electronic printed circuit board for a specific application using industry standard software.

Course outcomes

1. Able to analyze the fabrication processes of printed circuit boards.
2. Perform the chemical and mechanical processes by using negative/positive masks
3. Students are able to define how to operate the software and hardware (i.e. drilling, etching/routing, milling equipments as well as the developer and etcher machines)

PCB DESIGNING SOFTWARE Study of circuit simulation software (any one- TINA-PRO/ PSPICE/ CIRCUIT MAKER/ GPSIM/ SAPWIN etc).

Overview and Study of the key features and applications of the software. Application of the software in the field of Electronic Devices, Electronic Instrumentation and Network Analysis Design, Optimization and simulation of

1. Basic Electronic circuits (examples rectifiers, clippers, clampers, diode, transistor characteristics etc). 2. Transient and steady state analysis of RL/ RC/ RLC circuits, realization of network theorems.

3. Use of virtual instruments built in the software. Study of PCB layout software Overview and use of the software in optimization, designing and fabrication of PCB pertaining to above circuits simulated using above simulation software or other available. Students should simulate and design the PCB for at least two circuits they are learning in the current semester.

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ECA-307

GD / SS

ECA-307	**Self-study /GD Seminar (Internal Assessment)**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

Course Preambles:

1. Collecting data and Breeding fresh ideas and taking inputs from a particular group
2. Perception of common people on a particular topic
3. Identify a solution to a specific problem or issue
4. Selecting candidates after their written test for hiring in a company
5. Selecting candidates for admission in an educational institute

Course outcomes

1. Understanding of the Subject: During a group discussion, it is being constantly assessed how deep your knowledge is about the chosen topic and how well you are aware of each aspect of that topic

2. Team Work: While working in an organization or even during management studies, it is very important to work as a part of the team in a given project or any assignment. This skill is really important and it is evaluated through GD as well. You not only put your own points but also listen to others and then come to a concluding point. This shows how ready you are to listen to other's opinion, give value to that and also at the same time stand by your own convictions.

Objective of GD and seminar is 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

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Energy, Ecology, Environment and Society

BEA-401

BEA-401	**Energy, Ecology, Environment & Society**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preamble:

The program is highly relevant to both the public sector and the private sector. Knowledge about sustainable development, energy and environmental challenges are expected to increase sharply in the future. Such social change also requires new ways of thinking. In-depth knowledge in these areas will therefore be on high demand. The multidisciplinary approach of this master will undoubtedly strengthen the relevance of social science graduates for both public and private secto

Course Outcomes

1. Knowledge of energy carriers, energy technologies, energy challenges, digitalization and ICT related to energy system integration.

2. Advanced knowledge of transition theory and other theoretical perspectives on politics and policy changes.

3. Advanced knowledge of national and international energy politics and policy.

4. Advanced knowledge of the challenges associated with a low carbon transition, and how this affects both societal structures and individual lives in an intersectional perspective.

5. Advanced knowledge of strategies and actions necessary for a low carbon transition

UNIT -1(10H)

Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources.

UNIT-2(10H)

Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation

UNIT-3(10H)

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(6H)

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(6H)

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. RanaSVS ; "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. BalaKrishnamoorthy; "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

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Digital Electronics

ECA-402

ECA-402	Digital Electronics	2L:1T:0P	3 Credits	3Hrs/Week

Course Preamble:

1. To understand number representation and conversion between different representation in digital electronic circuits.
2. To analyze logic processes and implement logical operations using combinational logic circuits.
3. To understand characteristics of memory and their classification.
4. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines.
5. To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.

Course Outcomes

1. Develop a digital logic and apply it to solve real life problems.
2. Analyze, design and implement combinational logic circuits.
3. Classify different semiconductor memories.
4. Analyze, design and implement sequential logic circuits.
5. Analyze digital system design using PLD.

Unit-I(10H)

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and DeMorgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

Unit-II(10H)

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half andFull Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

Unit-III(10H)

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Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulsetrain generator, Pseudo Random Binary Sequence generator, Clock generation.

Unit-IV(6H)

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

Unit-V(6H)

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL ,Data type sand objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition ,2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

ECA-402	Digital Electronics	0L:0T:1P	1 Credits	2Hrs/Week

List of Experiments:

1. Study of various basic gates(IC 7400,7402,7404,7486,7408 etc.) & to verify its truth table.

2. Verify the operation of NAND and NOR gates as universal gates.

3. Study of half and full adder / half and full subtractor& verify its truth table.

4. Study of 4:1 and 8:1 MUX and verify its truth table.

5. Study of 2x4 and 4x8 DEMUX and verify its truth table.

6. Verify truth table of SR, JK, T and D flip-flops using IC 7473, IC 7474 and IC7476.

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7. Study the decade counter using IC7490 and verify its operation using truth table.

8. Study the 4-bit ripple counter using IC7493 and verify its operation. Plot the waveform at output of each flip

Signals and System

ECA-403

ECA-403	Signals and System	3L:0T:0P	3 Credits	3Hrs/Week

Course Preamble:

1. To introduce students the concept and theory of signals and systems needed in electronics and telecommunication engineering fields.

2. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domain

Course Outcomes

1. Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them,
2. Understand use of transforms in analysis of signals and system in continuous and discrete time domain.
3. Observe the effect of various properties and operations of signals and systems.

Unit-I (10H)

Signals and systems as seen in everydaylife, and in various branches of engineering and science.Energy and power signals, continuous and discrete time signals, continuous and discreteamplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability.

Unit-II (10H)

Linear shift-invariant (LSI) systems, impulse response and step response, convolution, inputoutputbehavior with aperiodic convergent inputs. Characterization of causality and stability oflinear shift-invariant systems.System representation through differential equations anddifference equations.

Unit-III(10H)

Periodic and semi-periodic inputs to an LSI system, the notion of a frequencyresponse and itsrelation to the impulse response, Fourier series representation, the Fourier Transform,convolution/multiplication and their effect in the frequency domain, magnitude and

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phaseresponse, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and theDiscrete Fourier Transform (DFT).Parseval'sTheorem.The idea of signal space and orthogonal Bases.

Unit-IV(6H)

The Laplace Transform, notion ofeigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution todifferential equations and system behavior.The z-Transform for discrete time signals and systems- eigen functions, region of convergence,z-domain analysis.

Unit-V(6H)

State-space analysis and multi-input, multi-output representation.The state-transition matrix andits role. The Sampling Theorem and its implications- Spectra of sampled signals.Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and itseffects.Relation between continuous and discrete time systems.

Text/Reference books:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.
3. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.
4. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.

ECA-403	**Signals and System**	**0L:0T:2P**	**1 Credits**	**2 Hrs/Week**

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.

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Analog Communication
ECA-404

ECA-404	Analog Communication	3L:0T:0P	3 Credits	3Hrs/Week

Course Preamble:

1. The fundamentals of basic communication system, types of noise affecting communication system and noise parameters.
2. Need of modulation, modulation processes and different amplitude modulation schemes
3. Different angle modulation schemes with different generation and detection methods.
4. Various radio receivers with their parameters.
5. Need of sampling and different sampling techniques.

Course Outcomes

1.Understand different blocks in communication system and how noise affects communication using different parameters.
2. Distinguish between different amplitude modulation schemes with their advantages, disadvantages and applications..
3. Analyze generation and detection of FM signal and comparison between amplitude and angle modulation schemes.
4. Identify different radio receiver circuits and role of AGC.
5. Sample analog signal and recover original.

Unit-I (10H)

Review of signals and systems, Frequency domain representation of signals, Principles ofAmplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

Unit-II(10H)

Review of probability and random process. Gaussian and white noise characteristics,Noiseinamplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.

Unit-III(10H)

Pulse modulation.Sampling process. Pulse Amplitude and Pulse code modulation (PCM),Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

Unit-IV(6H)

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquistcriterion.Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

Unit-V(6H)

Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.

Text/Reference Books:

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
4. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering",John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers, 2004.
6. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000.

ECA-404	**Analog Communication**	**0L:0T:2P**	**1 Credits**	**2 Hrs/Week**

List of Experiments:

1.Analysis of AM Modulation and Demodulation Techniques (Transmitter and Receiver), Calculation of Parameters.

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2. Analysis of FM Modulation and Demodulation (Transmitter and Receiver) and Calculation of Parameters .

3. To Construct and Verify Pre-emphasis and De-emphasis and Plot the Waveforms.

4. Study of Super-heterodyne Receiver and Characteristics of Radio Receiver.

5. To Construct Frequency Multiplier Circuit and to Observe the Waveform

6. Study of AVC and AFC.

7. Study of PLL chip (566) and its use in various systems.

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Electronic Instrumentation

ECA-405

ECA-405	Electronic Instrumentation	2L:1T:0P	3 Credits	3Hrs/Week

Course Preamble:

1. To provide basic knowledge about the various sensors and data acquisition systems applied in Wireless sensor network.
2. To provide fundamental concepts of control system such as mathematical modeling, time response and frequency response.
3. To develop concepts of stability and its assessment criteria.

Course Outcomes

1. Students will be able to explain principle of operation for various sensors.
2 .Students will be able to describe functional blocks of data acquisition system.
3. Students will be able to find transfer functions for given system.

Unit-I (10H)

Measurement and Error: Accuracy and Precision, Sensitivity, Linearity, Resolution, Hysterisis, Loading Effect. Measurements of Current, Voltage, Power and Impedance: DC and AC Ammeter, DC VoltmeterChopper type and solid-state, AC voltmeter using Rectifier, Average, RMS, Peak Responding voltmeters, Multi-meter, Power meter, Bolometer and Calorimeter.

Unit-II (10H)

Cathode Ray Oscilloscope (CRO): Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration, Screen for CRTs, Graticules, Vertical and Horizontal deflection system, Time base circuit, Oscilloscope Probes, Applications of CRO, Special purpose CROsMulti input, Dual trace, Dual beam, Sampling, Storage (Analog and Digital), Oscilloscope.

Unit-III (10H)

AC Bridges: Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge (High voltage and Relative permittivity), Wein bridge, Wagner earth detector, Impedance measurement by Q-meter. Non-Electrical Quantities (Transducer): Classification of Transducers, Strain gauge, Displacement Transducer- Linear Variable Differential Transformer (LVDT) and

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Rotary Variable Differential Transformer (RVDT), Temperature Transducer- Resistance Temperature Detector (RTD), Thermistor, Thermocouple, Piezo-electric transducer, Optical Transducer- Photo emissive, Photo conductive, Photo voltaic, Photo-diode, Photo Transistor, Nuclear Radiation Detector.

Unit-IV (6H)

Signal generator & Display: Signal and Function Generators, Sweep Frequency Generator, Pulse and Square Wave Generator, Beat Frequency Oscillator, Digital display system and indicators, Classification of Displays, Display devices, Light Emitting diodes(LED), Liquid Crystal Display(LCD).

Unit-V (6H)

Digital Measurement and Instruments: Advantages of Digital Instrument over Analog Instrument, Digital-to-analog conversion (DAC) - Variable resistive type, R-2R ladder Type, Binary ladder, Weighted converter using Op-amp and transistor, Practical DAC. Analog-to-digital Conversion (ADC) -Ramp Technique, Dual Slope Integrating Type, Integrating Type (voltage to frequency), Successive Approximations, digital voltmeters and multi-meters, Resolution and sensitivity of digital meter, PLC structure, principle of operation, response time and application.

References:

1. H. S. Kalsi: Electronics Instrumentation, TMH.

2. K. Sawhney: Instrumentation and Measurements, DhanpatRai and Co.

3. Helfric and Cooper: Modern Electronic Instrumentation and Measurement Techniques; Pearson.

ECA-405	Electronic Instrumentation	0L:0T:2P	1 Credits	3Hrs/Week

List of Experiments: All experiments (wherever applicable) should be performed through the following steps. Step 1: Circuit should be designed/drafted on paper. Step 2: The designed/drafted circuit should be simulated using Simulation Software Grading System 2015-16 Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. Step 4: The bread board circuit should be fabricated on PCB by one batch using PCB machine.

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1. Study of CRO and Function Generator.

2. Displacement measurement by LVDT.

3. Force measurement by strain gauge.

4. Measurement of Capacitor, Self-induction using Q-meter.

5. Temperature measurement by thermistor, RTD and thermocouple.

6. Optical Transducer- Photo conductive, Photo voltaic, Photo-diode, Photo-Transistor

7. Design of digital to analog converter.

8. PLC operation and applications (for example: relay, timer, level, traffic light etc.)

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Simulation Lab-II

ECA-406

ECA-406	Simulation Lab-II	0L:0T:2P	1 Credits	2Hrs/Week

Course Preamble:

1. To impart the fundamental knowledge on using various analytical tools like ANSYS, FLUENT,etc., for Engineering Simulation.
2. To know various fields of engineering where these tools can be effectively used to improve the output of a product.
3. To impart knowledge on how these tools are ued in Industries by solving some real time problems using these tools..

Course Outcomes

1. The student will be able to appreciate the utility of the tools like ANSYS or FLUENT in solving real time problems and day to day problems.

2. Use of these tools for any engineering and real time applications.

3. Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their employment.

ADVANCED SIMULATION/ VERIFICATION SOFTWARE Study of simulation/ verification software (any one- LAB-VIEW/KTECHLAB/ GNU CIRCUIT ANALYSIS PACKAGE/ LOGISIM/ MULTISIM/ SCILAB etc)

Overview and Study of the key features and applications of the software.

Application of the software in the field of Electronic Circuits, Digital Electronics and Analog Communication. Design, Optimization, simulation and verification of

1. Electronic circuits (example amplifiers, oscillators etc).

2. Realization and verification of various digital electronic circuits (example logic gates, adders, subtractorsetc)

3. Realization of various signals and communication link etc.

Students should simulate and verify at least six circuits they are learning in the current semester

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ECA- 407- Industrial Training – I

ECA- 407	Industrial Training – I	0L:0T:2P	1 Credits	2Hrs/Week

Course Preamble:

What new skills will I learn or hope to learn during the internship? Some skills you may have the chance to develop include: operating office or computer equipment; handling a variety of situations simultaneously; organizing or analyzing data, records, or budgets; or improving teamwork, writing, and speaking abilities. Assignments and work environment will determine the types of skills developed.

Course Outcomes

1. Explore career alternatives prior to graduation.
2. Integrate theory and practice.
3. Assess interests and abilities in their field of study.
4. Learn to appreciate work and its function in the economy.
5. Develop work habits and attitudes necessary for job success.
6. Develop communication, interpersonal and other critical skills in the job interview process.
7. Build a record of work experience.
8. Acquire employment contacts leading directly to a full-time job following graduation from college.

1. Internship on area in Electronics filed .

Note- In this internship student should complete 90 Hr Internship on Electronics filed

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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

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Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore.
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 Electronics and Communication Engineering

Minutes of Board of Studies Committee Meeting (ONLINE MEETING) Dated : 08.6.2020

The Board of Studies Committee Meeting was held in the room of HOD (EC) at 10:30 AM on 08.06.2020. Following members were present.

1) Dr. Mukesh Tiwari (Chairmen)
2) Mr. Vijay Prakash Singh (Member)
3) Dr. Prabodh Khampariya (Member)
4) Ms. Alka Thakur (Member)
5) Mr. Devendra Patle (Member)
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 EC-5th and 6th 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 5th and 6th semester

1. Course structures
2. Proposed teaching pedagogies
3. Academic flexibilities like honors with extract credits acquired through either advanced study of same courses or with procuring additional credits form additional courses as per student's choice.
4. Regular B. E degree *along with specialization* by acquiring credits for *professional electives* from courses of specific domain or regular degree (without specialization) from professional electives as per student choice (may not belong to a specific domain).
5. Open electives offered by other departments.
6. Learning difficulties and addressing them
7. Career and academic counseling.
8. Credited co-curricular activities.
9. Skilling in professional domains and branch specific areas to promote industry ready competency among learners.
10. Necessary certification curses
11. Inculcation of societal and ethical concern etc., regarding.

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Minutes of the Meeting of Board of Studies (BOS), ECE Department

BOS Online Meeting of ECE was conducted on 08-06-2020 at 2:30 PM in Department of Electronics and Communications Engineering.

Minutes of meeting:

1. Chairman of the Board Dr. Mukesh Tiwari , addressed the members and introduced external BOS Members to the board and further internal members introduced themselves.
2. Address by chair regarding the rationale for the proposal of new curriculum.
3. Chairman of the Board Dr. Mukesh Tiwari, explained the guidelines, commonalities, workshop to suit discipline requirements and uniqueness (40% practical and 60% Theory based curriculum) of AICTE curriculum for 5th & 6th Sem.
4. Proposed curriculum presented by Chair.

General Comments:

1. Dr. Mukesh Tiwari & Dr. N.P. Patidar expressed their concern about motivating students towards domain specific courses in induction program .
2. Mr. Vijay Prakash Singh & Mr. Amit Raje asked the reason behind a few courses in V to VI semester without dedicating learners to project work?
3. Dr. Prabodh Khampariya about certifications and recommended to include some sensors based activity as a part of curriculum keeping in view of IOT for near future, may be as an inter disciplinary open elective.
4. Contents of Professional electives should be revisited keeping in view of the syllabus coverage of core courses, suggested by Ms.Alka Thakur
5. Inclusion of case studies in professional courses, where ever possible, suggestion by Mr. Devendra Patle.

Course related comments

1. Dr. Mukesh Tiwari asked to downsize university common syllabus in workshop course.
2. Dr. Prabodh Khampariya suggested the inclusion of Band pass sampling concepts to the syllabus of course Signal and systems.
3. Mr. Vijay Prakash Singh recommended offering a separate course on 'CMOS and ITC.

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

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

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Electronics and Communication 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	ECA-501	Computer Architecture	60	30	10	30	20	150	2	1	2	4
2	ECA-502	Digital Signal Processing	60	30	10	30	20	150	2	1	2	4
3	ECA-503	CMOS Design	60	30	10	30	20	150	2	1	2	4
4	ECA-504	Program Elective-I	60	30	10	-		100	3	1	0	4
5	ECA-505	Open Core Elective - I	60	30	10	-		100	3	1	0	4
6	ECA-506	Industrial Training-I				150	100	250			4	2
	TOTAL		300	150	50	240	160	900	12	5	10	22

Program Elective-I	ECA-504(A) Power Electronics	ECA-504(B) Nano Electronics	ECA-504(C)Neural Network
Open Core Elective - I	ECA-505(A) Scientific computing	ECA-505(B) Data Compression & Cryptography	ECA-505(C)Operating System

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Electronics and Communication 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	ECA-601	Control Systems	60	30	10	30	20	150	2	1	2	4
2	ECA-602	Optical Communication	60	30	10	30	20	150	2	1	2	4
3	ECA-603	Program Elective-II	60	30	10			100	3	1	0	4
4	ECA-604	Program Elective-III	60	30	10	-		100	3	1	0	4
5	ECA-605	Open Core Elective - II	60	30	10	-		100	3	1	0	4
6	ECA-606	Minor Project	-	-	-	180	120	300	-	-	4	2
	TOTAL		300	150	50	240	160	900	13	3	8	20

Program Elective-II		
ECA-603	(A) Computer Networks	(B) Information Theory and Coding

Program Elective-III		
ECA-604	(A) Digital Image & Video Processing	(B) Speech and Audio Processing

Open Core Elective - II		
ECA-605	(A) Introduction to MEMS	(B) Bio-Medical Electronics

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SEMESTER -V

ECA-501

Computer Architecture

ECA-501	Computer Architecture	2L:1T:0P	3 credits	2Hrs/Week

Course Preambles:

To understand the structure, function and characteristics of computer systems. To understand the design of the various functional units and components of computers. To identify the elements of modern instructions sets and their impact on processor design.

Course Outcomes:

1. learn how computers work
2. know basic principles of computer's working
3. analyze the performance of computers
4. know how computers are designed and built
5. Understand issues affecting modern processors (caches, pipelines etc.).

UNIT-I(10H)

Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Ques, Subroutines.

UNIT-II (6H)

Processor organization, Information representation, number formats.

UNIT-III(10H)

Multiplication & division, ALU design, Floating Point arithmetic, IEEE 754 floating point formats Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit.

UNIT-IV (10H)

Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit.

Microprogrammed computers - CPU control unit Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory.

UNIT-V(6H)

System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network.

Text/Reference Books:

1. V.CarlHammacher, "Computer Organisation", Fifth Edition.

2. A.S.Tanenbum, "Structured Computer Organisation", PHI, Third edition

3. Y.Chu, "Computer Organization and Microprogramming", II, Englewood Chiffs, N.J., Prentice Hall Edition

4. M.M.Mano, "Computer System Architecture", Edition

5. C.W.Gear, "Computer Organization and Programming", McGraw Hill, N.V. Edition 6. Hayes J.P, "Computer Architecture and Organization", PHI, Second edition

ECA-501	Computer Architecture	0L:0T:2P	1 credits	2Hrs/Week

Experiment List-

1. Write the working of 8085 simulator GNUsim8085 and basic architecture of 8085 along with small introduction.

2. Study the complete instruction set of 8085 and write the instructions in the instruction set of 8085 along with examples.

