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SRI SATYA SAI UNIVERSITY
OF TECHNOLOGY AND MEDICAL SCIENCES

SYLLABUS REVISION

Name of School-School of Engineering

Department-Electronics and Instrumentation Engineering

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

Department of Electronics and Instrumentation 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 (EI) at 12:30 PM on 03.6.2017. Following members were present.

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

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Scheme of Examination

Seventh Semester –BE (EI)

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Credits Allotted Subject wise			Total Credits
			Theory Slot			Practical Slot				L	T	P	
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work						
							Lab work & sessional	Assignment/ quiz					
1	EI-701	Satellite Communication	70	20	10	-	-	-	100	3	1	-	4
2	EI-702	Analytical Instrumentation	70	20	10	30	10	10	150	3	1	2	6
3	EI-703	Digital Control System	70	20	10	30	10	10	150	3	1	2	6
4	EI - 704	Elective –I	70	20	10	-	-	-	100	3	1	-	4
5	EI- 705	Elective –II	70	20	10	-	-	-	100	3	1	-	4
6	EI-706	Major Project Synopsys-I	-	-	-	60	20	20	100	-	-	4	4
7	EI-707	Industrial Training -I (2Week)	-	-	-	60	20	20	100	-	-	4	4
		Total	350	100	50	180	60	60	800	15	5	12	32

w.e.f July 2017

Elective –I

EI- 704[A] –Digital Image & Video Processing
EI- 704[B] - Data Acquisition System

Elective –II

EI- 705[A] – Nuclear Instrumentation
EI- 705[B] - Artificial intelligence

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EI 701
Satellite Communication

Unit-I 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: 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, 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, 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 systems: Network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network. direct broadcast satellite 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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EI 702
Analytical Instrumentation

Unit I -Molecular Spectro-analytical Methods: Colorimetry and Spectrophotometry: Introduction, theory: molecular energy levels, types of molecular transitions, Lambert-Beer's Law and limitations, types of sources, monochromators and detectors, Instrumentation of single beam and double beam instrument.

Unit II - Infrared Spectroscopy: Theory, diatomic molecules as a simple harmonic oscillator, instrumentation, sample handling techniques, Fourier Transform Infrared Spectroscopy (FTIR): advantages, instrumentation qualitative and quantitative applications, interpretation of Infrared (IR) spectra.

Unit III - Atomic Spectroscopy: Principle, comparison of atomic and molecular spectroscopy, atomic transitions, atomic absorption, atomization process, types of flames, fuel/ oxidant combinations, instrumentation of spectrophotometers, Interferences, spectral, chemical and ionization, applications, Atomic emission spectroscopy (AES), Flame photometer and its instrumentation, analysis using standard addition method, applications.

Unit IV- Separation methods: Theory of chromatography; instrumentation and applications of Thin layer chromatography (TLC). Column chromatography: Principle, process of elution through a column, chromatogram, band broadening, capacity factor, selectivity factor , Column efficiency, number of plates, plate height, column resolution.

Unit V - Gas Chromatography: Carrier gases, different type of injection systems, columns, stationary phases and detectors, isothermal mode, temperature programming mode, analysis by internal standard method, applications, High Performance Liquid Chromatography, mobile phase, isocratic and gradient elution, pumps, injection systems, columns, stationary phases, normal phase and reverse phase chromatography, detectors and their application.

References:

1. Skoog & Lerry, Instrumental Methods of Analysis, Saunders College Publications, New York
2. H.H.Willard, Instrumental Methods of Analysis, CBS Publishers.
3. D.C. Harris, Quantitate Chemical Analysis, W.H.Freeman
4. Christian G.D, Analytical Chemistry, John & Sons, Singapore
5. Skoog, West and Holler, Analytical Chemistry, Saunders College Publications, New York
6. Vogel's Textbook of Qualitative Chemical Analysis, ELBS

7. J.A. Dean, Analytical Chemistry Notebook, McGraw Hill
8. John H. Kennedy, Analytical Chemistry: Principles, Saunders College Publication
9. W. Kemp, Organic Spectroscopy, ELBS
10. Hand book of Instrumental Techniques for Analytical Chemistry, Frank Settle, editor, Prentice Hall

List of Experiments:

1. Determination of pKa value for a dye using double beam spectrophotometer.
2. Spectrometric determination of iron in water sample using double beam spectrophotometer.
3. Determination of concentrations of sodium, calcium, lithium and potassium in sample using flame photometer.
4. Determination of concentration of potassium ions in sample by standard addition method using flame photometer
5. Spectrum interpretation using FT-IR.
6. Analysis of various ions using atomic absorption system.
7. Thin layer chromatographic (TLC) separation of samples from different origin (Biological / Pharmaceutical / Food).
8. Qualitative analysis of samples using Gas chromatography
9. Qualitative analysis of samples using High Performance Liquid Chromatography.

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EI 703

Digital Control System

Unit I -Modeling of Digital Control System: Block diagram of sampled data / digital control system, Discrete LTI systems characterized by difference equations Sampling process and its frequency domain analysis, idea sampler, sampling theorem & Nyquist frequency, data conversion techniques uses of A/D, D/A and ZOH elements.

Unit II -Discrete System Modeling: Determination of the Z-plane and Z-transform, mapping between S-plane and Z-plane, Z-transform theorems, inverse Z-transform, Z-transform of system equations, solution of linear difference equations using Z-transform, pulse response, block diagram reduction for systems interconnected through samplers, signal flow graphs for hybrid systems.

Unit III -Discrete Transform Analysis: Transformation methods between planes (s, z and w), folding / aliasing, numerical solution differential, equations, Jordon transformation, backward forward & canonical difference, Pseudo continuous-time (PCT) Control system.

Unit IV -Discrete Control Analysis: Stability studies using Routh's test & Jury's test, Steady state error Analysis for stable systems, Root locus Analysis, Correlation between time Response & frequency response.

Unit V- Discrete state Variable Analysis: State variable representation, time domain state and output equations for sampled data control system, state variable representation of a discrete time SISO system using phase variables - canonical variables - physical variables, State transition equation, State variable representation in the z-domain, system stability, time response between sampling instants.

References:

1. Kuo, "Digital Control System", Oxford Press.
2. Ogata, "Digital Control System", PHI.
3. Gopal M., "Digital Control System", TMH.
4. Santina, Subberud and Hosteller, "Digital Control System Design", Oxford University Press.
5. Chen, "Analog & Digital Control System Design, Oxford University Press.

List of Experiments:

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-Leg.

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EI- 704[A]
Digital Image & Video Processing

Unit-I Fundamentals of Image processing and Image Transforms: Basic steps of image processing system sampling and quantization of an image – basic relationship between pixels image transforms, 2 –D Discrete Fourier Transform, Discrete Cosine Transform (DCT), Discrete Wavelet transforms.

Unit-II Image Processing Techniques: Image enhancement: spatial domain methods: histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters frequency domain methods: basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering.

Unit-III Image Segmentation & Image Compression: Segmentation concepts, point, line and edge detection, thresholding, region based segmentation, image compression fundamentals, coding redundancy, spatial and temporal redundancy, compression models, lossy and lossless, Hoffmann coding, arithmetic coding, LZW coding, run length coding, bit plane coding, transform coding, predictive coding , wavelet coding, JPEG standards

Unit-IV Basic Steps of Video Processing: Analog video, digital video, time varying image formation models: 3d motion models, geometric image formation, photometric image formation, sampling of video signals, filtering operations.

Unit-V 2-D Motion Estimation: Optical flow, general methodologies, pixel based motion estimation, block matching algorithm, mesh based motion estimation, global motion estimation, region based motion estimation, multi resolution motion estimation, waveform based coding, block based transform coding, predictive coding, application of motion estimation in video coding.

References:

1. M. Tekalp ,"Digital video Processing", Prentice Hall International .
2. Relf, Christopher G.,"Image acquisition and processing with LabVIEW", CRC press.
3. Aner ozdemi R, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms", John Wiley & Sons.
4. Chris Solomon, Toby Breckon ,"Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab,
5. Gonzaleze and Woods ,"Digital Image Processing ", 3rd edition , Pearson

EI- 704[B]

Data Acquisition System

Unit-I Display System: Seven segment Dot matrix, Multiplexed, Code converter, LCD, construction, working and Programming Hitachi controller), Plasma and vapor displays.

Unit-II Recorders: Galvanometric type, null type, potentiometer type, strip chart and circular chart type, magnetic tape recorder-principle & operation, digital tape recorders.

Unit-III Telemetric Systems: land line & RF telemetry, voltage, current and position telemetry with feedback mechanism, RF telemetry, amplitude modulation , frequency modulation , pulse modulation pulse amplitude modulation, pulse code modulation, wire INE and radio channels, microwave channels, radio ink, transmitting and receiving antenna, telemetry with time and frequency division multiplexing, telemetry hardware, band width and noise reduction(interference, Grounding, shielding, Guarding).

Unit-IV Data transfer techniques: DMA controller and data transfer in DMA mode, serial data transmission method and standards, 4-20 mA current loop, RS-232C, specifications connection and timing , RS- 422, RS-423, GPIB/IEEE-488, standard digital interface, parallel communication, Centronix port, communication protocols, Local Area networks, Firewire, Universal serial bus, HART protocol, foundation, fieldbus, ModBus, TCP/IP, data compression, encryption, error detection & correction techniques, optical disk storage.

Unit-V Data Acquisition System (DAS): single channel and multi channel, data conversion, Supervisory control and data acquisition system (SCADA), data acquisition system around microprocessor, micro controller & PC.

References:

1. Mathivanan N "Microprocessor PC Hardware and interfacing", PHI, New delhi
2. H S Kalsi " Electronic Instrumentation" TMH, New delhi
3. Patranabis- Principles of Industrial Instrumentation 3rd Ed., TMH
4. Singh- Industrial Instrumentation & Control 3rd ed., TMH

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EI- 705[A]

Nuclear Instrumentation

Unit I- Introduction: Properties of nuclear systems and radiation, interaction of radiation with matter, radioactive sources-choice of isotopes. radiation detectors-ionization chambers, geiger-muller counters, scintillation counters, semiconductor devices, neutron detectors based on recoil, measuring circuits including modulators, converters and stabilizers, synchronous detectors. counting statistics, correlation sets, standard deviation of rate meters, error propagation, effect of background, statistical distribution of pulse height distribution, detector efficiency.

Unit-II Nuclear Reactor Instrumentation: Diffusion, moderation, absorption and delay processes, Neutron flux measurement, Control rod calibration, nuclear fuel inspection and testing including poisoning, Radiation energy measurement, Remote control instrumentation, nuclear instrument maintenance.

Unit-III Application to industrial System: Radioactive tracer technique, gas and liquid flow measurement, leak detection, residence time and its distribution, application to blending corrosion and wear studies thickness and density measurement by beta rays, gamma ray absorption technique, measurement of thickness of surface material by back scattering.

Unit-IV Safety: Hazards of ionization radiation, physiological effect of radiation, dose and risk, radiological protection (Plpha, beta and Gamma, X, Neutron), Shielding material and effectiveness, operational safety instruments, emergency schemes, effluent disposal, application to medical diagnosis and reatment.

Unit-V Radioactive Devices : Level detection by radioactive devices, interface detection by neutron moderation technique, measurement of gas pressure and gas analysers, spectroscopic and frequency methods, void detection, moisture meter, smoke detection, ozonizer, radio chromatography and interferometry, portable instruments, source activity for dynamic properties of instruments.

References:

1. Ed. Noltingk, B.E., "Instrumentation Reference Book, Butterworth Heinemenn.
2. Boltan W., Newness, "Instrumentation and Measurement., Newness.
3. Jones, "Instrumentation Series",

EI- 705[B]

Artificial Intelligence

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

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

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

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

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

References:

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

EI-706
Major Project Synopsis-I

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

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EI-707
Industrial Training –I

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

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

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

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Scheme of Examination

B.E. VIII Semester (Electronics Instrumentation)

S.No.	Sub Code	Subject Name	Max Marks Theory			Max. Marks Practical			Total Marks	Credits Allotted Subject wise Period per week			Total Credits
			End Sem Exam	Mid Sem MST (Two tests average)	Quiz-Assignment	End Sem Practical/ Viva	Term Work: Lab work & sessional	Term Work: Assignment/ quiz		L	T	P	
1	EI-801	Optical Instruments & Sensors	70	20	10	30	10	10	150	3	1	2	6
2	EI-802	Safety and Reliability Engineering	70	20	10	30	10	10	150	3	1	2	6
4	EI-803	Elective-II	70	20	10	-	-	-	100	3	1	-	4
5	EI-804	Elective-III	70	20	10	-	-	-	100	3	1	-	4
6	EI-805	Major Project	-	-	-	120	80	-	200	0	0	8	8
7	EI-806	Ad. Software Lab – III	-	-	-	30	10	10	50	0	0	2	2
8	EI-807	Seminar / Group Discussion (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	2
TOTAL			**280**	**80**	**40**	**210**	**110**	**80**	**800**	**12**	**4**	**16**	**32**

L: Lecture- T: Tutorial- P: Practical

w.e.f. July- 2017

Elective-III

EI803A Simulation & Modelling

EI803B Embedded Systems

EI803C Intelligent Instrumentation

Elective-IV

EI 804A Fuzzy logic & Neural networks

EI 804B Digital Image Processing

EI 804C Advance Industrial Electronic

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EI- 801 – OPTICAL INSTRUMENTS AND SENSORS

UNIT-I

Introduction to vector nature of light, Propagation of light, Propagation of light in a cylindrical dielectric rod, ray model, wave model. Theory of image formation, Review of aberration, Comma, acclamation, distortion, Chromative aberration, Osages

UNIT-II

Different types of optical fibers, model analysis of a step index fiber. Signal degradation on optical fiber due to dispersion and attenuation.

UNIT-III

Optical fiber in instrumentation use of optical fibers as sensors, modulation techniques for sensors fiber optic power measurement. Stabilized calibrated light sources end-to-end measurement of fiber losses, optical signal processing.

UNIT-IV

Optical power meters, optical attenuators, optical spectrum analyzer, optical switching & logic gate and measurement techniques like optical time domain reflectometry, (OTDR), attenuation measurements

UNIT-V

Optical Sources & detectors: LED and LASERS, photo detectors, pin detectors detector responsitivity – noise, optical receivers. Integrated optical devices

References:

1. An Introduction to Fiber Optics by Cherin
2. Optical fiber – System Technology, design and applications by C.K. Rao
3. Optical Fiber Sensors, Vol.12 by Culshaw B. and Dakin J. (Ed.), Arctech House
4. Fundamentals of Fiber Optics in Telecommunications and sensor, by B.P. Pal, Wiley Eastern
5. Optical Fiber Communication by G. Kelser, McGraw Hill
6. Liu- Principles & Application of Optical Communication 1st ed., TMH
7. Ghatak- Optics 4th ed., TMH
8. Keiser- Optical Fiber Communication 4th ed., TMH

LIST OF EXPERIMENTS

Optical Instrumentation and Sensors

1. Setting up Fiber Optic Analog Link and Digital Link
2. Study of Intensity Modulation Technique using Analog input signal
3. Pulse Width Modulation in Fiber Optic Link.
4. Measurement of propagation or attenuation loss in optical fiber.
5. Measurement of bending loss in optical fiber.
6. Numerical Aperture (NA) of the fiber.
7. Study of Diffraction gratings.
8. Study of Michelson Interferometer.
9. Study of Reflection Holography.
10. Study of Transmission Holography

EI-802 SAFETY AND RELIABILITY ENGINEERING

UNIT-I

Reliability and safety definitions, Risk factor, Classification of failures and protective measures. Safety measurement, Preliminary hazard analysis, Subsystem fault hazard analysis, Common mode failures, codes and standards for safety.

UNIT-II

Reliability improvement

Redundancy element, Unit, and stand by optimization-cost trade off, Fault tree analysis-Constructions of

Fault tree-Calculations of reliability from fault tree-reliability allocation-evaluation of reliability-test-O.C. curve specifying reliability acceptance test.

UNIT-III

Definition of Quality-Quality control design-Product development cycle-Quality planning of manufacturing process-Process selection and control-Inspection and testing-Quality audit-Organizing for quality-Quality function-Quality engineering and quality control-Typical organization for quality : Small scale, Medium scale and Large scale organization.

UNIT-IV

Distribution, Markov modeling, Stress-strength approach to reliability design, Relationship between MTBF, hazard rate, failure rate, reliability.

UNIT-V

Redundancy techniques, examples from Electrical, Nuclear, Chemical and Process Engineering, Elementary Analysis and Estimation techniques.

References:

Jurian J.M., "Quality V Control Handbook", McGraw Hill.
Grant E.L., & Levenworth, "Statistical Quality Control", McGraw Hill.
Geedenko B.V., "Mathematical Methods of Reliability Theory", Academic.
Mann, Schafer R.E., & Singapurvala N.D., "Mehods for Statistical Analysis of Reliability and Life Date"
Reigenbaum V., "Total Quality Control", McGraw Hill.
Trylot J.R., "Quality Control Systems-Procedures for Planning Quality Programs".