3. Write an assembly language code in GNUsim8085 to implement data transfer instruction.

4. Write an assembly language code in GNUsim8085 to store numbers in reverse order in memory location.

5. Write an assembly language code in GNUsim8085 to implement arithmetic instruction.

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ECA-502

Digital Signal Processing

ECA-502	Digital Signal Processing	2L:1T:0P	3 Credits	2Hrs/Week

Course Preambles:
The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation and analysis DSP systems.

Course 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 applications

Unit-I(10H)
Introduction to Digital Signal Processing, Discrete time signals & systems, linear shift invariant systems, stability and causality, Linear-constant coefficient difference equations, Frequency domain representation of discrete time signals and systems, properties of the Discrete Time Fourier transform (DTFT), Sampling and discrete time processing of continuous-time signals.

Unit-II(10H)
Applications of z-transforms, solution of difference equations of digital filters, System function, stability criterion, frequency response of stable systems, one sided Z-transform and its applications.

Unit-III(10H)
Discrete Fourier series: Properties of discrete Fourier series, DFS representation of periodic sequences. Discrete

Fourier Transforms: Properties of DFT: Fast Fourier Transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms. Inverse FFT.

Unit-IV (6H)
IIR DIGITAL FILTERS: Analog filter approximations - Butterworth and Chebyshev, Design of

IIR Digital filters from analog filters, Bilinear transformation method, step & impulse invariance techniques, Spectral Transformations, Realization of IIR digital filters - direct, canonic, cascade & parallel forms.

Unit-V(6H)

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters frequency response, Design of FIR Digital Filters using Window Techniques. Comparison of IIR and FIR filters, Realization of FIR digital filters direct, linear phase, cascade & parallel forms.

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.

ECA-502	Digital Signal Processing	0L:0T:2P	1Credits	2Hrs/Week

List of Experiments (Extendable)

1. Generation, analysis and plots of discrete-time signals.

2. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding

3. Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality.

4. Computation and plots of z-transforms, verification of properties of z-transforms.

5. Computation and plot of DFT of sequences, verification of properties of DFT.

6. Implementation of various window design techniques (Rectangular, Bartlett, Hann, Hamming

ECA-503
CMOS Design

ECA-503	CMOS Design	2L:1T:0P	3 Credits	2Hrs/Week

Course Preambles:

1. To learn basic CMOS Circuits.
2. To learn CMOS process technology.
3. To learn techniques of chip design using programmable devices.
4. To learn the concepts of designing VLSI Subsystems.

Course Outcomes:
At the end of the course the students will be able to
1. Design different CMOS circuits using various logic families along with their circuit layout.
2. Use tools for VLSI IC design.

UNIT-I(6H)

Review of MOS transistor models, Non-ideal behavior of the MOS Transistor.

UNIT-II(10H)

Transistor as a switch. Inverter characteristics, Integrated Circuit Layout: Design Rules, Parasitics. Delay: RC Delay model, linear delay model, logical path efforts.

UNIT-III(6H)
Power, interconnect and Robustness in CMOS circuit layout.

UNIT-IV(10H)
Combinational Circuit Design: CMOS logic families including static, dynamic and dual rail logic.

UNIT-V(10H)
Sequential Circuit Design: Static circuits. Design of latches and Flip-flops.

'Text/Reference Books:
1. N.H.E. Weste and D.M. Harris, CMOS VLSI design: A Circuits and Systems Perspective, 4thEdition, Pearson Education India, 2011.
2. C.Mead and L. Conway, Introduction to VLSI Systems, Addison Wesley, 1979.
List of Experiments:

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1. Design Universal gates and all other gates using S-edit and getting its transient response
2. Obtain the DC- characteristics of CMOS Inverter using DC-analysis.
3. Design Symbol of CMOS Inverter and using instances of its getting transient response.
4. Design Symbol of Universal gates and using instances of them getting transient response.
5. Design a Transmission gate using PMOS & NMOS by instance calling.
6. Design the Layout of NMOS and PMOS transistor.
7. Design the Layout of CMOS Inverter.

ECA-503	CMOS Design	0L:0T:2P	1 Credits	2Hrs/Week

LIST OF EXPERIMENTS

1 .Familiarization with MOS model parameters in PSPICE software.
2 .Simulation of MOS Inverter with different loadsusing PSPICE software.
3 .Simulation of CMOS Inverter for different parameters *Kn*, *Kp*as a design variablein PSPICE software.
4.Study of the switching characteristics of CMOS Inverter and find out noise margins.
5. Simulate CMOS amplifier using PSPICE software.

6. Layout design of a CMOS Inverter using any layout design tool.

7. Layout design of a 2-input CMOS NAND/NOR gate using any layout design tool.

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Program Elective-I
ECA-504(A)
Power Electronics

ECA-503(A)	**Power Electronics**	**3L:1T:0P**	**4 Credits**	**2Hrs/Week**

Course Preambles:

1.To understand and acquire knowledge about various power semiconductor devices.

2.To prepare the students to analyze and design different power converter circuits.

Course Outcomes:
At the end of this course students will demonstrate the ability to
1. Build and test circuits using power devices such as SCR
2. Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters,
3. Learn how to analyze these inverters and some basic applications.
4. Design SMPS.

UNIT-I(10H)

Characteristics of Semiconductor Power Devices: Thyristor, power MOSFET and IGBTTreatment
should consist of structure, Characteristics, operation, ratings, protections and thermai considerations. Brief introduction to power devices viz. TRIAC, MOS controlled thyristor (MCT), Power Integrated Circuit (PIC) (Smart Power), Triggering/Driver, commutation and snubber circuits for thyristor, power MOSFETs and IGBTs (discrete and IC based).Concept of fast recovery and schottky diodes as freewheeling and feedback diode.

UNIT-II(10H)

Controlled Rectifiers: Single phase: Study of semi and full bridge converters for R, RL, RLE and level loads. Analysis of load voltage and input current- Derivations of load form factor and ripple factor, Effect of source impedance, Input current Fourier series analysis of input current to derive input supply power factor, displacement factor and harmonic factor.

UNIT-III(10H)

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Choppers: Quadrant operations of Type A, Type B, Type C, Type D and type E choppers, Control techniques for choppers – TRC and CLC, Detailed analysis of Type A chopper. Step up chopper. Multiphase Chopper.

UNIT-IV(6H)

Single-phase inverters: Principle of operation of full bridge square wave, quasi-square wave, PWM inverters and comparison of their performance. Driver circuits for above inverters and mathematical analysis of output (Fourier series) voltage and harmonic control at output of inverter (Fourier analysis of output voltage). Filters at the output of inverters, Single phase current source inverter.

UNIT-V(6H)

Switching Power Supplies: Analysis of fly back, forward converters for SMPS, Resonant converters - need, concept of soft switching, switching trajectory and SOAR, Load resonant converter – series loaded half bridge DC-DC converter. Applications: Power line disturbances, EMI/EMC, power conditioners. Block diagram and configuration of UPS, salient features of UPS, selection of battery and charger ratings, sizing of UPS. Separately excited DC motor drive.P M Stepper motor Drive.

Text /Reference Books:

1. Muhammad H, Rashid, "Power electronics" Prentice Hall of India.
2. Ned Mohan, Robbins, "Power electronics", edition III, John Wiley and sons.
3. P.C. Sen., "Modern Power Electronics", edition II, Chand& Co.
4. V.R.Moorthi, "Power Electronics", Oxford University Press.
5. Cyril W., Lander," Power Electronics", edition III, McGraw Hill.
6. G K Dubey, S R Doradla,:Thyristorised Power Controllers", New Age International Publishers.SCR manual from GE, USA.

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ECA-504(B) Nano Electronics

ECA-504(B)	Nano Electronics	3L:1T:0P	4 Credits	2Hrs/Week

Course Preambles:

The major objectives are to provide students with knowledge and understanding of nano-electronics as an important interdisciplinary subject.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand various aspects of nano-technology and the processes involved in making nano components and material.
2. Leverage advantages of the nano-materials and appropriate use in solving practical problems.
3. Understand various aspects of nano-technology and theprocesses involved in making nano components and material.
4. Leverage advantages of the nano-materials and appropriate use in solving practical problems.

UNIT-I(10H)

Introduction to nanotechnology, mesostructures,Basics of Quantum Mechanics: Schrodinger equation, Density of States.

UNIT-II(10H)

Particle in a box Concepts, Degeneracy.Band Theory of Solids.Kronig-Penny Model. Brillouin Zones.

UNIT-III(10H)

Shrink-down approaches: Introduction, CMOS Scaling, The nanoscale MOSFET, Finfets, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.).

UNIT-IV(6H)

Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors,Carbon nanotube electronics, Bandstructure and transport, devices.

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UNIT-V(6H)

Applications, 2D semiconductors and electronic devices, Graphene, atomistic simulation.

Text/ Reference Books:

1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson, 2009.
2. W. Ranier, Nanoelectronics and Information Technology (Advanced Electronic Materialand Novel Devices), Wiley-VCH, 2003.
3. K.E. Drexler, Nanosystems, Wiley, 1992.
4. J.H. Davies, The Physics of Low-Dimensional Semiconductors, Cambridge University Press, 1998.
5. C.P. Poole, F. J. Owens, Introduction to Nanotechnology, Wiley, 2003

ECA-505(A)
Data Compression & Cryptography

ECA-505(A)	Data Compression & Cryptography	3L:1T:0P	4 Credits	3 Hrs/Week

Course Preambles:
This course will cover the concept of security , types of attack experienced, encryption and authentication for deal with attacks, what is data compression, need and techniques of data compression

Course Outcomes
At the end of this course the student will have the knowledge of Plaintext, cipher text, RSA and other cryptographic algorithm, Key Distribution, Communication Model, Various models for data compression

Unit-I (10H)
Introduction to the Concept of Security: Introduction, The Need of Security, Security Approaches, Principal of Security, Types of Attacks.

Unit- II (10H)
Cryptographic Techniques: Introduction, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks .

Unit-III (10H)
Computer-based Symmetric Key Cryptographic Algorithms: Introduction, Algorithm Types and Models, An Overview of Symmetric Key Cryptography, Data Encryption Standard(DES), International Data Encryption Algorithm(IDEA), RC5, Blowfish, Advanced Encryption Standard(AES), Differential and Linear Cryptanalysis.

Unit- IV (6H)
Computer-based Asymmetric Key Cryptographic Algorithms: Introduction, Brief History of Asymmetric Key Cryptography, An Overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Knapsack Algorithm, Some other Algorithms.

Unit- V (6H)
Public Key Infrastructure (PKI): Introduction, Digital Certificates, Private Key Management, The PKIX Model, Public Key Cryptography standard(PKCS), XML, PKI and Security .

References: 1.Behrouz A. Forouzan and D. Mukhopadhyay- Cryptography & Network Security, 2nd Edition - 1 st reprint 2010, McGraw Hill, New Delhi.
2.WadeTrapple, Lawrence C. Washington- Introduction to Cryptography with coding Theory, 2nd Edition pearson Education.

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ECA-505(B)
Operating System

ECA-505(B)	Operating System	3L:1T:0P	4 Credits	2Hrs/Week

Course Preambles:

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS

Course Outcomes

Students will be able to:

1. Analyze the structure of OS and basic architectural components involved in OS design
2. Analyze and design the applications to run in parallel either using process or thread models of different OS
3. Analyze the various device and resource management techniques for timesharing and distributed systems

UNIT I (10H)

Introduction:- History of operating System, Types of Operating System: Batch Processing, RealTime, Multitasking & Multiprogramming, Time-sharing system, Operating system services,Operating system structure, System Cal! & System Boots, Operating system design &Implementations, System protection, Buffering & Spooling.

UNIT II (10H)

Processes Management:- The Process concept, The process control block, Systems programmer'sview of processes, Operating system services for process management, Scheduling algorithms, FirstCome first serve, Round Robin, Shortest run time next, Highest response ratio next, MultilevelFeedback Queues, Performance evaluation of scheduling algorithms stated above.

UNIT III (10H)

Deadlock:- Characterization, Methods for deadlock handling, deadlock prevention, deadlockavoidance, 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 &DrumScheduling, File system in Linux & Windows

UNIT IV (6H)

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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, InterruptService Routine.

UNIT V (6H)

Memory Management:- Memory Hierarchy, MFT & MVT, logical and physical address space,Concept of swapping and Paging, Memory management without swapping or paging, contiguousand 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 opera
tingsystem",PHI Learning

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Industrial Training-I
ECA-506

ECA-506	**Industrial Training-I (Minor)**	**0L:0T:4P**	**2 credits**	**2Hrs/Week**

Course Preamble:

1. To expose the students to actual working environment of Electronics 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.

Course 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.
- Organizational 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.

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Semester – VI

Control Systems
ECA-601

ECA-601	Control Systems	2L:1T:0P	3 credits	2Hrs/Week

Course Preamble

1. The students should be able to learn the type of System, dynamics of physical systems, classification of control system, analysis and design objective.
2. The students should learn how to represent system by transfer function and block diagram reduction method and Mason's gain formula.
3. The students should able to learn time response analysis and demonstrate their knowledge frequency response.
4. Students can be able to learn stability analysis of system using Root locus, bode plot, polar plot, and Nyquist plot.

Course Outcomes:

1. Identify open and closed loop control system
2. Formulate mathematical model for physical systems.
3. Simplify representation of complex systems using reduction techniques.
4. Use standard test signals to identify performance characteristics of first and second-order systems.
5. Apply root locus technique for stability analysis.
6. Analyze performance characteristics of system using Frequency response methods

UNIT-I(10H)

Introduction to control problem- Industrial Control examples. Transfer function. System with dead-time.System response. Control hardware and their models: potentiometers, synchros, LVDT, dc and ac servomotors, tacho-generators, electro hydraulic valves, hydraulic servomotors, electro pneumatic valves, pneumatic actuators. Closed-loop systems. Block diagram and signal flow graph analysis.

UNIT-II(10H)

Feedback control systems- Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness. proportional, integral and derivative systems. Feedforward and multi-loop control configurations, stability concept, relative stability, Routh stability criterion.

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UNIT-III(10H)

Time response of second-order systems, steady-state errors and error constants. Performance specifications in time-domain. Root locus method of design. Lead and lag compensation.

UNIT-IV(6H)

Frequency-response analysis- Polar plots, Bode plot, stability in frequency domain, Nyquist plots. Nyquist stability criterion. Performance specifications in frequency-domain. Frequency domain methods of design, Compensation & their realization in time & frequency domain. Lead and Lag compensation. Op-amp based and digital implementation of compensators. Tuning of process controllers. State variable formulation and solution.

UNIT-V(6H)

State variable Analysis- Concepts of state, state variable, state model, state modelsfor linear continuous time functions, diagonalization of transfer function, solution of state equations, concept of controllability &observability. Introduction to Optimal control & Nonlinear control, Optimal Control problem,Regulator problem, Output regulator, treking problem. Nonlinear system – Basic concept & analysis.

Text/Reference Books:

1. Gopal. M., "Control Systems: Principles and Design", Tata McGraw-Hill, 1997.
2. Kuo, B.C., "Automatic Control System", Prentice Hall, sixth edition, 1993.
3. Ogata, K., "Modern Control Engineering", Prentice Hall, second edition, 1991.

ECA-601	Control Systems	0L:0T:2P	1 credits	2Hrs/Week

Experiment list

1. Overview of the MATLAB Environment for control system.
2. Step Response of 1st and 2nd order systems in MATLAB.
3. Analysis and Designing of bode plot using MATLAB.
4. Analysis and Designing of Root locus using MATLAB.
5. Introduction to Simulink for Control System.
6. To study of PID controller with Simulink.
7. Introduction of State Spaces design in MATLAB.
8. Test of Controllability and Observability.
9. Determination of state transition matrix
10. Introduction to LTI viewer.
11. Design of digital compensators, Lag, Lead

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Optical Communication

ECA-602

ECA-602	Optical Communication	2L:1T:0P	3 credits	2Hrs/Week

Course Preamble

1.To learn the basic elements of optical fiber transmission link, fiber modes configurations an structures.
2.To understand the different kind of losses, signal distortion, SM fibers.
3. To learn the various optical sources, materials and fiber splicing
4. To learn the fiber optical receivers and noise performance in photo detector.

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

1. Understand the principles fiber-optic communication, the components and the bandwidth advantages.

2. Understand the properties of the optical fibers and optical components.

3. Understand operation of lasers, LEDs, and detectors

4. Analyze system performance of optical communication systems

5. Design optical networks and understand non-linear effects in optical fibers

UNIT-I(10H)

Introduction to vector nature of light, propagation of light, propagation of light ina cylindrical dielectric rod, Ray model, wave model.

UNIT-II(10H)
Different types of optical fibers, Modal analysis of a step index fiber. Signal degradation on optical fiber due to dispersion and attenuation. Fabrication of fibers and measurement techniques like OTDR.

UNIT-III(10H)

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Optical sources - LEDs and Lasers, Photo-detectors - pin-diodes, APDs, detector responsivity, noise, optical receivers. Optical link design - BER calculation, quantum limit, power penalties.

UNIT-IV(6H)

Optical switches - coupled mode analysis of directional couplers, electro-opticswitches. Optical amplifiers - EDFA, Raman amplifier. WDM and DWDM systems. Principles of WDM networks.

UNIT-V(6H)

Nonlinear effects in fiber optic links. Concept of self-phase modulation, groupvelocity dispersion andsolition based communication.

Text/Reference Books

1. J. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 (Indian Edition).
2. T. Tamir, Integrated optics, (Topics in Applied Physics Vol.7), Springer-Verlag, 1975.
3. J. Gowar, Optical communication systems, Prentice Hall India, 1987.
4. S.E. Miller and A.G. Chynoweth, eds., Optical fibres telecommunications, Academic Press, 1979.
5. G. Agrawal, Nonlinear fibre optics, Academic Press, 2nd Ed. 1994.
6. G. Agrawal, Fiber optic Communication Systems, John Wiley and sons, New York, 1997
7. F.C. Allard, Fiber Optics Handbook for engineers and scientists, McGraw Hill, New York (1990).

ECA-602	Optical Communication	0L:0T:2P	1 credits	2Hrs/Week

List of Experiments:

1. Launching of light into the optical fiber and calculate the numerical aperture and V-number.
2. Observing Holograms and their study.
3. Optic version Mach-Zehnder interferometer.
4. Measurement of attenuation loss in an optical fiber.
5. Diffraction using gratings.
6. Construction of Michelson interferometer.
7. Setting up a fiber optic analog link and study of PAM.
8. Setting up a fiber optic digital link and study of TDM and Manchester coding.
9. Measurement of various misalignment losses in an optical fiber.

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Program Elective-II
Computer Networks
ECA-603(A)

ECA-603(A)	Computer Networks	3L:1T:0P	4 credits	3Hrs/Week

Course Preamble

1. Describe the general principles of data communication.
2. Describe how computer networks are organized with the concept of layered approach.
3. Describe how signals are used to transfer data between nodes.
4. Implement a simple LAN with hubs, bridges and switches.

Course Outcomes:

1. Understand the concepts of networking thoroughly.
2. Design a network for a particular application.
3. Analyze the performance of the network

UNIT-I(10H)

Introduction to computer networks and the Internet: Application layer: Principles of network applications, The Web and Hyper Text Transfer Protocol, File transfer, Electronic ail, Domain name system, Peer-to-Peer file sharing, Socket programming, Layering concepts.

UNIT-II(10H)

Switching in networks: Classification and requirements of switches, a generic switch, Circuit Switching, Time-division switching, Space-division switching, Crossbar switch and evaluation of blocking probability, 2-stage, 3-stage and n-stage networks, Packet switching, Blocking in packet switches, Three generations of packet switches, switch fabric, Buffering, Multicasting, Statistical

UNIT-III(10H)

Multiplexing. Transport layer: Connectionless transport - User Datagram Protocol, Connectionoriented transport – Transmission Control Protocol, Remote Procedure Call. Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call.

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UNIT-IV(6H)

Congestion Control and Resource Allocation: Issues in Resource Allocation, Queuing Disciplines, TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

UNIT-V(6H)

Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, addressing, Ethernet, Hubs, Switches.

Text Reference books:

1. J.F. Kurose and K. W. Ross, "Computer Networking – A top down approach featuring the Internet", Pearson Education, 5th Edition
2. L. Peterson and B. Davie, "Computer Networks – A Systems Approach" Elsevier Morgan Kaufmann Publisher, 5th Edition.
3. T. Viswanathan, "Telecommunication Switching System and Networks", Prentice Hall
4. S. Keshav, "An Engineering Approach to Computer Networking" , Pearson Education
5. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition
6. Andrew Tanenbaum, "Computer networks", Prentice Hall
7. D. Comer, "Computer Networks and Internet/TCP-IP", Prentice Hall
8. William Stallings, "Data and computer communications", Prentice Hall

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SSSUTMS

Information Theory and Coding
ECA-603(B)

ECA-603(B)	Information Theory and Coding	3L:1T:0P	4 credits	3 Hrs/Week

Course Preamble

1. Understand error–control coding.
2. Understand encoding and decoding of digital data streams.
3. Be familiar with the methods for the generation of these codes and their decoding techniques.
4. Be aware of compression and decompression techniques.
5. Learn the concepts of multimedia communication.

Course Outcomes:

1. Design an application with error–control.
2. Use compression and decompression techniques.
3. Apply the concepts of multimedia communication

UNIT-I(10H)

INFORMATION THEORY:

Entropy, Information rate, source coding: Shannon-Fano and Huffman coding techniques, Mutual Information, Channel capacity of Discrete Channel, Shannon- Hartley law, Trade-off between bandwidth and SNR.

UNIT-II(10H)

ERROR CONTROL CODES:

Examples of the use of error control codes,basic notations, coding gain,Characterization of Error control codes, performance of error control codes, comparison of uncoded and coded systems.

UNIT-III(10H)

LINEAR BLOCK CODES:

Linear block codes and their properties, standard arrays, syndromes, weight distribution. Error detection/correction properties, modified linear block codes.

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UNIT-IV(6H)

CONVOLUTION CODES:

Convolution encoders, structural properties of convolution codes, trellis diagrams, Viterbi algorithm, performance analysis.

CYCLIC CODES:

General theory, Shift Register Implementations, Shortened Cyclic codes, CRCs for Error Detection.

UNIT-V(6H)

BCH AND RS CODES:

Algebraic Description, Frequency Domain Description, Decoding Algorithms for BCH and RS Codes.

REFERENCE BOOKS:

[1] John Proakis, "Digital Communications", TMH, 5th Ed.,2008.

[2] Simon Haykin, "Communication System", Wiley, 2008.

[3] Jorge Castineira, Moreira, "Essentials of Error Control

Coding", Wiley, 2006.

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Digital Image & Video Processing
ECA-604(A)

ECA-602	Optical Communication	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble

1.To study the image fundamentals and mathematical transforms necessary for image processing.

2. To study the image enhancement techniques

3.To study image restoration procedures.

4. To study the image compression procedures.

Course Outcomes

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-I(10H)

Digital Image Fundamentals-Elements of visual perception, image sensing andacquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

UNIT-II(10H)

Image Enhancements and Filtering-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-III(10H)

Color Image Processing-Color models–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.

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UNIT-IV(6H)

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.NImage Compression-Redundancy–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-V(6H)

Fundamentals of Video Coding- Inter-frame redundancy, motion estimationtechniques – fullsearch, fast search strategies, forward 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.

Text/Reference Books:

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

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Speech and Audio Processing
ECA-604(B)

ECA-604(B)	Optical Communication	3L:0T:0P	3 credits	3 Hrs/Week

Course Preamble

To provide an introduction to basic concepts and methodologies for the analysis, modeling, synthesis and coding of speech and music. To provide a foundation for developing applications and for further study in the field. To introduce software tools for the analysis and manipulation of speech and music and to gain practical experience in the design and implementation of speech and music processing algorithms.

Course Outcomes

1. Mathematically model the speech signal
2. Analyze the quality and properties of speech signal.
3. Modify and enhance the speech and audio signals.

UNIT-I(10H)
Introduction- Speech production and modeling - Human Auditory System; General structure of speech coders; Classification of speech coding techniques – parametric, waveform and hybrid ;Requirements of speech codecs –quality, coding delays, robustness.

UNIT-II(10H)
Speech Signal Processing- Pitch-period estimation, all-pole and all-zero filters, convolution; Power spectral density, periodogram, autoregressive model, autocorrelation estimation.

UNIT-III(10H)
Linear Prediction of Speech- Basic concepts of linear prediction; Linear Prediction Analysis of non stationary signals –prediction gain, examples; Levinson-Durbin algorithm; Long term and short-term linear prediction models; Moving average prediction.

UNIT-IV(10H)
Speech Quantization- Scalar quantization–uniform quantizer, optimumquantizer, logarithmic quantizer, adaptive quantizer, differential quantizers; Vector quantization – distortion measures, codebook design, codebook types.

UNIT-V(10H)
Scalar Quantization of LPC- Spectral distortion measures, Quantization based onreflection coefficient and log area ratio, bit allocation; Line spectral frequency – LPC to LSF conversions,

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quantization based on LSF. Linear Prediction Coding- LPC model of speech production; Structures of LP Cencoders and decoders; Voicing detection; Limitations of the LPC model.

Text/Reference Books:

1. "Digital Speech" by A.M.Kondoz, Second Edition (Wiley Students_ *Edition), 2004.*
2. "Speech Coding Algorithms: Foundation and Evolution of Standardized Coders", W.C. Chu, WileyInter science, 2003.

Introduction to MEMS
ECA-605(A)

ECA-605 (A)	Introduction to MEMS	3L:0T:0P	3 credits	3 Hrs/Week

Course Preamble

The objective of this course is to present the state of the art in the areas of mechanical systems to enable the control systems.

Course Outcomes

At the end of the course the students will be able to
1. Appreciate the underlying working principles of MEMS and NEMS devices.
2. Design and model MEM devices

UNIT-I(10H)

Introduction and Historical Background, Scaling Effects. Micro-Nano Sensors.

UNIT-II(10H)

Actuators and Systems overview: Case studies. Review of Basic MEMS fabrication modules: Oxidation,
Deposition Techniques, Lithography (LIGA), and Etching.

UNIT-III(10H)

Micromachining: Surface Micromachining, sacrificial layer processes,

UNIT-IV(6H)

Stiction; Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding. Mechanics of solids in MEMS/NEMS: Stresses, Strain, Hookes's law, Poisson effect, Linear Thermal Expansion, Bending; Energy methods,

UNIT-V(6H)

Overview of Finite Element Method, Modeling of Coupled Electromechanical Systems.

Text/Reference Book:

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1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhat, V. K. Aatre, Micro and Smart Systems, Wiley India, 2012.
2. S. E.Lyshevski, Nano-and Micro-Electromechanical systems: Fundamentals of Nano-and Microengineering (Vol. 8). CRC press, (2005).
3. S. D. Senturia, Microsystem Design, Kluwer Academic Publishers, 2001.
4. M. Madou, Fundamentals of Microfabrication, CRC Press, 1997.
5. G. Kovacs, Micromachined Transducers Sourcebook, McGraw-Hill, Boston, 1998.

Bio-Medical Electronics
ECA-605(B)

ECA-605(B)	Bio-Medical Electronics	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble

1. To introduce the basic concepts related to the operation of electrical & electronic measuring instruments.
2. To understand operational and application aspects of CRO (normal and storage).
3. To analyze and apply various AC bridges for the measurements of various physical quantities minimizing errors by following proper precautions.
4. To study the principles behind various transducers and their applications in the measurement of various parameters in electrical and mechanical engineering fields.

Course Outcomes

1. Understand the basic concepts of electrical units, measurement errors and accuracy.
2. Measure different physical parameters using different transducers.
3. Gain experience in interpreting technical specifications and selecting sensors and transducers for a given application.
4. Apply the principles and practice for instrument design and develop for real world problems.

UNIT-I(10H)

Measurements & Errors: Significance of measurements, methods of measurements: Direct & indirect methods, Mechanical, Electrical, Electronic Instruments, Classification of instruments, Deflection & null type, Characteristics of instruments: accuracy, precision, drift, span & range, Significant Figures, Static Sensitivity, Linearity, hysteresis, Threshold, Dead zone, Resolution, Loading effect etc. Error & its types: Gross systematic error: Instrumental Error, Environmental error, observational error. Random error: Arithmetic mean, Range, deviation, Average deviation, Standard deviation, variance etc.

UNIT-II(10H)

CRO & Measurements: Basic CRO Circuit, Dual trace Oscilloscope, Dual beam Oscilloscope, Sampling Oscilloscope, Analog Storage Oscilloscope, Digital Storage Oscilloscope. Measurement with CRO: Frequency, Voltage, Current, Phase, Dielectric, Frequency ratio etc. A.C Bridges: General equation for bridge balance, Measurement of inductance, Capacitance and Q of the coil, Capacitance Maxwell's, Wiens, Schering Bridge, Wagner Earth Tester.

UNIT-III(10H)

Signal generator, function generator, sweep frequency generator, pulse and square wave generator, wave analyzers, harmonic distortion analyzer, spectrum analyzer, heterodyne frequency meter, frequency counter, measurement errors, automatic and computing counter, Digital voltmeter, Ramp type DVM, Integrating DVM, successive approximation DVM.

UNIT –IV (6H)

Transducer: Electrical transducers, classification of transducers, resistive transducer, resistance thermometers, thermistors, thermocouples, Inductive transducer, LVDT, Capacitive, piezoelectric, hall effect transducers. Measurement of non Electrical quantity: Displacement, strain, flow measurements, Rota meter, Venturi meter, Bourdon tube pressure transducer, temperature.

UNIT-V(6H)

Sensors: Gas Sensor, NBA agent, Microbial sensor, electro analytical sensor, Enzyme based sensor-glucose sensor, Electronic nose –halitosis, breath analysis. Advances in sensor technology: lab –on –a chip, smart sensor, MEMS and Nano sensor. Radiation sensor , Thermal radiation sensor.

Reference Books:

1. Electrical Electronics Measurement & Measuring Instrumentation by A.K Shawney.
2. Electronics & Instrumentation Measurement by J.B Gupta.
3. Instrumentation & Measurement by Helfrick Cooper, PHI India
4. Electronics Instrumentation, H.S. Kalasi, TMH India
5. Biomedical senses & Measurement by Wane, Pind, Liu, Sprinper.
6. Measurement, Instrumentation, and Sensors Handbook, Second Edition: TwoVolume Set John G. Webster, HalitEren, CRC Press
7. Measurement System by Doebelin, Tata McGraw-Hill Education
8. Biosensors: Theory and Applications, Donald G. Buerk, by CRC Press
9. Fundamentals of Instrumentation 2nd Edition by NJATC, Cengage Learning; 2 edition

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Minor Project
ECA-606

ECA -606	**Project-I (Minor)**	**0L:0T:4P**	**2 credits**	**6Hrs/Week**

Course 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
4. limitations
5. understand statistical data analysis
6. Understand computerized data acquisition.
7. Conceive a problem statement either from rigorous literature survey or from the requirements
8. raised from need analysis.
9. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
10. Write comprehensive report on Minor project work.

Guidelines:

1. The Minor-project is a team activity having 3-4 students in a team. This is electronic product.
2. design work with a focus on electronic circuit design.
3. The Minor project 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. Minor 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 whichfunctional 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 Preambles of Minor project.
8. Student is expected to detail out specifications, methodology, resources required, criticalissues involved in design and implementation and submit the proposal within first week ofthe semester.
9. The student is expected to exert on design, development and testing of the proposed work as
10. per the schedule.
11. Art work and Layout should be made using CAD based PCB simulation software. Due
12. considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.

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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

Minutes of meeting Board of studies meeting

Name of Department: Electronics and Communication Engineering

Minutes of Board of Studies Committee Meeting Held on Dates **12/07/2021**

The Board of Studies Committee Meeting was held in the room of Department of Electronics and Communication Engineering at 11:00 AM. On **12/07/2021**, Following members were present.

1. Mr. Vijay Prakash Singh	SSSUTMS, Sehore	Chairman
2. Dr. A. S Rathore	SSSUTMS, Sehore	Internal Member
3. Mr. Devendra Patle	SSSUTMS, Sehore	Internal Member
4. Dr. Dheeraj K. Agarwal	MANIT Bhopal	External member
5. Dr. Ram Bilas Pachori	IIT Indore	External Member

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

Agenda. The review of the scheme and syllabus of Electronics and Communication Engineering from I to VIII semester.

Discussion:- All the member discuss and review the scheme and syllabus (I to VIII semester) and recommend that there is no change in present scheme and syllabus.

Resolution:-

It is resolved that there is no change in scheme and syllabus of of Electronics and Communication Engineering from I to VIII semester.

Chairman thanks the members forpeaceful conduction of meeting

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Signature of All members (Including Chairperson)

1. Dr. Vijay Prakash Singh
2. Dr. A. S Rathore
3. Mr. Devendra Patle
4. Dr. Dheeraj K. Agarwal
5. Dr. Ram Bilas Pachori

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(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electronics and Communication Engineering

Minutes of Board of Studies Committee Meeting(ONLINE MEETING) Dated : 08.06.2020

The Board of Studies Committee Meeting was held in the room of HOD (EC) at 02:30 AM on 08.06.2020.

1) Dr. Mukesh Tiwari (Chairmen)
2) Mr. Vijay Prakash Singh (Member)
3) Dr. Prabodh Khampariya (Member)
4) Ms. Alka Thakur (Member)
5) Mr. Devendra Patle (Member)
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 EC-7th and 8th 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 7th and 8th semester

1. Course structures
2. Proposed teaching pedagogies
3. Academic flexibilities like honors with extract credits acquired through either advanced study of same courses or with procuring additional credits form additional courses as per student's choice.
4. Regular B. E degree *along with specialization* by acquiring credits for *professional electives* from courses of specific domain or regular degree (without specialization) from professional electives as per student choice (may not belong to a specific domain).
5. Open electives offered by other departments.
6. Learning difficulties and addressing them
7. Career and academic counseling.
8. Credited co-curricular activities.
9. Skilling in professional domains and branch specific areas to promote industry ready competency among learners.
10. Necessary certification curses
11. Inculcation of societal and ethical concern etc., regarding.

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(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electronics and Communication Engineering

Minutes of Board of Studies Committee Meeting Dated :03.06.2019

The Board of Studies Committee Meeting was held in the room of HOD (EC) at 10:30 AM on 03.06.2019. 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 EC-7th and 8thsemesterScheme 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 and 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)

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Electronics and Communication 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	ECA-701	Microwave Theory and Techniques	60	30	10	30	20	150	3	0	2	4
2	ECA-702	Antennas and Propagation	60	30	10	30	20	150	3	0	2	4
3	ECA-703	Program Elective-IV	60	30	10			100	3	0	0	3
4	ECA-704	Open Core Elective - III	60	30	10		-	100	3	0	0	3
6	ECA-705	Project Stage-I	-	-	-	120	80	200	-	-	10	5
7	ECA-706	Self Study/GD/Seminar					200	200			2	1
	TOTAL		240	120	40	180	320	900	12	0	16	20

Program Elective-IV		
ECA-703	(A) Satellite Communication	(B) Mixed Signal Design
Open Core Elective - III		
ECA-704	(A) Wireless Sensor Networks	(C) High Speed Electronics

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Electronics and Communication 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	ECA-801	T.V & Radar Engineering	60	30	10	30	20	150	3	0	2	4
3	ECA-802	Program Elective-V	60	30	10			100	3	0	0	3
4	ECA-803	Open Core Elective - IV	60	30	10	-		100	3	0	0	3
6	ECA-804	Project Stage-II	-	-	-	240	160	400	-	-	16	8
	TOTAL		180	90	30	270	180	750	9	0	18	18

Program Elective-V		
ECA-802	(A) Mobile Communication and Networks	(B) Embedded systems
Open Core Elective - IV		
ECA-803	(A) CAD of Digital Systems	(B) Engineering and Acoustics

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SEMESTER – VII

Microwave Theory and Techniques
ECA-701

ECA-701	Microwave Theory and Techniques	3L:0T:P	3 credits	3Hrs/Week

Course Preambles:

1. To understand Analysis of Waveguides and gain complete knowledge about Microwave Components.
2. Design of Impedance Matching and Tuning using lumped and distributed elements for network.
3. To Analysis and study characteristics of microwave tube Generators and Amplifiers.
4. To Analysis and study characteristics of microwave Semiconductor of detector, switch, generator and amplifier.
5. Study different RADARs and its supporting systems.
6. Study various applications of microwave engineering.

Course Outcomes:

1. Understand various microwave system components their properties.
2. Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuit analysis.
3. Design microwave systems for different practical application.

UNIT-I(10H)

Introduction to Microwaves-History of Microwaves, Microwave Frequency bands;Applications of Microwaves: Civil and Military, Medical, EMI/ EMC. Mathematical Model of Microwave Transmission-Concept of Mode, Features ofTEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission. Analysis of RF and Microwave Transmission Lines- Coaxial line, Rectangularwaveguide, Circular waveguide, Strip line, Micro strip line.

UNIT-II(10H)

Microwave Network Analysis- Equivalent voltages and currents for non-TEMlines, Network parameters for microwave circuits, Scattering Parameters. Passive and Active Microwave Devices- Microwave passive components:Directional Coupler, Power Divider, Magic Tee, Attenuator, Resonator. Microwave active components: Diodes, Transistors, Oscillators, Mixers. Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes. Microwave Tubes: Klystron, TWT, Magnetron.

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UNIT-III(10H)

Microwave Design Principles- Impedance transformation, Impedance Matching,Microwave Filter Design, RF and Microwave Amplifier Design, Microwave Power Amplifier Design, Low Noise Amplifier Design, Microwave Mixer Design, Microwave Oscillator Design. Microwave Antennas- Antenna parameters, Antenna for ground based systems, Antennas for airborne and satellite borne systems, Planar Antennas.

UNIT-IV(6H)

Microwave Measurements- Power, Frequency and impedance measurement atmicrowave frequency, Network Analyzer and measurement of scattering parameters, Spectrum Analyzer and measurement of spectrum of a microwave signal, Noise at microwave frequency and measurement of noise figure. Measurement of Microwave antenna parameters.

UNIT-V(6H)

Microwave Systems- Radar, Terrestrial and Satellite Communication, Radio Aidsto Navigation, RFID, GPS. Modern Trends in Microwaves Engineering- Effect of Microwaves on human body, Medical and Civil applications of microwaves, Electromagnetic interference and Electromagnetic Compatibility (EMI & EMC), Monolithic Microwave ICs, RFMEMS for microwave components, Microwave Imaging.

Text/Reference Books:

1. R.E. Collins, Microwave Circuits, McGraw Hill
2. K.C. Gupta and I.J. Bahl, Microwave Circuits, Artech house

ECA-701	Microwave Theory and Techniques	0L:0T:2P	1 credits	2 Hrs/Week

List of Experiments

1.To study the microwave test bench and its components.
2.To Study the characteristics of Klystron Tube and to determine its electronic tuning range.
3. To determine the frequency and wavelength in a rectangular wave-guide working on TE10mode.
4. To study the V-I characteristics of Gunn Diode.
5. Study the function of Magic Tee by measuring the following parameters.
(a) Measurement of VSWR at different ports and
(b) Measurement of isolation and coupling coefficient.
6. Study the function of Isolator by measuring the following parameters.
(a) Input VSWR measurement of Isolator .
(b) Measurement of insertion loss and isolation.
7. Study the function of Attenuator (Fixed and Variable type) by measuring the following parameters.
(a) Input VSWR measurement.

(b) Measurement of insertion loss and attenuation.

8. Study the function of Two Hole Directional Coupler by measuring the following parameters.

(a) To measure main line and auxiliary line VSWR.

(b) To measure the coupling factor and directivity.

9. Study the function of Circulator by measuring the following parameters.

(a) Input VSWR measurement of Circulator.

(b) Measurement of insertion loss and isolation.

10. To determine the Standing Wave-Ratio and reflection coefficient

Antennas and Propagation
ECA-702

ECA-702	**Antennas and Propagation**	**3L:0T:0P**	**3 Credit**	**3Hrs/Week**

Course Preambles:

1.Students will be introduced to antennas, their principle of operation

2. Antenna analysis and their applications.

3. Introduce the student to wave propagation over ground, through troposphere and ionosphere; diversity principles,

4. Propagation effects in microwave systems, satellite, space, and radar links

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the properties and various types of antennas.
2. Analyze the properties of different types of antennas and their design.
3. Operate antenna design software tools and come up with the design of the antenna of required specifications

UNIT-I (10H)

Fundamental Concepts- Physical concept of radiation, Radiation pattern, near-andfar-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions. Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linearelements near conductors, dipoles for mobile communication, small circular loop.

UNIT-II(10H)

Aperture and Reflector Antennas- Huygens' principle, radiation from rectangularand circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and cassegrain antennas. Broadband Antennas- Log-periodic and Yagi-Uda antennas, frequencyindependent antennas, broadcast antennas.

UNIT-III (10H)

Micro strip Antennas- Basic characteristics of micro strip antennas, feedingmethods, methods of analysis, design of rectangular and circular patch antennas.

UNIT-IV (6H)

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Antenna Arrays- Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of antenna arrays using Schelkunoff polynomial method, Woodward-Lawson method.

UNIT-V (6H)

Basic Concepts of Smart Antennas- Concept and benefits of smart antennas, fixedweight beam forming basics, Adaptive beam forming. Different modes of Radio Wave propagation used in current practice.