EI- 803A– SIMULATION & MODELING

UNIT-I

Introduction: objectives of modeling, System theory and state variables Type of Model: Analytic, Simulation, Measurement, Analytic Modeling, Probability theory,
Random variables, Poisson process, Markov chains.

UNIT-II

Queuing Theory: Little's Law, M/M/1, M/M/1/k, M/M/C, queuing Models, M/G/1 [Impact variation in service times]

UNIT-III

Petrinets: Stochastic Petrinets[SPN],GSPN.

UNIT-IV

Simulation Modeling: Continuous and discrete event Simulation, Monte carlo Simulation, Pseudo random number generation, Non uniform Random variable Generation, Simulation Languages Features: Simpack, GPSS, GASP IV,CSIM, Estimation of Simulation Outputs/Output Matrix, confidence Intervals, Regenerative Simulation, Method of Batch Means.

UNIT-V

Case Studies: Analytic Vs Simulation Models, Application to Operating Systems, Data bases, Networks Architectures.

References:

P.A. Fishwick Getting started with simulation programming in C & C++. A. Narsingh Deo, Simulation with digi9tal computer.

EI- 803B – EMBEDDED SYSTEMS

UNIT-I

8 Bit Micro controllers: Introduction to MCS-51 family, Peripheral of MCS-51 family, PIC Micro Controller –CPU architecture, registers, instruction sets addressing modes, loop timing, On chip Peripherals of PIC, Motorola MC68H11 Family Architecture Registers, Addressing modes, Interrupts features of interrupts- Interrupt vector and Priority, timing generation and measurements, Input capture, Out capture.

UNIT-II

16 Bit Micro controller: Introduction to MCS-96 family, Peripherals of MCS-96 family, 80196-architecture, CPU operation, memory organization, I/O port, Operand addressing, instruction set, Interrupts, On chip Peripherals-PWM, Timers, HIS/HSO, Serial Port, External memory interfacing.

UNIT-III

32 bit Micro controller: Intel 80960-architecture, memory address space, Salient features of ARM processor family-ARM7 /ARM9/ ARM9E/ ARM10/ ARM11/ SecureCore /Strong ARM, XScale technology, ARM9200 Architecture,Pinouts, Peripheral Identifier, System Interrupts, External Interrupts, Product memory mapping, External memory mapping, Internal memory mapping, On chip Peripherals-Memory controllers, external Bus Interface(EBI), Advanced interrupt controller(AIC), USART, Timer counter.

UNIT-IV

Software development and tools: Embedded system evolution trends. Round- Robin, Roundrobin with Interrupts, function- One- Scheduling Architecture, Algorithms. Introduction toassembler- compiler-cross compilers and Integrated Development Environment (IDE) Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

UNIT-V

Real Time Operating Systems: Task and Task States, tasks and data, semaphores and shared Data Operating system Services- Message queues- Timer Function- Events- Memory Management, Interrupt Routines in an RTOS environment, basic design Using RTOS.

References:

David E Simon, " An embedded software Primer" Pearson education Asia.
John B Peat man " Design with Micro controller" Pearson education Asia.
Jonartthan W. Valvano Brooks/cole " Embedded Micro Computer Systems. Real time Interfacing", Thomson learning

EI- 803C – INTELLIGENT INSTRUMENTATION

UNIT-I

Intelligent versus Dumb instruments, A historical perspective of instrumentation systems. Review of digital transducers. Interfacing micro computers. Computer ports to high power devices. Optical shaft

encoder communication standards. Concepts of Real Time system and its application.

UNIT-II

Details of Data Acquisition systems (DAS) Logic control systems, Continuous & Batch modes, Single and multi loop controller. Details of Data logger and its application.

UNIT-III

Architecture of Virtual instrument and its relation to operating system. Software overview: LABVIEW, Graphical User Interface (GUI), Control and indicators: G programming- Data type, Data flow programming editing and running a virtual instrument.

UNIT-IV

G Programming details in LABVIEW, G Programming tools and libraries. Programming structure: For loop, While loop. CASE structure, Sequence Structure arrays and clusters. Array operations- Bundle/Unbundled String and file I/O. High level and low level I/Os. Attribute nodes, Local and global variables.

UNIT-V

Software development for Temperature (Low and High), Level, Speed, pressure etc.

References:

- Barney G C, Intelligent Instrumentation : Micro processor application in measurement and control,Prentice Hall, Engle Wood Cliff NJ.
- H S Store, Micro Computer Interfacing, Addison Wesley, Reading, MA
- Rathore T S, Digital Instrumentation, TMH
- Interfacing sensors to the IBM PC, Prentice Hall, Engle Wood Cliff NJ.
- Garry M. Johnson " LAB view Graphical Programming", TMH.
- Lisa K. Wells "Labview for Everyone, PHI.
- Barry Paton, "Sensor, Transducers and Labview", Prentice Hall.

EI- 804A– FUZZY LOGIC & NEURAL NETWORKS

UNIT-I

Fuzzy system introduction, Fuzzy relation, Membership function, Fuzzy matrices and entropy, Fuzzy operation and composition.

UNIT-II

Fuzzy Variables, Linguistic variables, measures of fuzziness, concepts of defuzzification, Fuzzy control applications.

UNIT-III

Fundamentals of Artificial Neural networks- Biological prototype – Artificial neuron, Activation functions, Single layer and multiplayer networks. Training Artificial neural networks, Preceptrons, Exclusive Or Problem – Linear seperability, Storage efficiency, Preceptron learning, perceptron training algorithms. Back propagation, Training algorithm, network configurations, Network paralysis, Local minima, temporal instability.

UNIT-IV

Counter propagation networks, Kohonen layer, Training the kohonen layer, Pre processing the inputted vectors, Initialising the wright vectors, Statistical properties, Training the grosberg layer. Full counter propagation networks, Applications.

Statistical methods, Boltzman training, Cauchy training, Artificial specific heat methods. Applications to

general non-linear optimization problems. Back propagation and cauchy training.

UNIT-V

Hopfield nets, Recurrent networks, Stability, Associative memory, Thermodynamic systems, Statistical Hopfiled networks, Applications. Bi-directional associative memories, Retrieving on stored association, Encoding the associations.

References :

- Laurence Fausett, "Fundamentals of Neural Networks", Prentice Hall.
- Zmmermann H.J., "Fuzzy Set Theory and its Applications", Allied Publishers Ltd.
- Klir G.J., and Folger T., "Fuzzy Sets, Uncertainty and Information", Prentice Hall.
- Limin Fu., "Neural Networks in Computer Intelligence", McGraw Hill.
- Zuroda J.M., "Introduction to Artificial Neural Systems", Jaico Publishing.
- Haykin S., "Artificial Neural Network: A Comprehensive Foundation: Asia Pearson Pub.

EI- 804B – DIGITAL IMAGE PROCESSING

UNIT-I

Digital Image Processing- Elements of a Digital Image Processing system, Structure of the Human eye, Image formation and contrast sensitivity, Sampling and Quantization, Neighbours of a pixel, Distance measures, Photographic file structure and exposure, Filem characteristics, Linear scanner, Video camera, Image processing applications.

UNIT-II

Image Transforms-Introduction to Fourier transform-DFT, Properties of two dimensional FT, Separability, Translation, Periodicity, Rotation, Average value, FFT algorithm, Walsh transform, Hadamard transform, Discrete Cosine transform.

UNIT-III

Image Enhancement- Definition, Spatial domain methods, Frequency domain methods, Histogram modify technique, Neighborhood averaging, Media filtering, Lowpass filtering, Averaging of multiple images, Image sharpening by differentiation and high pass filtering.

UNIT-IV

Image Restoration-Definition, Degradation model, Discrete formulation, Circulant matrices, Block circulant matrices, Effect of diagnolization of circulant and block circulant matrices, Unconstrained and constrained restorations , Inverse filtering, Wiener filter, Restoration in spatial domain.

UNIT-V

Image Encoding-Objective and subjective fidelity criteria, Basic encoding process, The mapping, The quantizer, The coder, Differential encoding, Contour encoding, Run length encoding, Image encoding relative to fidelity criterion, Differential pulse code modulation.

References:

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

EI- 804C– ADVANCE INDUSTRIAL ELECTRONICS

UNIT -I

Introduction to modern power conductor devices: Gate turn off thyristor (GTO), Insulated Gate Bipolar

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Junction Transistor (IGBT), Power BJT, Power MOSFET, MOS controlled thyristor (MCT), Reverse conducting thyristor (RCT), Smart Power Devices (Power ICs) Rating, Static and dynamic characteristics, Safe operating areas, Protections of devices, Devices selection.