Text/Reference Books:

1. J.D. Kraus, Antennas, McGraw Hill, 1988.
2. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 1982.
3. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
4. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw ill, 1984.
5. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980.
6. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill, 2005
7. R.E. Crompton, Adaptive Antennas, John Wiley

Antennas and Propagation
ECA-701

ECA-702	Antennas and Propagation	0L:0T:1P	1 Credit	2Hrs/Week

List of Experiments

Following illustrative practical should be simulated with the help of any RF simulation software e.g. FEKO / HFSS / IE3D / Microwave Office / Microwave Studio or any other similar software:-

1. To Plot the Radiation Pattern of an Omni Directional Antenna.
2. To Plot the Radiation Pattern of a Directional Antenna.
3. To Plot the Radiation Pattern of a Parabolic Reflector Antenna.
4. To Plot the Radiation Pattern of a Log Periodic Antenna.
5. To Plot the Radiation Pattern of a Patch Antenna.
6. To Plot the Radiation Pattern of a Dipole/ Folded Dipole Antenna.
7. To Plot the Radiation Pattern of a Yagi (3-EL/4EL) Antenna.
8. To Plot the Radiation Pattern of a Monopole/ WHIP/ Collinear Antenna.
9. To Plot the Radiation Pattern of a Broad site Antenna.
10. To Plot the Radiation Pattern of a Square Loop Antenna

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Program Elective-IV

Satellite Communication
ECA-703(A)

ECA-703(A)	Mixed Signal Design	3L:0T:0P	3 Credit	3Hrs/Week

Course Preambles

1. To provide an in-depth understanding of different concepts used in a satellite communication system.

2. To explain the tools necessary for the calculation of basic parameters in a satellite communication system.

3. To get knowledge of every aspects of satellite communication like orbital mechanics, launching techniques, satellite link design, earth station technology and different access system towards a satellite.

Course Outcomes:
At the end of this course students will demonstrate the ability to
1. Visualize the architecture of satellite systems as a means of high speed, high range communication system.
2. State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.
3. Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.

UNIT-I (10H)

Introduction to Satellite Communication: Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications and frequency bands used for satellite communication.

UNIT-II (6H)

Orbital Mechanics: Orbital equations, Kepler's laws, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity etc. of a satellite, concepts of Solar day and Sidereal day.

UNIT-III (6H)

Satellite sub-systems: Study of Architecture and Roles of various sub-systems of a satellite system such as Telemetry, tracking, command and monitoring (TTC & M), Attitude and orbit control system (AOCS), Communication sub-system, power sub-systems etc.

UNIT-IV (10)

Typical Phenomena in Satellite Communication:Solar Eclipse on satellite, its effects, remedies for Eclipse, Sun Transit Outage phenomena, its effects and remedies, Doppler frequency shift phenomena and expression for Doppler shift. Satellite link budget Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver, noise power calculation, Drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions.

UNIT-V (10)

Modulation and Multiple Access Schemes:Various modulation schemes used in satellite communication, Meaning of Multiple Access, Multiple access schemes based on time, frequency, and code sharing namely TDMA, FDMA and CDMA.

Text /Reference Books:

1. Timothy Pratt Charles W. Bostian, Jeremy E. Allnutt: Satellite Communications: Wiley India. 2nd edition 2002
2. Tri T. Ha: Digital Satellite Communications: Tata McGraw Hill, 2009
3. Dennis Roddy: Satellite Communication: 4th Edition, McGraw Hill,2009

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Mixed Signal Design
ECA-703 (B)

ECA-703(B)	Mixed Signal Design	3L:0T:0P	3 Credit	3Hrs/Week

Course Preambles

1. Importance of CMOS and Mixed Signal VLSI design in the field of Electronics and Telecommunication.
2. Underlying methodologies for analysis and design of fundamental CMOS Analog and Mixed signal Circuits like Current and Voltage references, Single stage Amplifiers, Operational Amplifiers, Data Converters.
3. The issues associated with high performance Mixed Signal VLSI Circuits

Course Outcomes:

1. Understand the practical situations where mixed signal analysis is required.
2. Analyze and handle the inter-conversions between signals.
3. Design systems involving mixed signals

UNIT-I (10H)

Analog and discrete-time signal processing, introduction to sampling theory; Analog continuous time filters: passive and active filters; Basics of analog discrete-time filters and Z-transform.

UNIT-II(10H)

Switched-capacitor filters- Non idealities in switched-capacitor filters; Switched-capacitor filter architectures; Switched-capacitor filter applications.

UNIT-III(10H)

Basics of data converters; Successive approximation ADCs, Dual slope ADCs ,Flash ADCs, Pipeline ADCs, Hybrid ADC structures, High-resolution ADCs, DACs.

UNIT-IV(6H)

Mixed-signal layout, Interconnects and data transmission; Voltage-mode signaling and data transmission; Current-mode signaling and data transmission.

UNIT-V(6H)

Introduction to frequency synthesizers and synchronization; Basics of PLL, Analog PLLs; Digital
PLLs; DLLs.

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Text/Reference Books:

1. R. Jacob Baker, CMOS mixed-signal circuit design, Wiley India, IEEE press, reprint 2008.
2. BehzadRazavi , Design of analog CMOS integrated circuits, McGraw-Hill, 2003.
3. R. Jacob Baker, CMOS circuit design, layout and simulation, Revised second edition, IEEE press, 2008.
4. Rudy V. dePlassche, CMOS Integrated ADCs and DACs, Springer, Indian edition, 2005.
5. Arthur B. Williams, Electronic Filter Design Handbook, McGraw-Hill, 1981.
6. R. Schauman, Design of analog filters by, Prentice-Hall 1990 (or newer additions).
7. M. Burns et al., An introduction to mixed-signal IC test and measurement by, Oxford university press, first Indian edition, 2008

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Open Core Elective - III

Wireless Sensor Networks
ECA-704(A)

ECA-704(A)	Wireless Sensor Networks	3L:0T:0P	3 Credit	3Hrs/Week

Course Preambles

1.Introduction to planning and design of wireless networks
2. Introduction to HSPA systems
3. To study emerging technologies like Bluetooth, zigbee, Wimax
4. Understanding the wireless sensor network architecture and the protocol stack and WSN applications.

Course Outcomes:
1. Design wireless sensor networks for a given application
2. Understand emerging research areas in the field of sensor networks
3. Understand MAC protocols used for different communication standards used in WSN
4. Explore new protocols for WSN

UNIT-I (10H)

Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks

UNIT-II(10H)
Mobile Ad-hoc Networks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks. Issues and challenges in wireless sensor networks

UNIT-III(10H)
Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and ZigBee,

UNIT-IV(6H)
Dissemination protocol for large sensor network. Data dissemination, data gathering, and data fusion; Quality of a sensor network; Real-time traffic support and security protocols.

UNIT-V(6H)
Design Principles for WSNs, Gateway Concepts Need for gateway, WSN to Internet Communication, and Internet to WSN Communication.Single-node architecture, Hardware

components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC.

Text/Reference Books:

1. WaltenegusDargie , Christian Poellabauer, "Fundamentals Of Wireless Sensor Networks Theory And Practice", By John Wiley & Sons Publications ,2011
2. SabrieSoloman, "Sensors Handbook" by McGraw Hill publication. 2009
3. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks", Elsevier Publications,2004
4. KazemSohrby, Daniel Minoli, "Wireless Sensor Networks": Technology, Protocols and Applications, Wiley-Inter science
5.Philip Levis, And David Gay "TinyOS Programming" by Cambridge University Press 2009

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High Speed Electronics
ECA-704(B)

ECA-704(B)	High Speed Electronics	3L:0T:0P	3 Credit	3Hrs/Week

Course Preambles

To give a fundamental understanding of the new high speed semiconducter circuits which are now being developed and forms a basis for the developement of high capacity cost efficient interactive multimedia system operated above 20 GHz

Course Outcomes:
1. Understand significance and the areas of application of high-speed electronics circuits.
2. Understand the properties of various components used in high speed electronics
3. Design High-speed electronic system using appropriate components.

UNIT-I(10H)

Transmission line theory (basics) crosstalk and nonideal effects; signal integrity: impact of packages, vias, traces, connectors; non-ideal return current paths, high frequency power delivery. methodologies for design of high speed buses; radiated emissions and minimizing system noise; Noise Analysis: Sources, Noise Figure, Gain compression, Harmonic distortion, Intermodulation,Cross-modulation, Dynamic range

UNIT-II(10H)

Devices: Passive and active, Lumped passive devices (models), Active (models,lowvshighfrequency)

UNIT-III(10H)

RF Amplifier Design, Stability, Low Noise Amplifiers, Broadband Amplifiers (and Distributed) Power Amplifiers, Class A, B, AB and C, D E Integrated circuit realizations, Cross-over distortion Efficiency RF power output stages

UNIT-IV(6H)

Mixers – UpconversionDownconversion, Conversion gain and spurious response. Oscillators Principles. PLL Transceiver architectures

UNIT-V(6H)
Printed Circuit Board Anatomy, CAD tools for PCB design, Standard fabrication, Microvia Boards. Board Assembly: Surface Mount Technology, Through Hole Technology, Process Control and Design challenges.

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Text/Reference Books:

1. Stephen H. Hall, Garrett W. Hall, James A. McCall "High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices", August 2000, Wiley-IEEE Press
2. Thomas H. Lee, "The Design of CMOS Radio-Frequency Integrated Circuits", CambridgeUniversity Press, 2004, ISBN 0521835399.
3. BehzadRazavi, "RF Microelectronics", Prentice-Hall 1998, ISBN 0-13-887571-5.
4. Guillermo Gonzalez, "Microwave Transistor Amplifiers", 2nd Edition, Prentice Hall

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Project Stage-I
ECA-705

ECA -705	**Project-I**	**0L:0T:10P**	**5 credits**	**8Hrs/Week**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Design and validate Electronics algorithms for optimum solution
2. Analyze the dynamic response and the calibration of few instruments
3. Build projects as per industry and society demands.

Guidelines:

1. The Major-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 Major 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 Preambles of Minor project.
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 CAD based PCB simulation software. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.

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SSSUTMS ★ SEHORE (M.P.)

Self Study / GD/Seminar

ECA-706

ECA-706	Self-Study/GD/Seminar	0L:0T:2P	1 credits	1Hrs/Week

Course Preamble:

The main Preamble 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.

Couse 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.

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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.

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

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SEMESTER-VIII

T.V & Radar Engineering
ECA-801

ECA-801	T.V & Radar Engineering	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble:

1. To introduce the basics of picture transmission and reception, analysis and synthesis of composite video signal, receiver and picture tubes and television camera tubes.
2. To study various colour television systems with greater emphasis on television standards
3. To become well conversant with new development in digital video engineering.
4. To introduce advanced TV systems, MAC signals and direct to home TV technology.
5. To introduce most latest and revolutionary ideas in the field of digital TV, HDTV, WDTV.
6. To study various display system and its application.

Course Outcomes:

1. Understand the fundamental concepts of television transmitter and receiver systems, the transmission of video signals and importance of television standards to effectively work with broadcasting applications, trouble shooting of television systems.
2. Understand different colour television systems used worldwide and its compatibility.
3. Understand principles of digital video and component video signal.
4. Understand advanced TV technology, MAC signals and DTH technology.
5. Describe and differentiate working principles of latest digital TV, HDTV, and WDTV.
6. Understand the working principles and applications of latest display like LCD, LED, Plasma and large flat panel monitors.

Unit I : Basic Television System (10H)

Introduction: Scanning principles: sound and picture transmission, scanning process, camera pick-up devices, video signal, transmission and reception of video signals, brightness perception and photometric quantities, aspect ratio and rectangular scanning, persistence of vision and flicker, vertical resolution, the Kell factor, horizontal resolution and video bandwidth, interlaced scanning.

Composite Video Signal: Lines and scanning, video signal components, horizontal sync and blanking standards, vertical sync and blanking standards, video modulation and vestigial side band signal, sound modulation and inter-carrier system.

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Television Standards: Standard channel characteristics, reception of the vestigial side band signals, television broadcast channel, consolidated CCIR system-B standard, various television broadcast systems.

Television Pick-up devices and Cameras: Camera lenses, auto-focus systems, television camera pick-ups, Silicon Vidicon, CCD image sensors, video processing of camera pick-up signal.

Unit II :Colour Television (10H)

Colour fundamentals: mixing of colours and colour perception, chromaticity diagram, colour television camera, colour TV signals and transmission, NTSC, SECAM and PAL system, Trinitron picture tube, automatic degaussing, plasma, LCD displays.

Television transmission and reception: requirement of TV broadcast transmission, design principle of TV transmitters, IF modulation, power output stages, block diagram of TV transmitter, co-channel interference and ghost images during propagation of television signals, antenna requirements for television system, block schematic and function requirements for television receivers, trends in circuit design, colour television receiver.

Unit III : Digital Television Technology(10H)

Merits of digital technology, fully digital television system, digital television signals, digitized video parameters, digital video hardware, transmission of digital TV signals, bit rate reduction, digital TV receivers, video processor unit, audio processor unit.

Other television systems: Closed Circuit television system (CCTV), Cable television system (CATV), multiplexed analog component encoding television system (MAC TV), High definition television system (HDTV), High definition multiplexed analog component television (HD-MAC TV), High Performance Computer Controlled TV (HPCC TV), 3-D stereoscopic television techniques..

Unit IV : RADAR (6H)

The Radar range equation, block diagram and operation, performance factors: prediction of range performance, minimum detectable signal, receiver noise, probability density functions, signal to noise ratios. Radar cross section of targets, transmitter power, pulse repetition frequency and range ambiguities, antenna parameters.

The CW radar: the Doppler effect, FM-CW radar.The Moving Target Indicator (MTI) Radar: delay line cancellers.

Unit V : Radar Receivers (6H)

The radar receiver, noise figure, mixers, low noise front ends, displays- type A and PPI representations, duplexer and receiver protectors.

Other Radar systems: Synthetic aperture radar, HF over the horizon radar, Air Surveillance Radar (ASR), Bistatic radar.

References:

1. M. Dhake: Television and Video Engineering, 2nd Edition,TMH, New Delhi.
2. M. I. Skolnik: Introduction to Radar Systems, TMH, New Delhi.
3. R. G. Gupta: Television Engineering and Video Systems, TMH, New Delhi.
4. R. R. Gulati: Monochrome and Colour Television, New Age International.
5. Grob and Herndon: Basic Television and Video Systems, McGraw Hill International.
6. P. Z. Peebles, Jr.: Radar Principles, Wiley India Pvt. LTD.
7. Edde: Radar- Principles, Technology Applications, Pearson Education.

ECA-801	T.V & Radar Engineering	0L:0T:2P	1 credits	3Hrs/Week

List of Experiments:

Section A: Television Engg.

1. (a) To Study the Circuit Description of RF Tuner Section.
   (b) To Study the RF Section by Measuring Voltages at Various Test Points.
   (c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for RF Section.

2. (a) To Study the Circuit Description of VIF Tuner Section.
   (b) To Study the VIF Section by Measuring Voltages at Various Test Points.
   (c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for VIF Section.

3. (a) To Study the Circuit Description of Video and Chroma Section Tuner Section.
   (b) To Study the Video and Chroma Section by Measuring Voltages at Various Test Points
   (c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Video and Chroma Section.
4. (a) To Observe the Horizontal Oscillator and Horizontal Output Section through Various Test Point.
   (b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Horizontal Oscillator and Horizontal Output
   Section.

5. (a) To Observe the Vertical Oscillator and Vertical Output Section through Various Test Point.
   (b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Vertical Oscillator and Vertical Output Section.

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6. To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Sound Output Section.

7. To Study the Circuit Description of Audio and Video Section Tuner Section.

8. (a) To Study the System Control Section by Measuring Voltages at Various Test Points.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for System Control Section.

Section B: RADAR

1. Study of Doppler Effect.

2. To Measure Speed of a fan and various Other Objects (Pendulum, Tuning Fork, Plate etc.)

3. To Simulate the Variable Speed of Moving Objects using Velocity Simulator.

Program Elective-V
Mobile Communication and Networks

ECA-802(A)

ECA-802(A)	Mobile Communication and Networks	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble:

1. To understand the basic cellular system concepts.
2. To have an insight into the various propagation models and the speech coders used in mobile communication.
3. To understand the multiple access techniques and interference Eduction techniques in mobile communication.

Course Outcomes:

1. Discuss cellular radio concepts.
2. Identify various propagation effects.
3. To have knowledge of the mobile system specifications.
4. Classify multiple access techniques in mobile communication.
5. Outline cellular mobile communication standards.
6. Analyze various methodologies to improve the cellular capacity

UNIT- I (10H)

Overview of OSI Model : Significance of layered Model , PDUs, SDUs,IDUs, Higher layer Protocols. Switching and Components. Introduction, Applications, history, of wired & wireless Communication systems. Radio Transmission: frequencies ,signal propagation, antenna , types of modulation, FHSS, DSSS. Multiple Access technology for Wireless Communication FDMA,TDMA,CDMA Cellular System: Introduction, types.

UNIT–II(10H)

Mobile Data Communication: Cellular Telephony, Structure, Fading, Small scale fading, Multi-path Fading, Speech Coding, Error Coding and Correction, Hand off Management, Switching and authentication, MTSO interconnections, frequency hopping, frequency reuse. Circuit Switched Data Services & Packet Switched Data Services on Cellular Networks, Personal Communication Systems (PCS) Architecture, Digital Enhanced Cordless Telecommunications (DECT,) Personal Access Comm. System (PACS).

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UNIT-III(10H)

Digital Cellular Systems and Standards: GSM System overview, Architecture, GSM Protocol Model, GSM Mobility Management, SMS security aspects. Broadcast System overview. General Packet Service (GRPS) Architecture, GRPS Network, Interfaces and Procedures (2.5 G), 3G Mobile Services: UMTS and International Mobile Telecommunications (IMT-2000), W-C DMA and CDMA 2000,Quality of service in 3G .

UNIT- IV(6H)

WLAN : Components and working of Wireless LAN, Transmission Media for WLAN, Infrastructure & types of WLAN, IEEE 802.11 Standards , Protocols for WLAN ,MACA,MACAW, Infrared technology. Wireless Application Protocol (WAP) model, architecture, Gateway, WAP protocols and WML

UNIT-V(6H)

Introduction to Bluetooth technology.Wireless in Local Loop (WLL) architecture, products. Satellite as a switch, Components of VSAT system, VSAT topologies, access schemes.

BOOKS

1. Jochen Schiller "Mobile Communication", Pearson Education.
2. Yi –Bing Lin and ImrichChlamtac "Wireless and Mobile Network Architectures", Wiley India.
3. Raj Pandaya "Mobile and Personal Communication System & Services".
4. UweHansmann, LotharMerk "Principles of Mobile Computing" 2nd Ed. Wiley India.
5. Roger L. Freeman " Telecom Transmission handbook" 4th ed. 1998 John Wiley & Sons Inc. New York.
6. Lee "Mobile Cellular Telecom" 1995 McGraw Hill.

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Embedded systems
ECA-802 (B)

ECA-802(B)	Embedded systems	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble:

1.Students have knowledge about the basic functions of embedded systems

Course Outcomes:

1. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

Unit I :(10H)

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: (10H)

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: (10H)

Architecture of 8085 microcontroller, memory organization, registers, interrupts, addressing modes, instruction sets.

Unit IV: (10H)

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.

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Unit V: (10H)

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 Realtime Systems Programming", TMH.

CAD of Digital Systems

ECA-803 (A)

ECA-803(A)	CAD of Digital Systems	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble:

1.Understand the fundamentals used to create and manipulate geometric models
2.Get acquainted with the basic CAD software designed for geometric modeling
3.Learn working principles of NC machines CNC control and part programming
4.Understand concept of Group Technology, FMS and CIM

Course Outcomes

1. Describe basic structure of CAD workstation, Memory types, input/output devices and display devices and computer graphics.
2. Acquire the knowledge of geometric modeling and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations
3. Explain fundamental and advanced features of CNC machines
4. Illustrate Group Technology, CAQC and CIM concepts

Unit 1(10H)

Introduction: Information requirements of mfg organizations; business forecasting and aggregate production plan; MPS, MRP and shop floor/ Production Activity Control (PAC); Mfg as a system, productivity and wealth creation; production processes on volume-variety axes; importance of batch and job shop production; CIM definition and CIM wheel, evolution and benefits; CIM as a subset of Product Life Cycle (PLC) mgt; design for mfg (DFM) and concurrent engg; product design in conventional and CIM environment; terms like CAD, CAE, CAM, CAP, CAPP, CATD and CAQ.

Unit 2(10H)

Graphics and standards: Raster scan, coordinate systems for model (M/ WCS) user and display; database for graphic modeling; PDM, PIM, EDM; define EDM, features of EDM; basic transformations of geometry- translation, scaling, rotation and mirror; introduction to modeling software; need for CAD data standardization; developments in drawing data exchange formats; GKS, PHIGS, CORE, IGES, DXF STEP DMIS AND VDI; ISO standard for exchange of Product Model data-STEP and major area application protocols.

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Unit 3(10H)

Geometric Modeling: Its use in analysis and mfg; 2D and 3D line, surface and volume models; linear extrusion and rotational sweep; Constructive Solid Geometry (CSG); basics of boundary presentation- spline, Bezier, b-spline, and NURBS; sculpture surfaces, classification, basics of coons, Bezier, b-spline and ruled surfaces; tweaking, constraint based parametric modeling; wire frame modeling, definition of point, line and circle; polynomial curve fitting; introduction to rapid prototyping.

Unit 4(6H))

Numeric control and part programming: Principles of NC machines, CNC, DNC; NC modes of point to point, -line and 2D, 3D contouring; NC part programming; ISO standard for coding, preparatory functions(G)- motion, dwell, unit, preset, cutter compensation, coordinate and plane selection groups; miscellaneous (M) codes; CLDATA and tool path simulation; ISO codes for turning tools and holders; ATC, modular work holding and pallets; time and power estimation in milling, drilling and turning; adaptive control, sequence control and PLC; simple part programming examples.

Unit 5(6H)

Group Technology: Importance of batch and job shop production; merits of converting zigzag process layout flow to smooth flow in cellular layout, Production Flow Analysis (PFA) and clustering methods; concept of part families and coding; hierarchical, attribute and hybrid coding; OPITZ, MICLASS and DCLASS coding; FMS; material handling; robots, AGV and their programming; agile mfg; Computer Aided Process Planning (CAPP), variant/ retrieval and generative approach

References:

1. S.KantVajpay; Principles of CIM; PHI

2. Rao PN; CAD/CAM;TMH

3. Groover MP; Automation, Production Systems & CIM; P.H.I.

4. Rao PN, Tiwari NK, Kundra TK; Computer Aided Manufacturing; TMH

5. Alavudeen A, Venkteshwarn N; Computer Integrated Mfg; PHI

6. Radhakrishnan P, Subramanian S and Raju V; CAD/CAM

Engineering and Acoustics

ECA-803 (B)

ECA-803(B)	Engineering and Acoustics	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble:
The fundamentals of sound wave description and propagation, noise control techniques, the hearing mechanism, acoustic instrumentation, noise criteria, psychoacoustics, sound source types and radiated sound fields, outdoor sound propagation, sound power measurement techniques, sound transmission loss, acoustic enclosures.

Course Outcomes
1. Be able to assess complex occupational and environmental noise problems using acceptable assessment criteria.
2. Understand the importance of protecting the community from excessive noise and how it damages the hearing mechanism.
3. Be able to use instrumentation for noise measurement and understand the type of measurements appropriate for various situations.

Unit-I (10H)

Audio and acoustics subdisciplines, survey Fundamental quantities, Fourier review, mass and vibration Damping, complex exponential solutions, forced oscillation.

Unit-II(10H)

Resonance, electrical circuit analogies Acoustic wave equation.

Unit-III (10H)

Armonic plane waves, intensity, impedance Spherical waves, sound level, dB examples Radiation from small sources.

Unit-IV (6H)

Baffled simple source, piston radiation Near field, far field Radiation impedance.

Unit-V (6H)

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Recap and review Demos, speed of sound measurement.

Reference

1. Foundations of engineering acoustics Book by Frank Fahy

2. Engineering Acoustics: An Introduction to Noise Control Book by Michael Moser

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Project Stage-II

ECA-804

ECA- 804	Projects –II (Major)	0L:0T:16P	8 credits	12Hrs/Week

Preambles:

The object of Project Work II & Dissertation 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, under the guidance of a Supervisor from the Department alone orjointly 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

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Induction Program

MC	Induction Program	0L:0T:0P	Nil	2Hrs/Week

Induction program (mandatory)	3 weeks duration (Please refer Appendix-A for guidelines & also details available in the curriculum of Mandatory courses)
Induction program for students to be offered right at the start of thefirst year.	• Physicalactivity • CreativeArts • Universal HumanValues • Literary • ProficiencyModules • Lectures by EminentPeople • Visits to localAreas • Familiarization to Dept./Branch &Innovations

A student has to undergo this induction program after joining the institute and before the commencement of classes. Normal classes of the engineering program shall begin after the students have undergone a three-weeks induction program. The Induction program for students comprises of Physical activities; Learning an art form; Literature & Cinema; Social Awareness; Lectures &Visits; Universal Human Values; Familiarization to Department/ Branch, College&Innovations.

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Constitution of India

MC	Constitution of India	0L:0T:0P	Nil	2Hrs/Week

Unit 1. Introduction

Concept of liberty; Concept of positive and negative obligations

Unit 2 The Premises of Social Revolution:

Intellectual and historical origins of the concept of Social Economic Justice in India.

Unit 3 Sixty years of civil rights movement in India:

Moderate nationalism and the emergence of the politics of socio-economic justice; Annie Besant, the Theosophical Society and the Home Rule League Movement,

Unit 4 Impact of Socialism on the Writing of the Indian Constitution [I], [1914-31]:

From the First World War to the Karachi Resolution: [a] Jawaharlal Nehru's arrival in national politics and his initiation in municipal politics; [b] The Bolshevik Revolution [1917] and its impact on growth of Indian socialism; [c] Growth and influence of Fabian socialists on Indian nationalism; [d] Commonwealth of India Bill [1925]; [e] National Demand or the Motilal Nehru Report [1927-8] and the Calcutta Congress [1928]; [f] Karachi Resolution of the Indian National Congress [1931]

Unit 5 Impact of Socialism on the Writing of the Indian Constitution [II], [1932-52]:

From the Demand for Adult Suffrage to Passing of the Constitution of India: [a] Growth of the Congress Socialist Party and the demand for the adoption of adult suffrage; [b] Panchayati Raj and empowerment in the Indian Constitution; [c] The National Plan [1938], the Bombay Plan [1944] and proposals for large-scale industrialisation in India; [d] The August Offer [1940], Cripps Mission [1942] and the Cabinet Mission proposals [1946]; [e] The establishment of Indian Constituent Assembly [1946], the Indian Independence Act [1947], the working of the Constituent Assembly and the Assembly debates and the role of the Oligarchy comprising of Jawahaharlal Nehru, Vallabhbhai Patel, MaulanaAbulKalam Azad and Rajendra Prasad in all; [f]

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Social reforms and State Security v. 'Due Process of Law'; [g] The introduction, passage and development of the Hindu Code Bill, 1956

References:

1. Bagehot, Walter, An Introduction to English Legal History, [London, 1990]
2. Berlin, Isaiah, Henry Hardy and Ian Harris, Liberty: Incorporating Four Essays on Liberty, [Oxford, 2002]
3. Austin, Granville, The Indian Constitution: Cornerstone of a Nation, [Oxford, 1966] –, Working of a Democratic Constitution: A History of the Indian Experience, [New Delhi, 2003]
4. Bagchi, Amiya Kumar, Private Investment in India, 1900-1939, [London, 1972]
5. Bakshi, P.M., The Constitution of India: With Comments and Subject Index, [Delhi, 1991]
6. Basu, Durgadas, Introduction to the Constitution of India, [New Delhi, 1995] –, Shorter Constitution of India, [Calcutta, 1959]
7. Chandra, Bipan, [et al.], India's Struggle for Independence, [New Delhi, 1991]
8. Coupland, Reginald, The Indian Problem, Three Volumes, [London, 1944]
9. Dutta, Nilanjan, 'From Subject to Citizen: Towards a History of Indian Civil Rights Movement', in Michael Anderson and SumitGuha, Changing Concepts of Rights and Justice in South Asia, [New Delhi, 2000]
10. Dhavan, Rajeev and Thomas Paul, Nehru and the Constitution, [Bombay, 1992]
11. Forbes, Geraldine, Women in India, [Cambridge, 1996] Gauba, O.P., Constitutionalism in a Changing Perspective, [New Delhi, 1996]
12. Mohanty, Manoranjan, 'Does India Need a New Constitution? [A Democratic Right Perspective on Constitutional Discourse]', in Surya Narayan Misra, Subhas Chandra Hazary and AmareshwarMisra, [ed.], Constitution and Constitutionalism in India, [New Delhi, 1999]

(09) Assessment

PO/ Course Assesment Tools Types	PO/Course Assesment Tools	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO 8	PO 9	PO10	PO1 1	PO 12
		Engineering Knowledge	Problem Analysis	Design/ Development of Solution	Investigation	Moderen Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management	Life-Long Learning
Direct Tools	Test	□	□	□	□				□		□	□	
	Assignments	□	□			□				□			
	lab /seminar/ industrial training/projects(Rubrics)	□	□	□		□		□	□	□	□	□	□
Indirect Tools	Course end survey	□				□		□					
	Exit survey	□	□										□
	Faculty Survey		□	□	□			□					
	Alumni Survey	□			□		□		□	□	□		□
	Program Statistics	□			□				□			□	

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(Minutes of the Board of Studies Committee Meeting)

School of Engineering

Minutes of meeting Board of studies meeting

Name of Department: Electronics & Instrumentation Engineering

Minutes of Board of Studies Committee Meeting Held on Dates **14/07/2021**

The Board of Studies Committee Meeting was held in the room of Department of Electronics & Instrumentation Engineering at 11:00 AM. On **14/07/2021**, Following members were present.

1. Mr. Vijay Prakash Singh	SSSUTMS, Sehore	Chairman
2. Dr. A. S Rathore	SSSUTMS, Sehore	Internal Member
3. Mr. Devendra Patle	SSSUTMS, Sehore	Internal Member
4. Dr. Dheeraj K. Agarwal	MANIT Bhopal	External member
5. Dr. Ram Bilas Pachori	IIT Indore	External Member

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

Agenda. The review of the scheme and syllabus of Electronics & Instrumentation Engineering from I to VIII semester.

Discussion:- All the member discuss and review the scheme and syllabus (I to VIII semester) and recommend that there is no change in present scheme and syllabus.

Resolution:-

It is resolved that there is no change in scheme and syllabus of of Electronics & Instrumentation Engineering from I to VIII semester.

Chairman thanks the members forpeaceful conduction of meeting.

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& Medical Sciences Sehore (M.P.)

Signature of All members (Including Chairperson)

1. Dr. Vijay Prakash Singh
2. Dr. A. S Rathore
3. Mr. Devendra Patle
4. Dr. Dheeraj K. Agarwal
5. Dr. Ram Bilas Pachori

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(Minutes of the Board of Studies Committee Meeting)

School of Engineering

Minutes of meeting Board of studies meeting

Name of Department: Electronics and Communication Engineering

Minutes of Board of Studies Committee Meeting Held on Dates **11/07/2021**

The Board of Studies Committee Meeting was held in the room of Department of Electronics and Communication Engineering at 11:00 AM. On **11/07/2021**, Following members were present.

1. Mr.Vijay Prakash Singh	SSSUTMS, Sehore	Chairman
2. Dr. A. S Rathore	SSSUTMS, Sehore	Internal Member
3. Mr. Devendra Patle	SSSUTMS, Sehore	Internal Member
4. Dr. Dheeraj K. Agarwal	MANIT Bhopal	External member
5. Dr. Ram Bilas Pachori	IIT Indore	External Member

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

Agenda. The review of the scheme and syllabus of M.Tech (Digital Communication & VLSI) from I to IV semester.

Discussion:- All the member discuss and review the scheme and syllabus (I to IV semester) and recommend that there is no change in present scheme and syllabus.

Resolution:-

It is resolved that there is no change in scheme and syllabus of of M.Tech (Digital Communication & VLSI) from I to IV semester.

Chairman thanks the members forpeaceful conduction of meeting.

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(09) Scheme of Exanimation (Digital Communication) Academic Year 2019-20

Scheme of Examination

First Semester –Master of Technology (Digital Communication)

SEMESTER-I

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.	MEDC-101	Advanced Mathematics	3	1	-	4	70	20	10	-	-	100
2.	MEDC-102	Digital Communication	3	1	-	4	70	20	10	-	-	100
3.	MEDC-103	VLSI Technology & Design	3	1	-	4	70	20	10	-	-	100
4.	MEDC-104	Advanced Digital Signal Processing	3	1	-	4	70	20	10	-	-	100
5.	MEDC-105	Information Theory & Coding	3	1	-	4	70	20	10	-	-	100
6.	MEDC-106	Lab -1 : Digital Communication	-	-	6	6	-	-	-	90	60	150
7.	MEDC-107	Lab -2 : Digital Signal Processing	-	-	6	6	-	-	-	90	60	150
		Total	15	5	12	32	350	100	50	180	120	800

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SEMESTER-II

Scheme of Examination

Second- Semester –Master of Technology (Digital Communication)

S.No.	Subject Code	Subject Name	Periods /week			Total Credits	Maximum Marks Allotted					Total Marks
							Theory Slot			Practical Slot		
			L	T	P		End Sem. Exam	Tests (Two)	Assignments/ Quiz	End Sem. Practical / Viva	Practical Record/ assignment/ Quiz/ Presentation	
1.	MEDC-201	Advanced Optical Communication	3	1	-	4	70	20	10	-	-	100
2.	MEDC-202	Wireless Communications and Networks	3	1	-	4	70	20	10	-	-	100
3.	MEDC-203	Advanced Data Communications	3	1	-	4	70	20	10	-	-	100
4.	MEDC-204	Telecommunication Switching & Networks	3	1	-	4	70	20	10	-	-	100
5.	MEDC-205	Cellular And Mobile Communications	3	1	-	4	70	20	10	-	-	100
6.	MEDC-206	Lab -1 : Modeling & Simulation Lab	-	-	6	6	-	-	-	90	60	150
7.	MEDC-207	Lab -2 : Simulation in MATLAB Environment	-	-	6	6	-	-	-	90	60	150
		Total	15	5	12	32	350	100	50	180	120	900

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Scheme of Examination

Third-Semester –Master of Technology (Digital Communication)

SEMESTER-III

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.	MEDC-301	Elective 1	3	1	-	4	70	20	10	-	-	100
2.	MEDC-302	Elective 2	3	1	-	4	70	20	10	-	-	100
3.	MEDC-303	Seminar			4	4				-	100	100
4.	MEDC-404	Dissertation Part I			8	8				120	80	200
		Total	6	2	12	20	140	40	20	120	180	500

Elective 1	(A) Wireless LAN	B) Soft Computing Techniques
Elective 2	(A) Network Design Technology	(B) Micro Controller System Design

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Scheme of Examination

Fourth- Semester –Master of Technology (Digital Communication)

SEMESTER-IV

S.No.	Sub Code	Subject Name	Periods per			Credits	Max Marks Theory			Max. Marks Practical		Total Marks
			L	T	P		End Sem Exam	Mid Sem	TW	End Sem Practical / Viva	Practical Record/ Quiz /Assignment / Presentation	
1.	MEDC- 401	Dissertation Part- II	-	-	20	20	-	-	-	300	200	500
TOTAL			-	-	20	20	-	-	-	300	200	500

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Advanced Mathematics

MEDC- 101

MEDC-101	Advanced Mathematics	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To learn principles of advanced engineering mathematics through linear algebra and calculus of variations.
2. To understand probability theory and random process that serve as an essential tool for applications of electronics and communication engineering sciences.

Course Outcomes:

1. Understand vector spaces, basis, linear transformations and the process of obtaining matrix of linear transformations arising in magnification and rotation of images.
2. Apply the technique of singular value decomposition for data compression, least square approximation in solving inconsistent linear systems.
3. Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits.

UNIT 1: (10-HOURS)

Partial Differential Equation Solution of Partial Differential Equation (PDE) by separation of variable method, Numerical solution of PDE (Laplace, Poisson's, Parabola) using finite difference Methods.

UNIT II: (10-HOURS)

Matrices And Linear System Of Equations Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout's triangularization method, Iterative methods-Jacobins method, Gauss-Seidal method, Determination of Eigen values by iteration.

UNIT III: (10-HOURS)

Calculus Of Variations Euler-Lagrange's differential equation, The Brachistochrone problems and other applications. Isoperimetric problem, Hamilton's Principle and Lagrange's Equation, Rayleigh-Ritz method, Galerkin method.

UNIT IV: (06-HOURS)

Fuzzy Logic Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their applications.

UNIT V: (06-HOURS)

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Reliability Introduction and definition of reliability, derivation of reliability functions. Failure rate, Hazard rate, mean time t future & their relations, concepts of fault tolerant analysis.

Reference Books:

1. Higher Engineering Mathematics - by Dr. B.S. Grewal; Khanna Publishers
2. Calculus of Variations - by Elsgole; Addison Wesley.
3. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
4. Introductory Methods of Numerical Analysis by S.S. Shastry.
5. Calculus of Variations - by Galfand & Fomin; Prentice Hall.
6. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
7. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
8. Numerical Solution of Differential Equation by M. K. Jain
9. Numerical Mathematical Analysis By James B. Scarborogh
10. Fuzzy Logic in Engineering by T. J. Ross
11. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

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Digital Communication

MEDC-102

MEDC-102	Digital Communication	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble

1. Understand and appreciate the need of various modulation and spread spectrum techniques.
2. Analyze the properties of basic Modulation techniques and apply them to Digital Communication
3. Apply different types of coding techniques to design the optimum receiver for channels with ISI and AWGN.
4. Design and develop the different types of modulation techniques, equalizer to improve the performance under fading channels for various applications.

Course Outcomes:

1. Explain merits and demerits of different modulation techniques & coding techniques, spread spectrum signals and channel behaviors
2. Analyze various modulation, equalization, diversity and coding techniques for communication systems
3. Compare performance of different types of modulation on different wireless application fading channels.
4. Design and demonstrate various modulation/coding equalization techniques and measure their performance

UNIT 1: (10-HOURS)

Digital PAM, binary PAM formats, line coding, band limited digital PAM systems, Nyquist pulse shaping, equalization, synchronization techniques, bit and frame synchronization. Coded pulse modulation, voice digitization rate (VDR) of PCM, DPCM, DM, ADM, CVSD, log PCM, their performance comparison, VDR reduction by speech coding, VOCODERS, noise performance of PCM and DM, Digital multiplexes. AT & T and CCITT hierarchies, quasi-synchronous multiplexes.

UNIT 2: (10-HOURS)

Digital CW modulation, BPSK, DPSK, DEPSK, QPSK, Mâ□™ary PSK, QASK, BFSK, Doubinary encoding, QPR coherent and non-coherent systems, error probabilities in PSK, DPSK, FSK, QPSK, 16 QAM, MSK, QPR and bit.

UNIT 3: (10-HOURS)

Matched correlation and optimum filters and symbol error rate.

UNIT 4: (06-HOURS)

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Spread Spectrum techniques: DS, CDMA, FH, PN sequence, Power requirement, PN- sequence code, and Walshâ□™s code.

UNIT 5: (06-HOURS)

ISDN & Value added communication system simulation & Analysis using MATLAB & Simulink

Application using communication toolboxes. Books :

1. Digital Communication. By Haykins Mc Graw Hill Int Edition.

2. Modern Digital & Analog Communication . By B P Lathi,. Willey Eatern Ltd. 2000.

3. Communication. Systems by A B Carlson, Tata Mc Graw Hill, 2000.

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VLSI Technology & Design

MEDC-103

MEDC-103	VLSI Technology & Design	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To learn the basic MOS Circuits
2. To learn the MOS Process Technology
3. To understand the operation of MOS devices.
4. To impart in-depth knowledge about analog and digital CMOS circuits

Course Outcomes:

1. Understand the fabrication process of IC technology
2. Analysis of the operation of MOS transistor
3. Analysis of the physical design process of VLSI design flow
4. Analysis of the design rules and layout diagram

UNIT – I: (10-HOURS)

Review of Microelectronics and Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology. Trends And Projections. 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: (10-HOURS)

Layout Design And Tools: 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: (10-HOURS)

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT –IV: (06-HOURS)

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT – V: (06-HOURS)

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Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

References:

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. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., Adisson Wesley

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Advanced Digital Signal Processing
MEDC-104

MEDC-104	Advanced Digital Signal Processing	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. Understand the design of various types of digital filters and implement them using various implementation structures and study the advantages & disadvantages of a variety of design procedures and implementation structures.
2. understand the concept and need for Multirate signal Processing and their applications in various fields of Communication & Signal Processing
3. understand difference between estimation & Computation of Power spectrum and the need for Power Spectrum estimation

Course Outcomes:

1. Design and implement a filter which is optimum for the given specifications.
2. Design a Mutirate system for the needed sampling rate and can implement the same using Poly phase filter structures of the needed order.
3. Estimate the power spectrum of signal corrupted by noise through a choice of estimation methods: Parametric or Non Parametric.

UNIT I : (10-HOURS)

Discrete Time signals - sequences, representation Discrete Time Systems Linear, Time invariant, LTI System, properties, constant coefficient difference equation. Frequency Domain Representation of discrete time signals & systems

UNIT II : (10-HOURS)

Discrete Time Random Signals Z Transform properties, R.O.C, stability, Causality criterion,Inverse Z-Transform , Recursive and Non recursive systems, Realization of discrete time system.

UNIT III : (10-HOURS)

D.F.T â□" properties, linear and circular convolution Discrete Cosine transform, relationship between DFT & DCT, I.D.F.T , computation of D.F.T : F.F.T â " Decimation in time & Decimation in frequency.