UNIT-II

DC to DC conversion, Buck Boost and Buck Boost converters (Circuit Configuration and analysis with different types of loads) Power factor, Harmonics and effect of source inductance in converter circuits. Resonant DC, DC converters. Switched mode power supply (SMPS).

UNIT-III

Concept of PWM in converters, Unity power factor converters, Voltage source inverters (VSI), Current source inverters (CSI). Application of VSI and CSI in induction motor control.

UNIT-IV

Non Drive applications of power electronics inverters, Uninterrupted power supply (UPS), Induction heating, Metal cutting, Active power line conditioning.

UNIT-V

Vector controlled and slip power controlled induction motor drives, Application of microprocessor, Micro controllers and DSP in Machine drives.

References :

- MH Rashid, Power Elex, PHI
- J.G. Kassakian, MF Schlecht and G.C. Verghese "Principle of Power Electronics", Reading, MA, Addison Wesley.
- Dubey G.K., " Power Semiconductor Controlled Drives", Engle Wood Cliffe NJ, Prentice Hall.
- DC Griffith, " Uninterruptible power supply", Marcell Dekker, NY.
- P. Vas, "Vector control of AC motors", Oxford Press

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S.S.S.U.T.M.S. Sehore (M.P.)

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

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

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Electronics and Instrumentation 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. 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 (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)

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Scheme of Examination - CBCS Patte

Academic Year 2017– 2018

Branch : Electronics Instrumentation Engineering **Semester - III**

Semest
er - III

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

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EIC-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.,

EIC-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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EIC-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, DeMorgans theorems, realization of switching functions using logic gates.

Unit-II : Combinational Logic:: AND, OR, NOT, XOR, XNOR, NAND, NOR, realization of Boolean function using universal gates. Half and full adder, half and full subtractor, Series and parallel adder, BCD adders, .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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EIC-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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EIC-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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WEF JULY 2017

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EIC-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.

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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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Scheme of Examination - CBCS Pattern

Academic Year 2017– 2018 (For B.E.2016 Batch)

Branch : Electronics Instrumentation 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	EIC - 401	Linear Integrated Circuits	60	30	10	30	20	2	1	2	4	150
2	EIC - 402	Microprocessors and Microcontrollers	60	30	10	30	20	2	1	2	4	150
3	EIC - 403	Communication Networks and Transmission Lines	60	30	10	30	20	2	1	2	4	150
4	EIC - 404	Analog Communication	60	30	10	30	20	2	1	2	4	150
5	EIC - 405	Electromagnetic Fields	60	30	10	-	-	2	1	-	3	100
6	EIC - 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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EIC-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.

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EIC- 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

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EIC-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.

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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.

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EIC - 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.

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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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EIC- 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.

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S.S.S.U.T.M.S. SEHORE (M.P.)

EIC-306 DATA STRUCTURES & ALGORITHMS

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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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. Sanj... 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. Prabesh Khampariya, Associate Professor (Electrical and Electronics Engineering), Member
7. Mr. Kailash patidar , Assistant Professor (Computer Science and Engineering), Member
8. Ms. Alka Thakur, Associate Professor (Electrical Engineering), Member
9. Mr. Anil Verma, Assistant Professor (Mechanical Engineering), Member
10. Mr. Manoj Kumar Gandwane, Assistant Professor (Chemical Engineering), Member
11. Mr. Prashant Singh, Assistant Professor (Aeronautical Engineering), Member
12. Mr. Devendra Patle, Assistant Professor (Electronics and Communication), Member

Chairman

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(09) Scheme of Exanimation (Electronics and InstrumentationEngineering) 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 Instrumentation 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**	**12**	**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

Course 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.

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

Unit-II Integral (6 Hrs):

DefiniteIntegralasalimitofasumandItsapplicationinsummationofseries;BetaandGammafunctionsandtheirproperties;Applicationsof definiteintegralstoevaluatesurface areas,MultipleIntegral,Changetheorderoftheintegration, Applicationsof multipleintegralforcalculatingareaandvolumesofthecurves.

Unit-III Sequencesandseries (6 Hrs):

Convergenceofsequenceandseries,testsforconvergence;Powerseries,Taylor'sseries,seriesforexponential,trigonometricandlogarithmfunctions;Fourierseries: Halfrangesine and cosineseries,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

Course 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.

Course 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 applicaiions 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 anditsapplications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging,surface characterisation techniques. Diffraction and scattering.

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

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

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

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

UNIT-V Periodic properties (10Hrs)

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

REFRENCES:

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

a. Estimate rate constants of reactions from concentration of reactants/products as a function of time
b. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
c. 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

Course 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

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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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 equationof motor, applications of DC motors (simple numerical problems)

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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. 6. S. Bobrow, "Fundamentals of Electrical En
7. 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.

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List of Experiments: -

1. Verification of Kirchhoff"s laws
2. Verification of Superposition and Thevenin Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and 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

PREAMBLES:-

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

OUTCOMES: -

Student's ability to hand letter will improve.

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

UNIT-I Introduction to Engineering Drawing(10 Hrs):

Principles of Engineering Graphics and their significance, usage of Drawing instruments, Lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales –Plain, Diagonal and 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

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UNIT-III Sections and Sectional Views of Right Angular Solids (6 Hrs):

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

UNIT-IV Isometric Projections: **(6 Hrs):**

Principles of Isometric projection –Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT-V Overview of Computer Graphics: (10 Hrs):

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

References:-

1.Bhatt N.D., Paschal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2.Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

3.Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication

4.Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

5.CAD Software Theory and User Manuals

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

List of Experiments:-

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

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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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SSSUTMS School of Engineering

BELC 207 Industrial Training

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

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

BEBSC-201 Mathematics-II

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

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.

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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,ApplicationofResiduestheoremforEvaluationofRealIntegral

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, 9th End., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Inca, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

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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)

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

List of Experiments: -

1. To determine the wavelength of sodium light by Newton's ring experiment.

2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.

3. To determine the energy band gap of a given semiconductor material.

4. To determine the plank's constant with help of photocell.

5 .Resolving Power of Telescope.

6 .V-I Charecteristics of P-N Junction diode.

7. Zener diode characteristics.

8. To determine the dispersive power of prism.

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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,

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Unit – III Computer System Overview (10 Hrs):

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

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List of Experiment:-

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

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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 .

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Unit IV Thermodynamics (10Hrs):

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

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 EDMmethods, measurement of directions by different methods, measurement of elevations bydifferent methods. Reciprocal levelling .

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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. Rainamrutam&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.

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.

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5. To determine the workability of fresh concrete of given proportions by slump test or compaction factor test.

6. To determine the Compressive Strength of brick .

7. To determine particle size distribution and fineness modulus of course and fine Aggregate.

8. To verify the law of Triangle of forces and Lami's theorem.

9. To verify the law of parallelogram of forces.

10. To verify law of polygon of forces

11. To find the support reactions of a given truss and verify analytically.

12. To determine support reaction and shear force at a given section of a simply Supported beam and verify in analytically using parallel beam apparatus.

13. To determine the moment of inertia of fly wheel by falling weight method.

14. To verify bending moment at a given section of a simply supported beam.

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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.

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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
- 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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(Minutes of the Board of Studies Committee Meeting)

Name of Department: - Electronics and Instrumentation 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 (EI) at 11:30 AM on 03.06.2019. Following members were present.

1. Dr. Mukesh Tiwari (Chairman)
2. Dr. Prabodh Khampariya (Member)
3. Mr. Vijay Prakash Singh (Member)
4. Mr. Devendra Patle (Member)
5. Ms. Alka Thakur (Member)
6. Ms. Jyotsna Sagar (HOD)

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 EI-8th -Semester -Scheme and Syllabus (CBCS)

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

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

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr. Mukesh Tiwari
2. Dr. Prabodh Khampariya
3. Mr. Vijay Prakash Singh
4. Mr. Devendra Patle
5. Ms. Alka Thakur
6. Ms. Jyotsna Sagar

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S.S.S.U.T.M.S. SEHORE (M.P.)