UNIT IV : (06-HOURS)

F.I.R and I.I.R Systems : Basic structure of FIR & IIR, Bilinear transformation, Design of discrete time I.I.R filters â□" Butterworth, Chebychev, Inv. Chebychev, elliptic etc. Design of F.I.R filters by windowing â□" rectangular,Bartlett, Hann, Hamming, Kaiser windows, Filter Design method .

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Relationship of Kaiser to other windows. Application of MATLAB for design of digital filters Effect of finite register length in filter design.

UNIT V: (06-HOURS)

Advanced signal processing techniques and transforms: Multirate Signal processing Down sampling/upsampling, Int. to discrete Hilbert transform, wavelet transform, Haar transform etc Application of DSP to Speech Signal Processing.

References :

1. A.V Opprenheim and R.W Schaffer, â□œDiscrete â□" Time signal processingâ□□ (2ndedition) , Prentice Hall
2. S. Mittra Digital Signal Processing using MATLAB, 2nd Edition.
3. Proakis, Int. to Digital Signal Processing, Maxwell Mcmillan.

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Information Theory & Coding
MEDC-105

MEDC-105	Information Theory & Coding	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To develop to understand the concept of information theory and data compression.

Course outcomes :

1. At the end of the course the students will have knowledge of entropy, relative entropy and mutual information.

UNIT I: (10 hours)

Information Theory Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT-II : (10 hours)

Error Control Coding: Block Codes Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder - CRC

UNIT-III: (10 hours)

Error Control Coding: Convolutional Codes Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

UNIT-IV: (6 hours)

Source Coding: Text, Audio And Speech Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 - Speech: Channel Vocoder, Linear Predictive Coding

UNIT-V (6 hours)

Source Coding: Image and Video Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard

Text Books:

1.R Bose, "Information Theory, Coding and Cryptography", TMH 2007
2.Fred Halsall, "Multidedia Communications: Applications, Networks, Protocols and Standards", Perason Education Asia, 2002
3.K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006
4.S Gravano, "Introduction to Error Control Codes", Oxford University Press 2007
5.Amitabha Bhattacharya, "Digital Communication", TMH 2006

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MEDC-106
Lab -1: Digital Communication

MEDC-106	Lab-1 Digital Communication	0L:0T:6P	6 credits	6Hrs/Week

List of Experiments

1. Design and Generation of random binary signals.
2. Study of impairments of signals generated in experiment 1 on passing through a simulated channel by observing Eye Pattern.
3. Generation Unipolar NRZ, Polar NRZ, Unipolar RZ and Polar RZ line codes.
4. Generation Manchester and AMI line codes.
5. Conversion of analogue signal into PCM format and its study.
6. Design and implementation of Delta Modulator for analogue signals.
7. Design, implementation and study of BASK Modulator and demodulator.
8. Design, implementation and study of BPSK Modulator and demodulator.
9. Design, implementation and study of BFSK Modulator and demodulator.
10. Design, implementation and study of multiplexer and de-multiplexer of digital signals using TDM

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MEDC-107

Lab -2 : Digital Signal Processing

MEDC-107	Lab-2 Digital Signal Processing	0L:0T:6P	6credits	6Hrs/Week

LIST OF PRACTICALS

1. Study of MATLAB 7.0.
2. Program to generate different kind of signals .
3. Write a program to find output for linear convolution using MAT LAB.
4. MATLAB program for generating the signal and sequences .
5. Program for determine the Discrete Fourier Transform.
6. Program for determine the inverse Discrete Fourier Transform.
7. Program for determination of auto correlation
8. Program for determination of cross correlation.
9. Filter design using Elliptical method.

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S S S U T M S SEHORE (M.P.)

MEDC-201 Advanced Optical Communication

MEDC-201	Advanced Optical Communication	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
2. To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.
3. To get familiar with the various optical source materials, LED structures, quantum efficiency, Laser diodes

Course Outcomes:

1. Students will be able to recognize and classify the structures of Optical fiber and types.
2. Students will be able to discuss the channel impairments like losses and dispersion.
3. Students will be able to analyze various coupling losses.
4. Students will be able to classify the Optical sources and detectors and to discuss their principle.

Unit 1 : Introduction To Optical Communication And Fiber Characteristics (10hours)
Evolution of Light wave systems, System components, Optical fibers - Step Index & Graded index - Mode theory, Fiber modes – Dispersion in fibers, Limitations due to dispersion - Dispersion shifted and dispersion flattened fibers - Fiber Losses - Non-linear effects

Unit 2 : Optical Transmitters (10hours)
Basic concepts - LED's structures - Spectral Distribution - Semiconductor lasers - Structures – Threshold conditions - SLM and STM operation - Transmitter design.

Unit 3 : Optical Detectors And Amplifiers (10hours)
Basic Concepts - PIN and APD diodes structures, Photo detector Noise, Receiver design. Amplifiers: Basic concepts - Semiconductor optical amplifiers; Raman - and Brillouin amplifiers - Erbium-doped fiber amplifiers, pumping requirements, cascaded in-line amplifiers.

Unit 4 : Coherent Lightwave Systems (6 hours)
Homodyne and heterodyne detectors - Modulation formats - Demodulation schemes - BER in synchronous receivers - Sensitivity degradation – Post - and pre compensation techniques - Optical solitons - Soliton based communication system.

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Unit 5 : Multichannel Systems (6 hours)

WDM systems, Multiple access networks - WDM Components - Hetero wavelength linear crosstalk and homo wavelength Linear Crosstalk – TDM, Channel multiplexing and demulltiplexing - Code-division multiplexing.

Reference Books

1. G.P.Agrawal, "Fiber Optic Communication Systems", 3rd Edition, John Wiley & Sons, New York, 2002.
2. G. Keiser, "Optical Fiber Communication Systems", McGraw Hill, New York 2000
3. Franz & Jain, "Optical Communication, System and Components", Narosa Publications, New Delhi 2000.
4. Djafar K. Mynbaev Lowell and Scheiner, "Fiber Optic Communication Technology", Pearson Education Asia, 2001.

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MEDC-202 Wireless Communications and Networks

MEDC-202	Wireless Communications and Networks	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To provide an overview of Wireless Communication networks area and its applications in communication engineering.
2. To appreciate the contribution of Wireless Communication networks to overall technological growth.
3. To explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.

Course Outcomes:

1. Understand fundamentals of wireless communications.
2. Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.
3. Demonstrate basic skills for cellular networks design.
4. Apply knowledge of TCP/IP extensions for mobile and wireless networking.

UNIT NO I ; WIRELESS COMMUNICATIONS SYSTEMS & FUNDAMENTALS: (10 HOURS)
Introduction to Wireless Communications Systems, examples, comparisons & trends, Cellular concepts - frequency reuse, strategies, Interference & System capacity, Trucking & grade of service. Improving coverage & capacity in Cellular Systems.

UNIT NO II : MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: (10 HOURS)
FDMA, TDMA, SSMA, (FHMA/CDMA / Hybrid techniques), SDMA technique (as applicable to Wireless Communications), Packet radio access-protocols, CSMA protocols, Reservation protocols, Capture effect in packet radio, Capacity of Cellular Systems.

UNIT NO III :WIRELESS NETWORKING: (10 HOURS)
Introduction, differences in wireless & fixed telephone networks, Traffic routing in Wireless Networks. Circuit switching, Packet switching, X.25 protocol, Wireless & Mobile data services: Cellular Digital Packet Data (CDPD), Data oriented CDPD Network advanced radio data information systems, RAM Mobile Data (RMD), Common Channel Signaling (CCS), Signaling System no.7 (SS7)-protocols, ISDN, Broad band ISDN and ATM Network services part, user part, Signaling traffic, services & performance. GPRS and higher data rates, Short Messaging Service in GSM, Mobile application [illegible]

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UNIT NO IV : MOBILE IP AND WIRELESS APPLICATION PROTOCOL: (6 HOURS)
Mobile IP operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, Wireless transaction, Wireless datagram protocol.

Unit No V : Wireless LAN: (6 hours)
Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 Physical layer. Adhoc Wireless Networks- Cellular and Adhoc Wireless Networks, Applications, MAC protocols, Routing, Multicasting, Transport layer protocols, Quality of service browsing, Adhoc Wireless Internet

Reference Books

1. Wireless Communication and Networking - Williams Stallings, 2003 PHI.
2. Wireless Communication, Principles- Theodore, S Rappaport 2nd Edn, 2002, PHI
3. Principles of Wireless Networks – KavehPah Laven and P.KrishnaMurthy, 2002, PE Reference books:
1. Wireless Digital Communications - Kamilo Fecher, 1990, PHI.
2. Telecommunication System Engineering – Roger I.Freeman, 4/ed, Wiley-Interscience, Jhon Wiley & Sons, 200

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S S S U T M S
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MEDC-203 Advanced Data Communications

MEDC-203	Advanced Data Communications	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To learn about basics of Data Communication networks, different protocols, standards and layering concepts.
2. To study about error detection and correction techniques.
3. Know about link layer protocol and point to point protocols.
4. To understand Medium Access Control sub layer protocols

Course Outcomes:

1. Understand the concepts of Data Communication networks, different protocols, standards and layering.
2. Acquire the knowledge of error detection, forward and reverse error correction techniques.
3. Analyze link layer protocol and point to point protocols

Unit-I: Digital Modulation: (10 hours)

Introduction, Information Capacity Bits, Bit Rate, Baud, and M-ARY Coding, ASK, FSK, PSK, QAM, BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

Unit -II: Basic Concepts of Data Communications, Interfaces and Modems: (10 hours)

Data Communication- Components, Networks, Distributed Processing, Network Criteria- Applications, Protocols and Standards, Standards Organizations- Regulatory Agencies, Line Configuration- Point-to-point- Multipoint, Topology- Mesh- Star- Tree- Bus- Ring- Hybrid Topologies, Transmission Modes- Simplex- Half duplex- Full Duplex, Categories of Networks- LAN, MAN, WAN and Internetworking, Digital Data Transmission- Parallel and Serial, DTE- DCE Interface- Data Terminal Equipment, Data Circuit- Terminating Equipment, Standards EIA 232 Interface, Other Interface Standards, Modems- Transmission Rates.

Unit-III: Error Detection and Correction: (10 hours)

Types of Errors- Single- Bit Error, CRC (Cyclic Redundancy Check)- Performance, Checksum, Error Correction- Single-Bit Error Correction, Hamming Code. Data link Control: Stop and Wait, Sliding Window Protocols. Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocol- Binary Synchronous Communication (BSC) - BSC Frames- Data Transparency, Bit

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Oriented Protocols – HDLC, Link Access Protocols.

Unit-IV: Switching: (6 hours)
Circuit Switching- Space Division Switches- Time Division Switches- TDM Bus- Space and Time Division Switching Combinations- Public Switched Telephone Network, Packet Switching- Datagram Approach- Virtual Circuit Approach- Circuit Switched Connection Versus Virtual Circuit Connection. Message Switching. Multiplexing: Time Division Multiplexing (TDM), Synchronous Time Division Multiplexing, Digital Hierarchy, Statistical Time Division Multiplexing.

Unit-V: Multiple Access: (6 hours)
Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Detection (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). Controlled Access- Reservation- Polling- Token Passing. Channelization- Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), - Code - Division Multiple Access (CDMA).

TEXT BOOKS:

1. Data Communication and Computer Networking - B. A.Forouzan, 3rd ed., 2008, TMH.
2. Advanced Electronic Communication Systems - W. Tomasi, 5 ed., 2008, PEI.
3. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
4. Data and Computer Communications - William Stallings, 8th ed., 2007, PHI.
5. Data Communication and Tele Processing Systems - T. Housely, 2nd Edition, 2008, BSP.
6. Data Communications and Computer Networks- Brijendra Singh, 2nd ed., 2005, PHI.
5. Telecommunication System Engineering – Roger L. Freeman, 4/ed., Wiley-Interscience, John Wiley & Sons, 2004.

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SSSUTMS (M.P.)

MEDC-204 Telecommunication Switching & Networks

MEDC-204	Telecommunication Switching & Networks	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To understand the working principles of switching systems from manual and electromechanical systems to stored program control systems.

Course outcomes:

1. Explain the working principle of switching systems involved in telecommunication switching
2. Assess the need for voice digitization and T Carrier systems
3. Compare and analyze Line coding techniques and examine its error performance

Unit-I Resource sharing and need for switching; (10 hours)
Circuit switching, Store and forward switching, Packet switching, electronic space division switching, Need for networks, Two stage networks, Three stage networks and n-stage networks.

Unit-II Time division switching: (10 hours)
Time switching, space switching, Three stage combination switching, n-stage combination switching; Traffic engineering: Hybrid switching, Two/Four wire transmission, Erlang formula and signaling.

Unit-III High speed digital access: (10 hours)
DSL technology, Cable Modem, SONET.

Unit-IV Local area networks: (6 hours)
Traditional ETHERNET, fast ETHERNET, Gigabit ETHERNET, Wireless LAN, Bluetooth, Connecting LAN's, Backbone networks.

Unit-V Integrated Services Digital Network: (6 hours)
Network & protocol architecture, user network interfaces, signaling, inter networking, ISDN standards, expert systems in ISDN, Broadband ISDN.

Reference Books
1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, Prentice Hall, New Delhi, 2001.
2. Data Communications and Networking- B.A. Forouzan, Tata McGrawhill, Third Edn., 2004

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MEDC-205 Cellular and Mobile Communication

MEDC-205	Cellular and Mobile Communication	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To expose the students to understand mobile radio communication principles and to study the recent trends adopted in cellular systems and wireless standards.

Course Outcomes:

1. Discuss the cellular system design and technical challenges.
2. Analyze the Mobile radio propagation, fading, diversity concepts and the channel modeling.
3. Analyze the design parameters, link design, smart antenna, beam forming and MIMO systems.

Unit -1 : Wireless Communications : (10 hours)
Introduction to wireless communications , examples of wireless communication system , the Cellular concept and system design fundamentals , Frequency reuse, Channel assignment strategies , Handoff strategies , Interfearance and system capacity , Trunk and grade services , Methods for improving coverage and capacity in cellular system .

Unit-2: Multiple Access Techniques (10 hours)
Multiple access techniques for wireless communications FDMA , TDMA , Spread spectrum techniques , SDMA , Packet Radio , CSMA , Capacity of cellular CDMA with multiple cells and capacity of SDMA.

Unit-3: Wireless Systems And Standards: (10 hours)
AMPS , IS-94, GSM traffic, Examples of GSM cell , Frame structure of GSM cell, details of forward and reverse CDMA channels.

Unit-4: Personal Access Communication Systems(6 hours)
Personal Mobile satellite communications, Integrating GEO, LEO, MEO Satellite and terrestrial mobile systems , Rake receiver and Advanced Rake receiver,

Unit-5: Mobile Radio propagation (6 hours)
Large scale path loss , Reflection , Diffraction , Scattering , Outdoor and Indoor propagation models , Small signal fading and multi path , measurement of small scale path loss , parameters of multi path channels , fading due to multi path , fading effect due to Doppler spread , small scale fading models , equalization , Diversity .

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Reference Books

1.Wireless Communications Principles and Practice , Second Edition , THEODORE S.REPPAPORT .
2.Wireless Digital Communications , DR. KAMILO FEHER .
3.Electronic Communication system , WAYNE TOMASI.
4.Wireless Communications , SANJY SHARMA.

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MEDC-206

Lab -1 : Modeling & Simulation Lab

MEDC-206	Lab -1 : Modeling & Simulation Lab	0L:0T:6P	6 credits	6Hrs/Week

LIST OF EXPERIMENTS

1 .Write a program to search an element in a two dimensional array

2. Using iteration and recursion concepts write programs for finding the element in the array using the Binary search method.

3 .Write a program to perform following operations on tables using functions only - Addition , Subtraction, Multiplication, Transpose.

4 . Write a program using iteration and recursion concepts for quick sort.

5 . Write a program to implement various operations on strings.

6. Write a program for swapping two numbers using call by value and call by reference strategies.

7. Write a program to implement Binary search tree.

8. Write a program to create a Linked List and perform operations such as insert, delete, update and reverse.

9. Write a program to simulate various sorting and searching algorithms.

10. Write a program to simulate various Graph traversing techniques.

11 . Write a program to simulate various tree traversal techniques.

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MEDC-207
Lab -2 : Simulation in MATLAB Environment

MEDC-207	**Lab -2 : Simulation in MATLAB Environment**	**0L:0T:6P**	**6 credits**	**6Hrs/Week**

LIST OF EXPERIMENT

1. Study of MATLAB 7.0
2. Arithmatic operation using MATLAB 7.0
3. Generation of Signals
4. Linear convolution using MATLAB
5. Program illustrates the design of a Butterworth bandstop filter.
6. To implement a causal IIR filter implemented in the Direct Form II structure, the function direct2 given below can be employed.
7. To implement a causal IIR filter implemented in the Direct Form II structure, the function direct2 given below can be employed
8. Program illustrates the design of a causal IIR filter, its simulation in transposed Direct Form II, and its application in filtering a signal.
9. Program up-sampler.
10. Illustration of Down-Sampling by an Integer Factor
11. Use fir2 to create a bandlimited input sequence
12. Program P10 4 can be employed to study the frequency-domain properties of the downsampler
13. FIR filter using Rectangular Window
14. FIR filter using Hamming Window
15. Circular Convolution of two sequences using MATLAB
16. IIR filter design using MATLAB

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ELECTIVE -1
MEDC – 301(A) WIRELESS LAN

MEDC-301(A)	WIRELESS LAN	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To impart the new concepts in Advanced Wireless Communications

Course Outcomes:

1. Understand fundamentals of wireless communications.
2. Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.
3. Demonstrate basic skills for cellular networks design.
4. Apply knowledge of TCP/IP extensions for mobile and wireless networking

UNIT –I: (10 HOURS)

Wireless System & Random Access Protocols: Introduction, First and Second Generation Cellular Systems, Cellular Communications from 1G to 3G, Wireless 4G systems, The Wireless Spectrum; Random Access Methods: Pure ALOHA, Slotted ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA).

UNIT –II: (10 HOURS)

Wireless LANs: Introduction, importance of Wireless LANs, WLAN Topologies, Transmission Techniques: Wired Networks, Wireless Networks, comparison of wired and Wireless LANs; WLAN Technologies: Infrared technology, UHF narrowband technology, Spread Spectrum technology

UNIT –III: (10 HOURS)

The IEEE 802.11 Standard for Wireless LANs: Network Architecture, Physical layer, The Medium Access Control Layer; MAC Layer issues: Hidden Terminal Problem, Reliability, Collision avoidance, Congestion avoidance, Congestion control, Security, The IEEE 802.11e MAC protocol

UNIT –IV: (6 HOURS)

Wireless PANs: Introduction, importance of Wireless PANs, The Bluetooth technology: history and applications, technical overview, the Bluetooth specifications, piconet synchronization and Bluetooth

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clocks, Master-Slave Switch; Bluetooth security; Enhancements to Bluetooth: Bluetooth interference issues, Intra and Inter Piconet scheduling, Bridge selection, Traffic Engineering, QoS and Dynamics Slot Assigment, Scatternet formation.

UNIT –V: (6 HOURS)

The IEEE 802.15 working Group for WPANs: The IEEE 802.15.3, The IEEE 802.15.4, ZigBee Technology, ZigBee components and network topologies, The IEEE 802.15.4 LR-WPAN Device architecture: Physical Layer, Data Link Layer, The Network Layer, Applications; IEEE 802.15.3a Ultra wideband.

REFERENCE BOOKS

1. Ad Hoc and Sensor Networks - Carlos de Morais Cordeiro and Dharma Prakash Agrawal, World Scientific,
2011.
2. Wireless Communications and Networking - Vijay K.Garg, Morgan Kaufmann
Publishers, 2009.
3. Wireless Networks - Kaveh Pahlaram, Prashant Krishnamurthy, PHI, 2002.
4. Wireless Communication- Marks Ciampor, Jeorge Olenewa, Cengage Learning, 2007.

MEDC – 301(B) Soft Computing Techniques

MEDC-301(B)	Soft Computing Techniques	3L:1T:0P	4 credits	6Hrs/Week

Course Preamble:

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Course Outcomes

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various
2. systems and fuzzy set theory.
3. Understand the concepts of fuzzy sets, knowledge representation using fuzzy
4. rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
5. To understand the fundamental theory and concepts of neural networks, Identify
6. different neural network architectures, algorithms, applications and their
7. limitations

UNIT –I: (10 HOURS)

Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT –II: (10 HOURS)

Artificial Neural Networks: Concept of Artificial Neural Networks and its basic 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 and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT –III: (10 HOURS)

Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Selforganizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system

UNIT –IV: (10 HOURS)

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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: (6 HOURS)

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.

REFERENCE BOOKS

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.
3. 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.

MEDC – 302(A) Network Design Technology

MEDC-302(A)	Network Desiga Technology	0L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To develop an understanding of computer networking basics.
2. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.

Course Outcomes

1. Recognize the technological trends of Network Design Technology.
2. Discuss the key technological components of the Network.
3. Evaluate the challenges in building networks and solutions to those.

UNIT I : (10 HOURS)

Review of concepts of Layering and Layered models- OSI & TCP/IP, LAN Technology, transmission Medium, Topology, Medium Access Control (MAC) Techniques including MAC& LLC sub layers,

UNIT II : (10 HOURS)

LAN system, Ethernet system, Fast Ethernet& Gigabit Ethernet, Token Ring, FDDI Internet working with TCP/IP, Internet Protocol (IP) Suite including IP V4, IP V6 Transport Protocols, TCP and UDP

UNIT II : (10 HOURS)

Introduction to IP routing, default route,routing operation, various interior gateways protocols like RIP, OSPF, difference between RIP and OSPF, and exterior gateway protocols like BGP.

UNIT IV : (6 HOURS)

Introduction to label Switching and MPLS,WAN technology: WAN Vs LAN, Circuit switching mechanism and network design, packet ,switched networking including routing and traffic control, X.25ISDN and Broadband ISDN: Overview, ISDN, interface and functions, layers and ISDN services-ISDN standards and services High Speed network frame relay, frame relay protocols, services and congestion control,

UNIT V : (6 HOURS)

ATM: ATM adaptation layer (AAL), ATM traffic and congestion control ATM LAN, ATM LAN emulation and multi protocols over ATM (MPOA)

REFERENCE BOOKS.

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1. Redia Pearlman, Interconnections, bridges, routers, switches and Int protocols Pearson Edu
2. Comer, Internetworking with TCP/IP Vol. I PHI
3. Tenenbaum, Computer Networks, PHI
4. Forouzan B, Data communication and networking, TMH.
5. Stalling W, Data and computer communications, PHI
6. Hardy, Inside networks, PHI
7. Glover and Grant, Digital Communication, PHI

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MEDC – 302(B) Micro Controller System Design

MEDC-302(B)	Micro Controller System Design	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To relate the basic architecture and addressing modes of a microcontroller.
2. To summarize the principles of top down design to microcontroller software development
3. To demonstrate assembly language programs for the advanced Microcontroller , assembly language code for high-level

Course Outcomes:

1. Distinguish Types of computers & microcontrollers.
2. Generalize 8-Bit, 16- Bit & 32 Bit advanced Microcontrollers.
3. Construct Real time Applications of Microcontrollers.

UNIT I : (10HOURS)

Review of 8-Bit and 16-bit microprocessor, support chips and interfacing techniques, single chip micro-computers, architecture, program and data memory, ports, input Output interfacing and programming.

UNIT II : (10HOURS)

Single chip micro controllers- INTEL 8051/ 8751, MOTOROLA 68HC0/68HC11 architecture, instruction set and programming, Memory mapping, addressing modes, Registers, expanded modes. Interrupt handling timing and serial I / O.

UNIT III : (10HOURS)

Software development Modular approach, integrated software development environment, Object oriented interfacing and programming, Recursion and debugging.

UNIT IV : (6 HOURS)

ATMEL 89C51 / 52 and PIC micro-Controllers- Case studies .Design and application of Micro-Controller in Data acquisition, Embedded controllers, Process control etc.

UNIT V : (6 HOURS)

DSP Processor architecture and sample design using TI – DSP, digital signal process a TI architectural history, dsp architecture evolution, dsp architecture enabling technologies, architecture optimized for dsp.

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REFERENCE BOOKS:

1. Embedded Systems 8051 By Majidi & Majidi
2. Design With Micro-Controllers By John P. Peatman Tmh
3. Embedded Micro-Computers System By Jonathan W. Valvano
4. Data Manuals – Intel Motorola

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MEDC-303
Seminar

MEDC-303	Seminar	0L:0T:4P	4 credits	4Hrs/Week

Course Preamble : To Analyses the topic of seminar with scope of work.

Course Outcome: This course helps to collect useful information from the literature on the assigned topic.

Seminar topic: One faculty assigned to each M. Tech student. Usually the assigned faculty suggest a particular research topic to the concern student. Subsequently student collects research papers. The faculty assigned/ supervisor gives one / two research paper and advice the student to make detail study on a. Authors contribution b. Mathematical analysis c. Performance comparison parameters

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MEDC-304
Dissertation Part I

MEDC-304	Dissertation Part I	0L:0T:8P	8 credits	6Hrs/Week

Course Preambles: To analyze the title and proposed a model for Dissertation.

Course outcomes: To study of literature survey, formulate the research problem and develop necessary methodology related to research problem. A workable design/ algorithm to be developed based on the proposed methodology, algorithm a design to be noted.

Course Contents: Title of the Dissertation- This should be carefully decided by the student after discussing with the dissertation supervisor or the guide. Explain the relevance and importance of the dissertation; Write a brief (1 or 2 pages) introduction of the dissertation explaining its relevance and importance.

Student has to spend two hours daily in library to analyze the problem. It is also essential for student to meet supervisor twice in a week to discuss the research problem. After four weeks of registration the first evaluation has been done before committee to revive the literature survey and formulation of the problem. .In second the evaluation, the student has to show the progress of work in terms of design level, mathematical model/ algorithm etc. At end of semester, simulation based design has been analyzed by the committee.

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MEDC- 401
Dissertation Part- II

MEDC-401	Dissertation Part II	0L:0T:20P	20 credits	6Hrs/Week

NOTES1.

Dissertation ** to be continued from III semester.
2. Final evaluation of dissertation will be based on the cumulative performance in all III and IV.
3. It is desirable to have one publication from the dissertation.

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9)Scheme of Examination (VLSI) Academic Year 2019-20

Scheme of Examination

First Semester –Master of Technology (VLSI)

SEMESTER-I

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.	MEVD-101	Advanced Mathematics	3	1	-	4	70	20	10	-	-	100
2.	MEVD-102	VLSI Design Concepts	3	1	-	4	70	20	10			100
3.	MEVD-103	Modeling of Digital Systems using HDL	3	1	-	4	70	20	10			100
4.	MEVD-104	Advanced Digital Signal Processing	3	1	-	4	70	20	10	-	-	100
5.	MEVD-105	VLSI Technology	3	1	-	4	70	20	10	-	-	100
6.	MEVD-106	Lab -1 : VLSI Design	-	-	6	6	-	-	-	90	60	150
7.	MEVD-107	Lab -2 : Hardware Description Languages	-	-	6	6	-	-	-	90	60	150
		Total	15	5	12	32	350	100	50	180	120	800

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Second Semester –Master of Technology (VLSI)

SEMESTER-II

S.No.	Subject Code	Subject Name	Periods /week			Total Credits	Maximum Marks Allotted					Total Marks
							Theory Slot			Practical Slot		
			L	T	P		End Sem. Exam.	Tests (Two)	Assignments Quiz	End Sem. Practical Viva	Practical Record/ assignment/ Quiz/ Presentation	
1.	MEVD-201	Design of Analog/Mixed Mode VLSI Circuits	3	1	-	4	70	20	10	-	-	100
2.	MEVD-202	ASIC Design And FPGAs	3	1	-	4	70	20	10	-	-	100
3.	MEVD-203	Embedded Real Time Operating Systems	3	1	-	4	70	20	10	-	-	100
4.	MEVD-204	Embedded Systems	3	1	-	4	70	20	10	-	-	100
5.	MEVD-205	System on Chip	3	1	-	4	70	20	10	-	-	100
6.	MEVD-206	Lab -1 : Designing with FPGAs	-	-	6	6	-	-	-	90	60	150
7.	MEVD-207	Lab -2 : Digital Signal Processing And Embedded System	-	-	6	6	-	-	-	90	60	150
		Total	15	5	12	32	350	100	50	180	120	800

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Scheme of Examination

Third-Semester –Master of Technology (VLSI)

SEMESTER-III

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.	MEVD-301	Elective- I	3	1	-	4	70	20	10	-	-	100
2.	MEVD-302	Elective- II	3	1	-	4	70	20	10	-	-	100
3.	MEVD-303	Seminar			4	4				-	100	100
4.	MEVD-304	Dissertation Part I			8	8				120	80	200
		Total	6	2	12	20	140	40	20	120	180	500

Elective -1	(A) CAD for VLSI Circuits	(B) Design for Testability
Elective - 2	(A) VLSI SIGNAL PROCESSING	(B) Low Power and High Speed VLSI Design

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Scheme of Examination

Fourth- Semester –Master of Technology (VLSI)

SEMESTER-IV

S.No.	Sub Code	Subject Name	Periods per			Credits	Max Marks Theory			Max. Marks Practical		Total Marks
			L		P		End Sem Exam	Mid Sem	TW	End Sem Practical / Viva	Practical Record/Quiz /Assignment / Presentation	
1.	MEVD-401	Dissertation Part- II	-		20	20	-	-	-	300	200	500
TOTAL			-		20	20	-	-	-	300	200	500

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Advanced Mathematics

MEVD- 101

MEVD-101	Advanced Mathematics	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

3. To learn principles of advanced engineering mathematics through linear algebra and calculus of variations.
4. To understand probability theory and random process that serve as an essential tool for applications of electronics and communication engineering sciences.

Course Outcomes:

1. Understand vector spaces, basis, linear transformations and the process of obtaining matrix of linear transformations arising in magnification and rotation of images.
2. Apply the technique of singular value decomposition for data compression, least square approximation in solving inconsistent linear systems.
3. Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits.

UNIT I: (10-HOURS)

Partial Differential Equation Solution of Partial Differential Equation (PDE) by separation of variable method, Numerical solution of PDE (Laplace, Poisson's, Parabola) using finite difference Methods.

UNIT II: (10-HOURS)

Matrices And Linear System Of Equations Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout's triangularization method, Iterative methods-Jacobins method, Gauss-Seidal method. Determination of Eigen values by iteration.

UNIT III: (10-HOURS)

Calculus Of Variations Euler-Lagrange's differential equation, The Brachistochrone problems and other applications. Isoperimetric problem, Hamilton's Principle and Lagrange's Equation, Rayleigh-Ritz method, Galerkin method.

UNIT IV: (06-HOURS)

Fuzzy Logic Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.

UNIT V: (06-HOURS)

Reliability Introduction and definition of reliability, derivation of reliability functions, failure rate, Hazard rate, mean time t future & their relations, concepts of fault tolerant analysis.

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Reference Books:

1. Higher Engineering Mathematics - by Dr. B.S. Grewal; Khanna Publishers
2. Calculus of Variations - by Elsgole; Addison Wesley.
3. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
4. Introductory Methods of Numerical Analysis by S.S. Shastry.
5. Calculus of Variations - by Galfand & Fomin; Prentice Hall
6. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill
7. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
8. Numerical Solution of Differential Equation by M. K. Jain
9. Numerical Mathematical Analysis By James B. Scarborogh
10. Fuzzy Logic in Engineering by T. J. Ross
11. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

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VLSI Design Concepts

MEVD-102

MEVD-102	VLSI Design Concepts	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To design and optimize CMOS Digital Integrated Circuits.
2. To understand floor planning and layout issues for digital circuits

Course Outcomes:

1. Understand the basic Physics and Modelling of MOSFETs.
2. Learn the basics of Fabrication and Layout of CMOS Integrated Circuits.
3. Study and analyze the performance of CMOS Inverter circuits on the basis of their operation and working.
4. Study the Static CMOS Logic Elements

UNIT – I : Introduction to CMOS circuits: (10HOURS)

MOS transistors, MOS switches, CMOS logic: Inverter, combinational logic, NAND, NOR gates, compound gates, Multiplexers. Memory: Latches and registers. Circuit and system representations: Behavioral, structural and physical representations.

UNIT– II: MOS transistor theory: (10HOURS)

NMOS, PMOS enhancement mode transistors, Threshold voltage, body effect, MOS device design equations, MOS models, small signal AC characteristics, CMOS inverter DC characteristics, static load MOS inverters, Bipolar devices - advanced MOS modeling – large signal and small signal modeling for BJT

UNIT– III: LOW – VOLTAGE LOW POWER VLSI CMOS CIRCUIT DESIGN: (10 HOURS)

CMOS invertor – Characteristics – Power dissipation, Capacitance estimation, CMOS static logic design, Logic styles.

UNIT– IV (10 HOURS)

Circuit characterization and performance estimation: Estimation of resistance, capacitance, inductance, Switching characteristics, CMOS gate transistor sizing, power dissipation, sizing routing conductors, charge sharing, Design margining yield, reliability, Scaling of MOS transistor dimensions.

UNIT– V (10 HOURS)

CMOS circuit and logic design: CMOS logic gate design, physical design of simple logic gates, CMOS logic structures, Clocking strategies, I/O Structures.

REFERENCES

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1. Weste, Eshraghian, "Principles of CMOS VLSI design", 2nd Edition Addison Wesley, 1994.

2. Douglas A Pucknell and Kamaran Eshragian, " Basic VLSI design ", 3rd edition, PHI, 1994.

3. BELLAOUR & M.I.ELAMSTRY, "Low – Power Digital VLSI Design. Circuits and Systems", Kluwer Academic Publishers, 1996.

4. S.IMAM & M.PEDRAM, "Logic synthesis for Low – Power VLSI Designs", Kluwer Academic publishers, 1998.

5. B.G.K.YEAP, "Practical Low Power Digital VLSI Design", Kluwer Academic publishers, 1998.

Modeling of Digital Systems using HDL

MEVD-103

MEVD-103	Modeling of Digital Systems using HDL	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To design combinational, sequential circuits using Verilog HDL.
2. To understand behavioral and RTL modeling of digital circuits
3. To verify that a design meets its timing constraints, both manually and through the use of computer aided design tool.

Course Outcomes:

1. Understand the basic concepts of verilog HDL
2. Model digital systems in verilog HDL at different levels of abstraction
3. Know the simulation techniques and test bench creation

UNIT – I Introduction to PLDs & FPGAs (10 HOURS)

ROMs, Logic array (PLA), Programmable array logic, GAL, bipolar PLA, NMOS PLA, PAL 14L4, Xilinx logic cell array (LCA) – I/O Block – Programmable interconnect – Xilinx – 3000 series and 4000 series FPGAs, Altera CPLDs, altera FLEX 10K series PLDs

UNIT – II Placement and routing (10 HOURS)

Mincut based placement – iterative improvement placement– Routing: Segmented channel routing – Maze routing – Routability and routing resources – Net delays.

UNIT – III Introduction to VHDL (10 HOURS)

Digital system design process – Hardware simulation – Levels of abstraction – VHDL requirements – Elements of VHDL – Top down design VHDL operators – Timing – Concurrency – Objects and classes – Signal assignments – Concurrent and sequential assignments.

UNIT – IV (6 HOURS)

Structural, Data flow & Behavioral description of hardware in VHDL, Parts library – Wiring [illegible] – Wiring of iterative networks – Modeling a test bench – Top down wiring components – Subp[illegible]

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data selection – State machine descriptions – Open collector gates – Three state bussing. - Process statement – Assertion statement – Sequential wait statements – Formatted ASCII I/O operations MSI based design.

UNIT – V (10HOURS)

Introduction to Verilog HDL. Lexical conventions – Data types – System tasks and Compiler Directives- Modules and Ports- Gate Level Modeling with Examples.

REFERENCES

1. P.K. Chan & S. Mourad, "Digital Design sing Field Programmable Gate Array" 1st Edition, Prentice Hall, 1994.

2. J. V. Old Field & R.C. Dorf, " Field Programmable Gate Array", John Wiley, 1995.

3. M. Bolton, " Digital System Design with Programmable Logic", Addison Wesley, 1990.

4. Thomas E. Dillinger, " VLSI Engineering", Prentice Hall, 1st Edition, 1998.

5. Douglas Perry, "VHDL", 3rd Edition, McGraw Hill 2001.

6. J. Bhasker, "VHDL", 3rd Edition, Addison Wesley, 1999.

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Advanced Digital Signal Processing

MEVD-104

MEVD-104	Advanced Digital Signal Processing	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To Comprehend characteristics of discrete time signals and systems
2. To analyze and process signals using various transform techniques
3. To identify various factors involved in design of digital filter

Course Outcomes:

1. Analyze and process signals in the discrete domain
2. Design filters to suit specific requirements for specific applications
3. Perform statistical analysis and inferences on various types of signals

UNIT 1 : (10 HOURS)

Discrete Time signals - sequences, representation Discrete Time Systems Linear, Time invariant, LTI System, properties, constant coefficient difference equation, Frequency Domain Representation of discrete time signals & systems

UNIT 2 : (10 HOURS)

Discrete Time Random Signals Z Transform properties, R.O.C, stability, Causality criterion Inverse Z- Transform, Recursive and Non recursive systems, Realization of discrete time system.

UNIT 3 : (10 HOURS)

D.F.T â" properties, linear and circular convolution Discrete Cosine transform, relationship between D.F.T & D.C.T. I.D.F.T, computation of D.F.T : F.F.T â" Decimation in time & Decimation in frequency

UNIT -4 (6 HOURS)

F.I.R and I.I.R Systems :Basic structure of FIR & IIR, Bilinear transformation, Design of discrete time I.I.R filters â" Butterworth, Chebychev, Inv. Chebychev, elliptic etc. Design of F.I.R filters by windowing â" rectangular, Bartlett, Hann, Hamming, Kaiser window filter , Design method , Relationship of Kaiser to other windows. Application of MATLAB for design of digital filters Effect of finite register length in filter design.

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UNIT 5 (6 HOURS)

Advanced signal processing techniques and transforms: Multirate Signal processing Down sampling/upsampling, Int. to discrete Hilbert transform, wavelet transform, Haar transform etc. Application of DSP to Speech Signal Processing.

REFERENCES :

1. A.V Oppenheim and R.W Schaffer, â□œDiscrete â□" Time signal processingâ€• (2nd edition) , Prentice Hall

2. S. Mitra Digital Signal Processing using MATLAB, 2nd Edition.

3. Proakis, Int. to Digital Signal Processing, Maxwell Mcmillan

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VLSI Technologies

MEVD -105

MEVD-105	VLSI Technologies	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To design and optimize CMOS Digital Integrated Circuits.
2. To understand floor planning and layout issues for digital circuits

Course Outcomes:

1. Understand the need for low power in VLSI.
2. Understand various dissipation types in CMOS.
3. Estimate and analyse the power dissipation in VLSI circuits. Course Outcomes:

UNIT –I: (10 HOURS)

Review of Microelectronics and Introduction to MOS Technologies: 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: (10 HOURS)

Layout Design and Tools: 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: (10 HOURS)

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT –IV: (6 HOURS)

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT –V: (6 HOURS)

Floor Planning: Floor planning methods, Global Interconnect, Floor Plan Design, Off-chip connections.

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REFERENCE:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian Eshraghian, D. A. Packnell, 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.

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MEVD-106

Lab -1 : VLSI Design

MEVD-106	VLSI Design	0L:0T:6P	6 credits	6Hrs/Week

EXPRIMENT LIST

1. Design a full adder circuit layout having a and b as input cin as Previous carry and Sum & Cout as output, according to design rules then verify results by simulating the design.
2. Design CMOS layout for D Flip-flop according to design rules then verify results by simulating the design.
3. Design a 4X1 Multiplexer using 2X1 Multiplexer then design a CMOS layout for it according to design rules then verify results by simulating the design.
4. Design a D Latch using pass gates and inverters then design a CMOS layout for it according to design rules then verify results by simulating the design.
5. Design a 2X1 Multiplexer using pass gates then design a CMOS layout for it according to design rules then verify results by simulating the design.
6. Design CMOS layout for an 2 input NAND Gate according to design rules then verify results by simulating the design.

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MEVD-107

Lab -2 : Hardware Description Languages

MEVD-107	Lab -2 : Hardware Description Languages	0L:0T:6 P	6 credits	6Hrs/Week

EXPRIMENT LIST

1. Write Verilog code to realize all the gates.
2. Write a Verilog program for the following combinational designsa).

(A) 2 to 4 decoder b),

(B) 8 to 3 (encoder without priority & with priority)c),

(C) 8 to 1 multiplexerd). 4 bit binary to gray convertere),

(D) Multiplexer,

(E) de-multiplexer,

(F) comparator

3. Write a HDL code to describe the functions of a full adder using three modeling styles.
4 .Write a model for 32 bit ALU using the schematic diagram shown below A(31:0)

5. Develop the Verilog code for the following flip-flops SR, D, JK &
6. Design 4 bit binary, BCD counters (Synchronous reset and asynchronous reset) and "anysequence counters Using Verilog code

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MEVD-201 CMOS Mixed Signal Circuit Design

MEVD-201	CMOS Mixed Signal Circuit Design	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To design and optimize CMOS Mixed Signal Circuit Design.
2. To understand floor planning and layout issues for digital circuits

Course Outcomes:

1. To learn performance optimization techniques in VLSI signal processing,
2. Transformations for high speed and power reduction using pipelining, retiming, parallel processing techniques, supply voltage reduction as well as for strength or capacitance reduction,
3. Area reduction using folding techniques, Strategies for arithmetic implementation.

UNIT -I: Switched Capacitor Circuits: **(10 HOURS)**
Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis. Non-ideal effects in switched capacitor circuits. Switched capacitor integrators first order filters, Switch sharing, biquad filters.