[Minutes Of the Board of Studies Committee Meeting]

Name of Department: - Electronics and Instrumentation Engineering

Minutes of Board of Studies Committee Meeting Dated : 01.06.2019

The Board of Studies Committee Meeting was held in the room of HOD (EI) at 11:30 AM on 01.06.2019. Following members were present

1. Dr. Mukesh Tiwari	(Chairman)	
2. Dr Prabodh Khampariya	(Member)	
3. Mr Vijay Prakash Singh	(Member)	
4. Ms Jyotsna Sagar	(HOD)	
5. Ms. Alka Thakur	(Member)	
6. Mr Devendra Patle	(Member)	

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

Agenda 1 Approval of EI 7th Semester Scheme and Syllabus (CBCS Pattern)

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

Resolution of the Discussion Syllabus was prepared as per current demand in industries and is approved for forthcoming 7th Semester.

The Chairman thanks the members for peaceful conduction of meeting

Signature of All members (Including Chairman)

1. Dr. Mukesh Tiwari	(Chairman)	
2. Dr Prabodh Khampariya	(Member)	
3. Mr Vijay Prakash Singh	(Member)	
4. Ms Jyotsna Sagar	(HOD)	
5. Ms. Alka Thakur	(Member)	
6. Mr Devendra Patle	(Member)	

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EIC-801

Transducers and Sensors

UNIT 1:

Functional elements of an instrument; active &passive transducers ;analog & digital modes of operation; null & deflection methods; I/O configuration of measuring instruments &instrument system-methods of correction for interfering &modifying inputs. Generalized performance characteristics of Instruments: Static characteristics and static calibration-Meaning of static calibration, measured value versus true value, Some basic statistics least square calibration curves, calibration accuracy versus installed accuracy.

UNIT 2:

Motion and Dimensional measurement: Fundamental standards ,relative displacements-translational and rotational, Calibration, Resistive potentiometers, differential transformers, variable inductance &variable reluctance pickups, capacitance pickup, Digital displacement transducers, Mechanical fly ball angular velocity sensor, Mechanical revolution counters .

UNIT 3:

Force, Torque, Shaft power: Standards & calibration; basic methods of force measurement; characteristics of elastic force transducer -Bonded strain gauge, differential transformer, Piezoelectric transducer, variable reluctance/FM-oscillator, digital systems.

UNIT 4:

Flow measurement: Local flow velocity, magnitude and direction. Flow Visualization.Velocity magnitude from pilot static tube. Velocity direction from yaw tube, dynamic wind vector indicator. Hot-film shock-tube velocity sensor. Laser Doppler anemo-meter; gross volume flow rate: calibration and standards .Constant-area, variable-pressure-drop meters (obstruction meters).Averaging pilot tubes..

UNIT 5:

Temperature measurement: Standards & calibration; thermal expansion methods-bimetallic thermometers, liquid-in-glass thermometers, pressure thermometers; RTD, thermistor and thermocouple (comparative study); digital thermometers. Radiation Methods - radiation fundamentals, radiation detectors: thermal and photon, monochromatic brightness radiation thermometers, two color radiation thermometers, black body tipped fiber optic radiation thermometer, Fluor optic temperature measurement, infrared imaging systems.

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Text Book:

1. 1. E. O. Doebelin and D.N. Manik,"Measurement systems application and designl, Tata McGraw Hill Publication.

Reference Book:

1. Arun K Ghosh, "Introduction to Transducers", PHI Publication.

2. Bela G. Liptak, "Process Measurement and Sensors.

List of Experiments:

1. Characteristics of resistance transducer

(i) Potentiometer

(ii) Strain Gauge

2. Characteristics of LVDT.

3. Characteristics of capacitive transducer

(i) Variable area

(ii) Variable distance.

4. Characteristics of Thermistors

5. Characteristics of RTD.

6. Characteristics of Thermocouples

7. Characteristics of LDR, Photo Diode, and Phototransistor:

(i) Variable Illumination.

(ii) Linear Displacement.

8. Measurement of resistance by Wheatstone bridge and measurement of bridge sensitivity.

9. Measurement of Capacitance by De'Sautys and Schering Bridge.

10. Measure of low resistance by Kelvin's double bridge.

11. Characteristics of diaphragm type pressure transd

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EIC-802

Opto Electronics

UNIT 1:

ELEMENTS OF LIGHT AND SOLID STATE PHYSICS: Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT 2:

DISPLAY DEVICES AND LASERS: Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

UNIT 3:

OPTICAL DETECTION DEVICES :Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT 4:

OPTOELECTRONIC MODULATOR: Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustoptic devices, Optical, Switching and Logic Devices.

UNIT 5:

OPTOELECTRONIC INTEGRATED CIRCUITS :Introduction, hybrid and Monolithic Integration, Application of Opto Electronic .

TEXTBOOKS:

1. Pallab Bhattacharya "Semiconductor Opto Electronic Devices", Prentice Hall of India Pvt.,

Ltd., New Delhi, 2006. 2. Jasprit Singh, "Opto Electronics – As Introduction to Materials and Devices", Mc Graw-Hill International Edition, 1998

REFERENCES:

1. S C Gupta, Opto Electronic Devices and Systems, Prentice Hal of India, 2005.

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2. J. Wilson and J.Haukes, "Opto Electronic An Introduction", Prentice Hall, 1995

List of Experiments:

1) To understand the basics of solid state physics.

2) To understand the basics of display devices.

3) To understand the optical detection devices.

4) To understand the design of optoelectronic integrated circuit

5) To design display devices.

6) To design optoelectronic detection devices and modulators.

7) To design optoelectronic integrated circuits.

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EIC-803(A)

Nuclear Science

UNIT 1:

Nucleus and Its Basic Features: Nuclear structure; nuclear forces and their properties, nuclear stability, nuclear radius and its measurement, nuclear spin, nuclear magnetic and electrical moments.

UNIT-2:

Nuclear Models: Single particle model, liquid drop model and semi-empirical mass formula, nuclear potential and shell model, collective model.

UNIT-3:

Nuclear Reaction: Nuclear reaction and laws of conservation, types of nuclear reaction, mechanism of nuclear reaction, nuclear fission & binuclear fusion and their explanation by liquid drop model.

UNIT-4:

Nuclear Decay: Decay constant, half-life period and mean life, alpha decay, beta decay, gamma decay, interactionof nuclear radiation with matter.

Nuclear Instruments-I Mass spectrograph,: General principle, Aston's Mass Spectrograph.

UNIT-5:

Nuclear Instruments-II Accelerators: Van de Graph Generator, Cyclotron,Synchrotron.Detectors: G M Counter, Scintillation counter, cloud chamber, Bubble Chamber, production and detection of neutrons and Gamma-photon. Application of Nuclear Techniques: Nuclear magnetic resonance, positron emission topography, radiotracer techniques and applications in material science and agriculture.

Text Books:

1. Tayal, "Nuclear Physics" Himalaya Publishing House.

2. S.N. Ghosal, "Nuclear Physics" S. Chand & Co.

3. S. B. Patel, "Nuclear Physics: An Introduction New Age International.

4. H. B. Lal, "Introuctory Nucler Physics" United Book Depot.

5. Wang, "Introductory Nuclear Physics", PHI Learning

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EIC-803(B)

Process Plant Design and Safety Management

UNIT 1:

Introduction: Basic concepts: General design considerations, Process design development, Layout of plant items, Flow sheets and PI diagrams, Economic aspects and Optimum design, Practical considerations in design and engineering ethics, Degrees of freedom analysis in interconnected systems, Network analysis, PERT/CPM,

UNIT 2:

Direct and Indirect costs, Optimum scheduling and crashing of activities. Flow-sheeting: Synthesis of flow sheet: Propositional logic and semantic equations, Deduction theorem Algorithmic flow sheet generation using P-graph theory, Sequencing of operating units, Feasibility and optimization of flow sheet using various algorithms viz, Solution Structure Generation (SSG), Maximal Structure Generation (MSG), Simplex, Branch-and-bound etc.

UNIT 3:

Methods of calculating depreciation, Profitability, Alternative investments and replacements.Optimum Design and Design Strategy: Break-even analysis, Optimum production rates in plant operation, Optimum batch cycle time applied to evaporator and filter press, Economic pipe diameter, Optimum insulation thickness,

UNIT 4:

Optimum cooling water flow rate and optimum distillation reflux ratio. Management of safety in Industry Safety Management - Concept of Safety, Applicable areas, unsafe actions &Conditions. Responsibility of Safety - Society, Govt Management.

UNIT 5:

Union & employees. Safety Officer - Appointment, Qualification, Duties of safety officer. Safety Committee - Membership, Functions & Scope of Safety committee. Motivation & Training of employees for safety in Industrial operations. Management - Designing, Importance & implementation of Disaster Control Action Plan

Text Books:

1. Peters, M.A. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers, McGraw Hill(2003).

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2. Anil Kumar, Chemical Process Synthesis and Engineering Design, Tata McGraw Hill (1982).

Reference Books:

1. Ulrich, G.D., A Guide to Chemical Engineering Process Design and Economics, John Wiley & Sons

(1984).

2. Perry, R.H. and Green, D., Chemical Engineer's Handbook, McGraw-Hill (1997)

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EIC-803 (C)

Telemetry and Data Transmission

UNIT 1:

Sampling Fundamentals :Introduction to sampling theorem and sampling process, convolution, computing minimum sampling rate , Aliasing errors, Digital Modulation Techniques: review of PCM and DPCM , methods of binary data transmission, Data formats , DM code converters, PSK, QPSK , FSK, probability of error- phase ambiguity resolution and differential encoding , error detection, error correction and error correction codes. Data handling System:

UNIT 2:

Block schematic, sensors, signal conditioning, multiplexing- high level and low level , ADC- range and resolution ,Word format, frame format , frame synchronizer code , R.F. links, X24, RS422, RS423, RS232c interfaces, multi terminal configuration, multipliers and concentrator , Data modems , data transmission over telephone lines.

UNIT-3

Data reception Systems :Bit synchronizers , frame synchronizers and sub frame synchronizers , PLL and Display systems.

UNIT-4

Remote Control : Communication based processing control system, pipelines, operational security systems components, pipeline control, power system control, programmable controllers for factory automation. Command, Tone command system, Tone digital command system, ON/OFF command and data commands.

UNIT-5

Aerospace Telemetry: Signal formation and conversion multiplexing techniques in tele-control, Industrial Tele-control installations, reliability in tele control installations.

Text Books:

1. Patranabis," Telemetry Principles: Tata Mcgraw Hill.

2. Schweber," Data Communication " Mcgraw Hill.

3. Berder&Menjewlse," Telemetry Systems".

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EIC-804(A)

Automation and Robotics

UNIT 1:

AUTOMATION:

Definition, advantages, goals, types, need, laws and principles of Automation. Elements of automation. Fluid power and its elements, application of fluid power, Pneumatics vs. Hydraulics, benefit and limitations of pneumatics and hydraulics systems, Role of Robotics in Industrial Automation.

UNIT 2:

Manufacturing Automation:Classification and type of automatic transfer machines; Automation in part handling and feeding,Analysis of automated flow lines, design of single model, multimodel and mixed model production lines. Programmable Manufacturing Automation CNC machine tools, Machining centers, Programmable robots, Robot time estimation in manufacturing operations.

UNIT 3:

ROBOTICS

Definition, Classification of Robots - Geometric classification and Control classification, Laws

of Robotics, Robot Components, Coordinate Systems, Power Source.Robot anatomy, configuration of robots, joint notation schemes, work volume, manipulator kinematics, position representation, forward and reverse transformations, homogeneous transformations in robot kinematics, D-H notations, kinematics equations, introduction to robot arm dynamics.

UNIT 4:

ROBOT DRIVES AND POWER TRANSMISSION SYSTEMS

Robot drive mechanisms: Hydraulic / Electric / Pneumatics, servo & stepper motor drives,

Mechanical transmission method: Gear transmission, Belt drives, Rollers, chains, Links, Linear to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearings.

UNIT 5:

ROBOT END EFFECTORS

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Classification of End effectors – active and passive grippers, Tools as end effectors, Drive system for grippers Mechanical, vacuum and magnetic grippers. Gripper force analysis and gripper design

Books and References:

1. An Introduction to Robot Technology, by CoifetChirroza, Kogan Page.
2. Robotics for Engineers, by Y. Koren, McGraw Hill.
3. Robotic: Control, Sensing, Vision and Intelligence, by Fu, McGraw Hill.
4. Introduction to Industrial Robotics, by Nagrajan, Pearson India
5. Robotics , by J.J. Craig, Addison-Wesley.
6. Industrial Robots , by Groover, McGraw Hill.
7. Robots & Manufacturing Automation, by Asfahl, Wiley
8. Fundamentals of Robotics: Analysis and Control, by Schilling, Pearson India
9. Automation & Robotics, byGhoshal, Oxford University Press.
10. Introduction to AI Robotics, by Murphy, PHI, India.

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EIC-804(B)

Advanced Control System

UNIT 1:

State Space Analysis of Continuous System:State space analysis, Solution of state equation, determination of state-transition matrix, using Laplace method, Similarity transformation method and Caley-Hamilton Method.

UNIT 2:

Analysis of Discrete System:Concept of state feedback design, Determination of controllability Matrix and test of controllability, State feedback controller design via pole placement method, Concept of state observer design, Determination of the observability matrix and test of observability condition, Design of the full state observer using pole placement.

UNIT 3:

Nonlinear systems:Nonlinear System Modeling Analysis of Nonlinear system (Inverted Pendulum)via Linearization, Describing function analysis of nonlinear system, Stability Analysis of Nonlinear system using Describing function Analysis.

UNIT 4:

Phase Plan Analysis: Construction of Phase portrait using Isoclines approach, Singular points, Phase plane analysis of 2nd order linear system, Phase plane analysis of nonlinear control system.

UNIT 5:

Liapunov Stability Analysis:Concept of stability in the sense of Liapunov. Linear system analysis using Liapunov approach,Determination of Liapunov functions using variable gradient method, Stability analysis of nonlinear systems.

Text Books:

1. M. Gopal, "Digital Control and State variable Methods", Tata Mc Graw Hill.

2. Ajit K. Madal, "Introduction to Control Engineering: Modelling, Analysis and Design" New Age.

Reference Books:

1. B.C. Kuo, "Digital Control Systems" Sounders College Publishing

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EIC-804(C)

Non -Conventional Energy Sources

UNIT 1:

Introduction : Various non-conventional energy resources- Introduction, availability,

Classification , relative merits and demerits .Solar Cells: Theory of solar cells. solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT 2:

Solar Thermal Energy: Solar radiation, flat plate collectors and their materials,

applications and performance, focussing of collectors and their materials, applications and

performance; solar thermal power plants, thermal energy storage for solar heating and cooling,

limitations.

UNIT 3:

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal

energy conversion-electrical conversion, non-electrical conversion, environmental considerations.Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations.Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT 4:

Thermo-electrical and thermionic Conversions Principle of working, performance and limitations.Wind Energy: Wind power and its sources, site selection, criterion, momentum theory,classification of rotors, concentrations and augments, wind characteristics. performance andlimitations of energy conversion systems.

UNIT 5:

Bio-mass :Availability of bio-mass and its conversion theory. Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle ,performance and limitations. Wave and Tidal Wave: Principle of working, performance and limitations. Waste Recycling Plants.

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Text/References Books:

1. Raja etal, "Introduction to Non-Conventional Energy Resources" Scitech Publications.

2. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, 2006.

3. M.V.R. Koteswara Rao, " Energy Resources: Conventional & Non-Conventional " BSP Publications,2006.

4. D.S. Chauhan,"Non-conventional Energy Resources" New Age International.

5. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI Learning.

6. Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.

7. Godfrey Boyle," Renewable Energy Power For A Sustainable Future", Oxford University

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EIC-805 (A)

Quality Management

UNIT 1:

Quality Concept :Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design ,Control on Purchased Product Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure. Manufacturing Quality Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims.

UNIT 2:

Quality Management :Organization structure and design, quality function, decentralization, designing and fitting ,organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program. Human Factor in quality attitude of top management, cooperation of groups, operators attitude, responsibility, causes of apparatus error and corrective methods.

UNIT 3:

Control Charts: Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts. Attributes of Control Chart Defects, construction and analysis of charts, improvement by control chart, variable sample size, Construction and analysis of C charts.

UNIT 4:

Defects diagnosis and prevention defect study, identification and analysis of defects, correctingmeasure, factors affecting reliability, MTTF, calculation of reliability, building reliability in theproduct, evaluation of reliability, interpretation of test results, reliability control,maintainability,

UNIT 5:

ISO-9000 and its concept of Quality Management ISO 9000 series, Taguchi method, JIT in some details.

Text / Reference Books:

1. Lt. Gen. H. Lal, "Total Quality Management", Eastern Limited, 1990.

2. Greg Bounds, "Beyond Total Quality Management", McGraw Hill, 1994.

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3. Menon, H.G, "TQM in New Product manufacturing", McGraw Hill 1992.

EIC-805(B)

Operation Research

UNIT 1:

Introduction: Definition and scope of operations research (OR), OR model, solving the OR model, art of modeling, phases of OR study. Linear Programming :Two variable Linear Programming model and Graphical method of solution, Simplex method ,Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

UNIT2:

Transportation Problems :Types of transportation problems, mathematical models , transportation algorithms, Allocation and assignment problems and models, processing of job through machines.