UNIT -II: Phased Lock Loop (PLL): (10 HOURS)
Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications

UNIT -III: Data Converter Fundamentals: (10 HOURS)
DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT -IV: Nyquist Rate A/D Converters: (6 HOURS)
Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT -V: Oversampling Converters: (6 HOURS)
Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multibit quantizers, Delta sigma D/A

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Reference Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
3. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013
4. CMOS Integrated Analog-to- Digital and Digital-to-Analog converters-Rudy Van De Plassche, Kluwer Academic Publishers, 2003
5. Understanding Delta-Sigma Data converters-Richard Schreier, Wiley Interscience, 2005.
6. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.

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MEVD -202
ASIC Design and FPGA

MEVD-202	ASIC Design and FPGA	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To design and optimize ASIC Design and FPGA.
2. To understand floor planning and layout issues for digital circuits

Course Outcomes:

1. Model digital systems in VHDL and SystemC at different levels of abstraction.
2. Partition a digital system into different subsystems.
3. Simulate and verify a design.

UNIT -I: Introduction To ASICS (10 HOURS)

Introduction to ASICS, CMOS Logic And ASIC Library Design, Types of ASICs - Design flow - CMOS transistors CMOS Design rules - Combinational Logic Cell – Sequential logic cell - Data path logic cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical effort -Library cell design - Library architecture.

Unit -II: Programmable Asics (10 HOURS)

Programmable Asics, Programmable ASIC Logic Cells And Programmable ASIC I/O Cells, Anti fuse - static RAM - EPROM and EEPROM technology - PREP benchmarks - Actel ACT - Xilinx LCA - Altera FLEX - Altera MAX DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks.

Unit -III: Interconnect (10 HOURS)

Programmable ASIC Interconnect, Programmable ASIC Design Software And Low Level Design Entry Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000,- Altera FLEX - Design systems - Logic Synthesis - Half gate ASIC -Schematic entry - Low level design language - PLA tools - EDIF- CFI design representation.

Unit -IV: Construction (6 HOURS)

ASIC Construction, Floor Planning, Placement And Routing, System partitions - FPGA partitioning - partitioning methods - floor planning - placement - physical design flow - global routing - detailed routing - special routing - circuit extraction - DRC.

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UNIT -V: PLDs (6 HOURS)

Design using Xilinx family FPGA, Review of VHDL/Verilog: Entities and architectures.

Reference Books:

1. M.J.S .Smith, - " Application - Specific Integrated Circuits " - Addison -Wesley Longman Inc., 1997
2. Skahill, Kevin," VHDL for Programmable Logic", Addison-Wesley, 1996
3. John F. Wakherly, " Digital Design: Principles and Practices", 2nd Edn 1994, Prentice Hall International Edn
4. Charles W. Mckay, "Digital Circuits a proportion for microprocessors", Prentice Hall

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MEVD -203
Embedded Real Time Operating Systems

MEVD-203	Embedded Real Time Operating Systems	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. Introduction of the real-time systems.
2. Computing required for the real-time embedded systems.
3. Communication required for the real-time embedded systems

Course Outcomes:

1. To present the mathematical model of the system.
2. To develop real-time algorithm for task scheduling.
3. To understand the working of real-time operating systems and real-time database.
4. To work on design and development of protocols related to real-time communication

UNIT – I: Introduction (10 HOURS)

Introduction to UNIX/LINUX, Overview of Commands, File I/O.(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec.

UNIT - II: Real Time Operating Systems (10 HOURS)

Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT - III: Objects, Services and I/O (10 HOURS)

Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT - IV: Exceptions, Interrupts and Timers (6 HOURS)

Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT - V: Case Studies of RTOS (6 HOURS)

RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

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Reference Books:

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011
2. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
3. Advanced UNIX Programming, Richard Stevens
4. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

MEVD 204

Embedded System Design

MEVD-204	Embedded System Design	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware , operating systems in correlation with hardware systems.

Course Outcomes:

1. Expected to understand the selection procedure of Processors in the Embedded domain.
2. Design Procedure for Embedded Firmware.
3. Expected to visualize the role of Real time Operating Systems in Embedded Systems

UNIT - I: Embedded Processing: (10 HOURS)

Introduction to Embedded Computing, Difference between Embedded and General-Purpose Computing, Characterizing Embedded Computing, Design Philosophies, RISC, CISC, VLIW versus superscalar, VLIW versus DSP Processors, Role of the Compiler, Architectural structures, The datapath, Registers and Clusters, Memory Architecture, Branch architecture, Speculation and prediction, Prediction in the embedded domain, Register File Design, Pipeline Design, the control unit, control registers.

UNIT - II: Embedded Processors: (10 HOURS)

Microprocessor versus Microcontroller architecture, ARM architecture, Embedded Cores, Soft and Hard Cores, Architecture of Configurable Microblaze soft core, Instruction set, Stacks and Subroutines, Microblaze Assembly Programming, Input-Output interfacing, GPIO, LCD interfacing, Peripherals, DDR Memory, SDRAM, Microblaze interrupts, Timers, Exceptions, Bus Interfacing, DMA, On-chip Peripheral bus (OPB), OPB Arbitration, OPB DMA.

UNIT -III: RTOS and Application design (10 HOURS)

Programming language choices, Traditional C and ANSI C, C++ and Embedded C++, matlab, Embedded JAVA, Embedded C extensions, Real time operating systems, Embedded RTOS, Real time process scheduling, structure of real time operating system, Memory management in Embedded operating system, operating system overhead, interprocess communication mechanisms, File systems in Embedded Devices, Different types of locks, Semaphores, Application studies with Vxworks, Montavista Linux etc.

UNIT -IV System Design and Simulation: (6 HOURS)

System-on-a-Chip (SoC), IP Blocks and Design Reuse, Processor Cores and SoC, Non-programmable accelerators, reconfigurable logic, multiprocessing on a chip, symmetric multiprocessing, heterogeneous multiprocessing, use of simulators, Compilers, Loaders, Linkers, locators, assemblers, Libraries, post run optimizer, debuggers, profiling techniques, binary utilities, linker script, Software simulation, In Circuit Emulation, Validation and verification, Hardware Software partitioning, Co-design.

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UNIT - V: Laboratory Work (6 HOURS)

Embedded System design using Embedded Development Kit Software and implementation on FPGA hardware, Practicals on Xilkernel, Vxworks and montavista Linux Real Time Operating Platforms.

Reference Books:

1. Wolf, W., High-Performance Embedded Computing Architectures, Applications,
2. and Methodologies, Morgan Kaufman Publishers (2007).
3. Heath, S., Embedded Systems Design, Elsevier Science (2003).
4. Fisher, J.A., Faraboschi, P. and Young, C., Embedded Computing - A VLIW
5. Approach to Architecture, Compilers and Tools, Morgan Kaufman (2005).
6. Simon, D.E., An Embedded Software Primer, Dorling Kindersley (2005).

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MEVD-205
System on Chip

MEVD-205	System on Chip	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1) To introduce the architectural features of system on chip.
2) To provides information on interconnection necessities between computational block and memory block.

Course outcomes:

1) Introduction to SOC Architecture and design.
2) Processor design Architectures and limitations
3) To acquires the knowledge of memory architectures on SOC.
4) To understands the interconnection strategies and their customization on SOC.

Unit I – Introduction (10 HOURS)

Introduction to SoC Design., Platform-Based SoC Design., Multiprocessor SoC and Network on Chip, Low-Power SoC Design

Unit II - System Design With Model Of Computation And Co-Design (10 HOURS)

System Models, Validation and Verification, Hardware/Software Codesign, Application Mapping, Synthesis.

Unit III - Computation-Communication Partitioning And Network On Chip-Based Soc (10 HOURS)

Communication System: Current Trend, Separation of Communication and Computation, Communication-Centric SoC Design, Communication Synthesis, Network-Based Design, Network on Chip, Architecture of NoC

Unit IV - Noc Design

Practical Design of NoC, NoC Topology-Analysis Methodology, Energy Exploration, NoC Protocol Design, Low-Power Design for NoC: Low-Power Signaling, On-Chip Serialization, Low-Power Clocking, Low-Power Channel Coding, Low-Power Switch, Low-Power Network on Chip Protocol

Unit V - Noc /Soc Case Studies

Real Chip Implementation-BONE Series-,BONE 1-4, Industrial Implementations-Intel's Tera-Hertz Multi-Core NoC, Intel's Scalable 3I,Communication Architecture, Academic Implementations-FAUST, RAW, design case study of SoC digital camera

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Reference Books:

1. Hoi-jun yoo, Kangmin Lee, Jun Kyoung kim, "Low power NoC for high performance SoC desing",CRC press, 2008.
2. Vijay K. Madisetti Chonlamieth Arpikanondt, "A Platform-Centric Approach to System-on-Chip (SOC) Design", Springer, 2005

MEVD-206

Lab -1 : Designing with FPGAs

MEVD-206	Lab -1 : Designing with FPGAs	0L:0T:6P	6 credits	6Hrs/Week

EXPERIMENT LIST

1 .XILINX's VIVADO FPGA Tools

2 . Simple Combinational Logic

3. Multi-Function Gate

4. Three-Bit Binary Added

5. Multiplexers in Combinational logic design

6. Decoder and Demultiplexer

7. Random Access Memory

8. Flip-Flop Fundamentals

9. Designing with D-Flip flops: Shift Register and Sequence Counter

10 Sequential Circuit Design: Counter with Inputs

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MEVD-207

Lab -2 : Digital Signal Processing And Embedded System

MEVD-207	Lab -2 : Digital Signal Processing And Embedded System	0L:0T:6P	6 credits	6Hrs/Week

EXPERIMENT LIST

1. Study of MATLAB 7.0
2. Arithmatic operation using MATLAB 7.0
3. Generation of Signals
4. Linear convolution using MATLAB
5. Program illustrates the design of a Butterworth bandstop filter.
6. To implement a causal IIR filter implemented in the Direct Form II structure, the function direct2 given below can be employed.
7. To implement a causal IIR filter implemented in the Direct Form II structure, the function direct2 given below can be employed.
8. Program illustrates the design of a causal IIR filter, its simulation in transposed Direct Form II, and its application in filtering a signal.
9. Program up-sampler.
10. Illustration of Down-Sampling by an Integer Factor
11. Use fir2 to create a bandlimited input sequence
12. Program P10 4 can be employed to study the frequency-domain properties of the downsampler
13. FIR filter using Rectangular Window
14. FIR filter using Hamming Window
15. Circular Convolution of two sequences using MATLAB
16. IIR filter design using MATLAB
17. Develop an embedded system for traffic light controller using microcontroller.
18. Develop an embedded system for automatic motion of a car & susequet display on LCD using microcontroller.

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Elective-1
MEVD 301 (A) CAD for VLSI Circuits

MEVD-301	(A) CAD for VLSI Circuits	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To design and optimize CAD for VLSI circuits.
2. To understand floor planning and layout issues for digital circuits

Course Outcomes:

1. Understand of VLSI Design Automation.
2. Acquire knowledge about CAD tools used for VLSI design.
3. Able to understanding Algorithms for VLSI Design Automation.
4. Able to gather knowledge of High Level Synthesis.
5. Understand Timing Analysis

UNIT- I VLSI DESIGN METHODOLOGIES : **(10 HOURS)**
Introduction to VLSI Design methodologies - Review of Data structures and algorithms - Review of VLSI Design automation tools - Algorithmic Graph Theory and Computational Complexity - Tractable and Intractable problems - general purpose methods for combinatorial optimization.

UNIT -II DESIGN RULES **(10 HOURS)**
Layout Compaction - Design rules - problem formulation - algorithms for Iconstraint graph compaction - placement and partitioning - Circuit representation - Placement algorithms - partitioning

UNIT- III FLOOR PLANNING : **(10 HOURS)**
Floor planning concepts - shape functions and floorplan sizing - Types of local routing problems - Area routing – channel routing - global routing - algorithms for global routing.

UNIT -IV SIMULATION : **(6 HOURS)**

Simulation - Gate-level modeling and simulation - Switch-level modeling and simulation - Combinational Logic Synthesis - Binary Decision Diagrams - Two Level Logic Synthesis

UNIT V MODELLING AND SYNTHESIS : **(6 HOURS)**

High level Synthesis - Hardware models - Internal representation - Allocation assignment and scheduling - Simple scheduling algorithm - Assignment problem - High level transformations

REFERENCES

1. S.H. Gerez, "Algorithms for VLSI Design Automation", John Wiley & Sons,2002
2. N.A. Sherwani, "Algorithms for VLSI Physical Design Automation", Kluwer Academic Publishers, 2002

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MEVD 301 (B) Design for Testability

MEVD-301(B)	(B) Design for Testability	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. To expose the students, the basics of testing techniques for VLSI circuits and Test Economics.

Course Outcomes:

1. Apply the concepts in testing which can help them design a better yield in IC design.
2. Tackle the problems associated with testing of semiconductor circuits at earlier design levels so as to significantly reduce the testing costs.
3. Analyse the various test generation methods for static & dynamic CMOS circuits.
4. Identify the design for testability methods for combinational & sequential CMOS circuits.
5. Recognize the BIST techniques for improving testability.

UNIT -I: INTRODUCTION TO TESTING: (10 HOURS)

Testing Philosophy, Role of Testing, Digital and Analog VLSI Testing, VLSI Technology Trends affecting Testing, Types of Testing, Fault Modeling: Defects, Errors and Faults, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault.

UNIT -II: Logic and Fault Simulation: (10 HOURS)

Simulation for Design Verification and Test Evaluation, Modeling Circuits for Simulation, Algorithms for True-value Simulation, Algorithms for Fault Simulation, ATPG.

UNIT -III: Testability Measures: (10 HOURS)

SCOAP Controllability and Observability, High Level Testability Measures, Digital DFT and Scan Design: Ad-Hoc DFT Methods, Scan Design, Partial-Scan Design, Variations of Scan.

UNIT -IV: BUILT-IN SELF-TEST:(6 HOURS)

The Economic Case for BIST, Random Logic BIST: Definitions, BIST Process, Pattern Generation, Response Compaction, Built-In Logic Block Observers, Test-Per-Clock, Test-PerScan BIST Systems, Circular Self Test Path System, Memory BIST, Delay Fault BIST.

UNIT -V: Boundary Scan Standard.

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Motivation, System Configuration with Boundary Scan: TAP Controller and Port, Boundary Scan Test Instructions, Pin Constraints of the Standard, Boundary Scan Description Language: BDSL Description Components, Pin Descriptions.

REFERENCE

1. Essentials of Electronic Testing for Digital, Memory and Mixed Signal VLSI Circuits - M.L. Bushnell, V. D. Agrawal, Kluwer Academic Publishers.
2. Digital Systems and Testable Design - M. Abramovici, M.A.Breuer and A.D Friedman, Jaico Publishing House.
3. Digital Circuits Testing and Testability - P.K. Lala, Academic Press.

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Elective-II

MEVD 302 (A) VLSI SIGNAL PROCESSING

MEVD-302(A)	VLSI SIGNAL PROCESSING	3L:1T:0P	4 credits	4Hrs/Week

Couse Preamble:

1. Introduce students to the fundamentals of VLSI signal processing and expose them to examples of applications.
2. Design and optimize VLSI architectures for basic DSP algorithms.
3. Design and optimize VLSI architectures for basic DSP algorithms.

Course Outcomes:

1. Understand VLSI design methodology for signal processing systems.
2. Be familiar with VLSI algorithms and architectures for DSP.
3. Be able to implement basic architectures for DSP using CAD tools.

UNIT -I: INTRODUCTION TO DSP: (10 HOURS)
Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms Pipelining and Parallel Processing: Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power Retiming: Introduction – Definitions and Properties – Solving System of Inequalities – Retiming Techniques

UNIT –II: FOLDING AND UNFOLDING: (10 HOURS)
Folding: Introduction -Folding Transform - Register minimization Techniques – Register minimization in folded architectures – folding of multirate systems Unfolding: Introduction – An Algorithm for Unfolding – Properties of Unfolding – critical Path, Unfolding and Retiming – Applications of Unfolding

UNIT -III: SYSTOLIC ARCHITECTURE DESIGN: (10 HOURS)
Introduction – Systolic Array Design Methodology – FIR Systolic Arrays – Selection of Scheduling Vector – Matrix Multiplication and 2D Systolic Array Design – Systolic Design for Space Representations contain Delays

UNIT -IV: FAST CONVOLUTION: (6 HOURS)
Introduction – Cook-Toom Algorithm – Winograd algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

UNIT -V: LOW POWER DESIGN: (6 HOURS)

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Scaling Vs Power Consumption Power Analysis, Power Reduction techniques – Power Estimation Approaches Programmable DSP: Evaluation of Programmable Digital Signal Processors, DSP Processors for Mobile and Wireless Communications, Processors for Multimedia Signal Processing

REFERENCE

1. VLSI Digital Signal Processing- System Design and Implementation – Keshab K. Parhi, 1998, Wiley Inter Science.
2. VLSI and Modern Signal Processing – Kung S. Y, H. J. While House, T. Kailath, 1985, Prentice Hall.
3. Design of Analog – Digital VLSI Circuits for Telecommunications and Signal Processing – Jose E. France, Yannis Tsividis, 1994, Prentice Hall.
4. VLSI Digital Signal Processing – Medisetti V. K, 1995, IEEE Press (NY), USA.

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MEVD 302 (B) Low Power VLSI Design

MEVD-302(B)	Low Power VLSI Design	3L:1T:0P	4 credits	4Hrs/Week

Course Preamble:

1. This course addresses a profound analysis on the development of the CMOS & BiCMOS digital circuits for a low voltage low power environment.
2. To study the concepts of device behavior and modelling.
3. To study the concepts of low voltage, low power logic circuits.

Course Outcomes:

RSE OUTCOMES:-

1. Capability to recognize advanced issues in VLSI systems, specific to the deepsubmicron silicon technologies.
2. Students able to understand deep submicron CMOS technology and digital CMOS design styles.
3. To design chips used for battery-powered systems and high performance circuits.

UNIT –I: FUNDAMENTALS: (10 HOURS)

Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT –II: LOW-POWER DESIGN APPROACHES: (10 HOURS)

Low-Power Design through Voltage Scaling – VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches, Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT –III: LOW-VOLTAGE LOW-POWER ADDERS: (10 HOURS)

Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques – Trends of Technology and Power Supply Voltage, Low Voltage Low-Power Logic Styles.

UNIT –IV: LOW-VOLTAGE LOW-POWER MULTIPLIERS: (6 HOURS)

Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

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UNIT –V: LOW-VOLTAGE LOW-POWER MEMORIES: (6 HOURS)

Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs. Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low Power SRAM Technologies. Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

REFERENCE :

1. CMOS Digital Integrated Circuits – Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 2011.
2. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.
3. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
4. Low Power CMOS Design – AnanthaChandrakasan, IEEE Press/Wiley International, 1998.
5. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.
6. Practical Low Power Digital VLSI Design – Gary K. Yeap, Kluwer Academic Press, 2002.
7. Low Power CMOS VLSI Circuit Design – A. Bellamour, M. I. Elamasri, Kluwer Academic Press, 1995.
8. Leakage in Nanometer CMOS Technologies – Siva G. Narendran, Anatha Chandrakasan, Springer, 2005.

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MEVD-303
Seminar

MEVD-303	Seminar	0L:0T:4P	4 credits	4Hrs/Week

Course Preamble : To Analyses the topic of seminar with scope of work.

Course Outcome: This course helps to collect useful information from the literature on the assigned topic.

Seminar topic: One faculty assigned to each M. Tech student. Usually the assigned faculty suggest a particular research topic to the concern student. Subsequently student collects research papers. The faculty assigned/ supervisor gives one / two research paper and advice the student to make detail study on a. Authors contribution b. Mathematical analysis c. Performance comparison parameters

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MEVD-304
Dissertation Part I

MEVD-304	Dissertation Part I	0L:0T:8P	8 credits	6Hrs/Week

Course Preambles: To analyze the title and proposed a model for Dissertation.

Course outcomes: To study of literature survey, formulate the research problem and develop necessary methodology related to research problem. A workable design/ algorithm to be developed based on the proposed methodology, algorithm a design to be noted.

Course Contents: Title of the Dissertation- This should be carefully decided by the student after discussing with the dissertation supervisor or the guide. Explain the relevance and importance of the dissertation; Write a brief (1 or 2 pages) introduction of the dissertation explaining its relevance and importance.

Student has to spend two hours daily in library to analyze the problem. It is also essential for student to meet supervisor twice in a week to discuss the research problem. After four weeks of registration the first evaluation has been done before committee to revive the literature survey and formulation of the problem. .In second the evaluation, the student has to show the progress of work in terms of design level, mathematical model/ algorithm etc. At end of semester, simulation based design has been analyzed by the committee.

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MEVD- 401
Dissertation Part- II

MEVD–401	Dissertation Part II	0L:0T:20P	20 credits	6Hrs/Week

NOTES1.

Dissertation ** to be continued from III semester.
2. Final evaluation of dissertation will be based on the cumulative performance in all III and IV.
3. It is desirable to have one publication from the dissertation.

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