UNIT 3:

Network Techniques :Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

UNIT 4:

Theory of Games :Rectangular games, Minimax theorem, graphical solution of 2 x n or m x 2 games, game with mixed strategies, reduction to linear programming model. Quality Systems: Elements of Queuing model, generalized poisson queuing model, single server models.

UNIT 5:

Inventory Control:Models of inventory, operation of inventory system, quantity discount.

Replacement:Replacement models: Equipment's that deteriorate with time, equipment's that fail with time.

Text / Reference Books:

1. Wayne L. Winston, "Operations Research" Thomson Learning,2003.

2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education,2003.

3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.

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4. V.K.Khanna, "Total Quality Management" New Age International, 2008

EIC-805 (C)

Mobile Application Development

UNIT 1:

INTRODUCTION: Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications Requirements gathering and validation for mobile applications.

UNIT 2:

BASIC DESIGN: Introduction – Basics of embedded systems design – Embedded OS – Design Constraints for mobile applications, both hardware and software related – Architecting mobile Applications – User interfaces for mobile applications – touch events and gestures – Achieving Quality constraints performance, usability, security, availability and modifiability.

UNIT 3:

ADVANCED DESIGN: Designing applications with multimedia and web access capabilities. Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT 4:

TECHNOLOGY I – ANDROID: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT 5:

TECHNOLOGY II – iOS: Introduction to Objective C – iOS features – UI implementation Touchframeworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application –Using Wifi - iPhone marketplace. Swift: Introduction to Swift, features of swift.

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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 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 Instrumentation 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 (EI) at 11:30 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 EI-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 Instrumentation 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 -Iil	60	30	10			100	3		-	3
2	EIA-302	Electromagnetic Theory	60	30	10			100	3		-	4
3	EIA-303	Electrical Instrumentation	60	30	10	30	20	150	2		2	3
4	EIA-304	Electronic Devices	60	30	10	30	20	150	3		2	4
5	EIA-305	Network Analysis and Synthesis	60	30	10	30	20	150	2		2	4
6	EIA-306	Simulation Lab-I				30	20	50			2	1
7	EIA-307	Self Study /GD Seminar					50	50			2	1
		TOTAL	**300**	**150**	**50**	**120**	**130**	750	13		10	20

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Electronics and Instrumentation 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	Assign-ments /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	EIA-402	Digital Electronics	60	30	10	30	20	150	2	1	2	4
3	EIA-403	Signals and System	60	30	10	30	20	150	3		2	4
4	EIA-404	Analog Communication	60	30	10	30	20	150	2	1	2	4
5	EIA-405	Electronic Measurement and Instrumentation	60	30	10	30	20	150	3		2	4
6	EIA-406	Simulation Lab-II				30	20	50			2	1
7	EIA-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.

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UNIT 4: (10hours)

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: (5 hours)

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

EIA-302

EIA-302	Electromagnetic Theory	3L:0T: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,

lossyconductive 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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Electrical Instrumentation

EIA-303

EIA-303	Electrical Instrumentation	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.

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Unit III (10H)

R, L, C Measurement: Bridges: Measurement of resistance using Wheatstone bridge, Kelvin's double bridge, Loss of charge method, ohm meter, meggar 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.

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

EIA-303	Electrical Instrumentation	0L:0T:2P	1 credits	2 Hrs/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 to enhance knowledge pertaining to this subject.

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Electronic Devices

EIA-304

EIA-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.

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Unit-V (6H)
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.

EIA-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

EIA-305

EIA-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
3.A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education

EIA-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.

SIMULATION LAB

EIA-306

EIA-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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EIA-307

GD / SS

EIA-307	**Self-study /GD Seminar (Internal Assessment)**	**0L:0T:2P**	**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.

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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

EIA-402

EIA-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)

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.

EIA-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.

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

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Signals and System

EIA-403

EIA-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.

EIA-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
EIA-404

EIA-404	Analog Communication	2L:1T: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.

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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.I.., "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.

EIA-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.

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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SSSUTMS SEHORE

Electronic Measurements and Instrumentation

EIA-405

EIA-405	**Electronic Measurements and Instrumentation**	**3L:0T: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.

Course Outcomes

3. To develop concepts of stability and its assessment criteria.

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)

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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 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.

EIA-405	**Electronic Measurements and Instrumentation**	**0L:0T:2P**	**1 Credits**	**2Hrs/Week**

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

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

Step2: 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.

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

EIA-406

EIA-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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EIA- 407

Industrial Training – I

EIA- 407	Industrial Training – I	0L:0T:1P	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

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite Pachama Oilfed Plant, Pachama, Sehore.

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 & Instrumentation Engineering

Minutes of Board of Studies Committee Meeting Dated : 09.06.2020

The Board of Studies Committee Meeting was held in the room of HOD (EI) at 10:30 AM on 09.06.2020. 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 EI-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 readyness among learners.
10. Necessary certification curses Indication of societal and ethical concern etc. regarding

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SEMESTER -V

Linear Control Systems
EIA-501

EIA-501	Linear Control Systems	**2L:1T:0P**	**3 credits**	**2Hrs/Week**

Course Preambles:

1. To develop basic skills of utilizing mathematical tools needed to analyze and design classical
   lincar control systems.
2. To understand and develop the state space representation of control systems.

Course Outcomes:

1. Understand the concept of the terms control systems, feedback, Mathematical modeling of Electrical and Mechanical systems.
2. Explain the time domain and frequency response analysis of control systems.
3. Acquire the knowledge of various analytical techniques used to determine the stability of control systems.
4. Able to understand the importance of design of compensators
5. Able to demonstrate controllability and observability of modern control systems.

UNIT-I (10H)

Introduction to Control Systems: Classification of control systems. Components of control systems, Feed-Back Characteristics, Effects of feedback - Mathematical modeling of Electrical and Mechanical systems, Transfer function, Transfer function of Potentiometer, synchro, AC servo motor, DC servo motor, Block diagram reduction technique, Signal flow graph, Mason's gain formula

UNIT-II (10H)

Time Domain Analysis: Standard test signals, Time response of first order systems, Transient response of second order system for unit step input, Time domain specifications, Steady state response, Steady state errors and error constants, Effects of P, PD, PI and PID controllers.

UNIT-III (10H)

Stability Analysis in S-Domain: The concept of stability, Routh's stability Criterion, Absolute stability and relative stability, limitations of Routh's stability.
Root Locus Technique: The root locus concept, construction of root loci, Effects of adding poles and zeros on the root loci.

UNIT-IV(6H)

Frequency Response Analysis: Introduction to frequency response, Frequency domain specifications, Bode plot, Stability analysis from Bode plots, Determination of transfer function from the Bode Diagram, Polar Plots, Nyquist Plots, Stability Analysis, Gain margin and phase margin

Control System Design: Introduction - Lag, Lead and Lag-Lead Compensator design in frequency Domain

UNIT-V (6H)

State Space Analysis: Concepts of state, State variables and state model, Derivation of state models of linear time invariant systems - Controllable, Observable and Diagonal state models, State transition matrix, Solution of state equation, Concepts of Controllability and Observability.

Reference Book:

1. Nagrath I.J. &Gopal.M - Control System Engineering, Wiley Eastern, 2003.
2. B.C.Kuo - Automatic Control Systems, Wiley India edition, 7th Edition, 2002.
3. K.Ogata - Modern Control System, Prentice Hall of India, 4th edition, 2002.
4. N.C.Jagan - Control Systems, B.S Publications, 2nd edition,2008.

EIA-501	Linear Control Systems	**2L:1T:0P**	**3 credits**	**2Hrs/Week**

LIST OF EXPERIMENTS

1. Characteristics of DC Servomotor.
2. AC Position control system.
3. DC Position control system.
4. ON/OFF Temperature Control system.
5. Step response of second order system.
6. Characteristics of AC Servomotor.
7. Characteristics of synchropair .
8. Frequency response analysis of LEAD compensating network
9. Frequency response analysis of LAG compensating network

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10.Temperature control system using PID.

11. Level control system.

12. Step response and frequency response of a given plant

Digital Signal Processing
EIA-502

EIA-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

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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.

EIA-502	Digital Signal Processing	0L:0T:2P	1 Credits	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, Hamming)

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

EIA-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 IGBTTreatmentshould consist of structure, Characteristics, operation, ratings, protections and thermal 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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SSSUTMS School of Engineering

EIA-504(B)
Instrumentation Systems

EIA-503(B)	Instrumentation Systems	3L:1T:0P	4 Credits	2Hrs/Week

Course Preambles:

1. To expose the students to various sensors and transducers for measuring mechanical quantities.
2. To understand the specifications of sensors and transducers.
3. To learn the basic conditioning circuits for various sensors and transducers.
4. To introduce advances in sensor technology.

Course Outcomes:

1. Familiar with both static and dynamic characteristics of measurement system.
2. Familiar with the principle and working of various sensors and transducers.
3. Able to design signal conditioning circuit for various transducers.
4. Able to identify or choose a transducer for a specific measurement application

UNIT –I (10H)

Measurement of Motion: Angular velocity (speed) measurement: Electrical methods like DC and AC Tacho generators, eddy current (drag cup) Tachometers and Stroboscopic method. **Acceleration measurements**: Seismic displacement, velocity, acceleration pick-ups, electromagnetic and electro dynamic type of velocity transducers, piezoelectric transducers, deflection type of accelerometer, bonded strain gauge accelerometer, and piezoelectric accelerometers.

UNIT-II (10H)
Measurement of force, Torque and Temperature: Basic methods of force measurement: characteristics of elastic force transducers, load cells. **Various types of Torque measurement**:absorption, transmission, stress, deflection type. **Measurement of Temperature:** Laws ofthermocouples, Thermocouple circuits, reference junction considerations ice bath

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reference junctionspecial materials, configurations and techniques (cooled thermocouples, pulsed thermocouples, andmultifunction thermocouples) and radiation thermometers.

UNIT – III (10H)

Measurement of flow: Classification of flow meters, head flow meters like orifice plate, venture tube, flow nozzle and pitot tube. Rotameter, electromagnetic flow meter, positive displacement meter, hot wire and hot film anemometer, mass flow measurements, rotor torque mass flow meter.

UNIT-IV (6H)

Measurement of liquid level: Electrical methods: Resistive, inductive and capacitive methods, capacitive variable area method, capacitive voltage divider method, capacitive variable dielectric constant method. Measurement of liquid level using gamma rays, ultrasonic method and float
Measurement of humidity: Absolute Humidity, relative humidity, hygrometers (resistive and capacitive hygrometer), Microwave refractometer , Aluminum oxide hygrometers.
Measurement of PH Electrodes: Station Glass and Calomel Electrodes, installation of PH meters.

UNIT V (6H)

Measurement of sound: Sound level meter microphones with their types like carbon and capacitive microphone, dynamic microphone, inductive microphone, piezo electric microphone. Pressure response of capacitive microphone

Referance Book:

1. C.S.Rangan, G R Sarma& V S N Mani, Instrumentation Devices and Systems-TMH, 2nd Edition 2004

2.B.Nakra&Chowdhari, Instrumentation Measurement and Analysis, TMH, 2nd Edition

3. D.V.S.Murthy, Transducers and Instrumentation. PHI, 1995 4. John P. Bentley, Principles

of Measurement Systems, 3rd Edition, Pearson Education, 2000.

4. Doebelin E.O, Measurement Systems - Application and Design, 4th Edition, McGraw-Hill .

5. Patranabis D, Principles of Industrial Instrumentation, 2nd Edition, Tata McGraw Hill, New Delhi, 1997.

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Open Core Elective - I
EIA-505(A)
Data Compression & Cryptography

EIA-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 .

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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 pearsonEducat

EIA-505(B) Advanced Sensors

EIA-505(B)
Advanced Sensors

EIA-505(Ab)	Advanced Sensors	3L:1T:0P	4 Credits	3 Hrs/Week

Course Preambles:

1. To introduce the principles of Advanced sensors
2. To introduce the construction and applications of Advanced sensors

Course Outcomes

1. Develop an understanding of need multi sensor and recent trends in technology
2. Explore Smart sensors working principle
3. Discuss the techniques for MEMS, NANO and Chemical sensors techniques
4. To understand the basic operation involved in Robotics, fiber optics and Boi sensors

UNIT – I

Sensor Fundamentals: Basic sensor technology and sensor system. **Application Consideration**: Sensor characteristics, system characteristics, instrument selection, data acquisition and readout, and installation.

UNIT –II

Biosensors: Overview, applications and of origin of biosensor, bio receptor molecules, transduction mechanisms in biosensors, application range of biosensors, and future prospects. **MEMS and NANO sensors:** Micro electromechanical systems (MEMS), Micromachining, Biomedical Applications, NANO sensors and carbon NANO tubes.

UNIT – III

Smart Sensors: Technology fundamentals and applications. **Electromagnetism in sensing**: Introduction to electromagnetism and inductance in sensor application, magnetic field sensors and applications.

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UNIT – IV

Chemical Sensors: Introduction to semiconductor gas detectors, ion selective electrodes, Conduct metric sensors, and mass sensors. **Fiber optic sensors:** Fiber optic sensors for the measurement of temperature, pressure, displacement, turbidity and pollution.

UNIT – V

Robotics sensors: Introduction, characteristics and types of sensors, touch or tactile sensors, binary and analog sensors, proximity sensors, types of proximity sensors, contact and non-contact proximity sensors, robotic vision.

1. Sensor Technology Handbook by Jon Wilson Newness Publication Elsevier
2. Pallas-Areny R and Webster JG, "Sensors and Signal Conditioning," Wiley India
3. Gardener, "Micro sensors, MEMS and Smart Devices," Wiley India
4. Khazan AD, "Transducers and their Elements – Design and Applications," Prentice Hall
5. Patranabis D, "Sensors and Transducers," Prentice Hall
6. Middlehook S and Audet SA, "Silicon Sensors," Academic Press
7. Dorf RC, "Sensors, Nanoscience, Biomedical engineering and instruments," CRC Press
8. Zanger H and Zanger C, "Fiber optics Communication and other applications," Macmillan publishing
9. Joshi RM, "Biosensors," ISHA Books
10. Webster JG, "Medicai Instrumentation, Application and Design," Wiley India

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Industrial Training-I
EIA-506

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

Course Preamble:

1. To expose the students to actual working environment **Electronics & Instrumentation** 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

Microcontroller & Microprocessor
EIA-601

EIA-601	Microcontroller & Microprocessor	2L:1T:0P	3 credits	2Hrs/Week

Course Preamble

1. To be able to understand in detail about 8086 microprocessor architecture, programming and interfacing.
2.To be able to understand about 8051 microcontroller architecture, and programming.

Course Outcomes

1. Acquire the knowledge of Architecture of 8086, writing assembly language programming for different applications.
2.Explain types of microcontrollers and their applications

UNIT-I (10H)

Microprocessor: Architecture of 8086 - Segmented memory, Addressing modes, Instruction set, Minimum and maximum mode operations.

UNIT-II (10H)

Introduction to Programming: Assembly language programming, Assembler directives, Simple programs using assembler, Strings, Procedures, Macros timing.

UNIT-III (10H)

Interfacing to Microprocessor: Memory and I/O interfacing, A/D and D/A interfacing, 8255(PPI),
Programmable Internal Timer (8253), Keyboard and display interlace, Interrupts of 8086.

UNIT- IV (6H)

Micro Controller Architecture: Types of Micro Controllers, 8051 MC - Architecture input / output pins, Ports and circuits, Internal and external memories, Counters and timers, Serial data input / output, Interrupts & timers.

UNIT-V (6H)

Introduction to Programming: Basic Assembly Language Programming, instruction cycle, Addressing modes, 8051 instruction set, Classification of instructions. Simple programs.

Reference Book:

1. Douglas. V. Hall microprocessors and Interfacing -Tata McGraw Hill -Revised 2nd Edition.

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2006.
2. Krishna Kant - microprocessors and Microcontrollers - Architecture, Programming and System Design 8085, 8086, 8051, 8096, Prentice-Hall India - 2007.
3. Kenneth. J. Ayala–The 8051 Microcontroller Architecture Programming and Applications", Thomson publishers, 2nd Edition, 2007.
4. Waiter A. Triebel&Avtar Singh - The 8088 and 8086 Microprocessor -Pearson Publishers, 4th Edition, 2007.

EIA-601	Microcontroller & Microprocessor	0L:0T:2P	1 credits	2Hrs/Week

Experiment List

1.To study development tools/environment for ATMEL/PIC microcontroller programme and Architecture.
2. Write an assembly language program to add, subtract, multiply, divide 16 bit data by Atmel microcontroller.
3. An assembly language program to generate 10 KHz frequency using interrupts on P1.2.
4. Study and analyze the interfacing of 16 x 2 LCD.
5. Study of implementation, analysis and interfacing of seven segment display.
6. Study of implementation of steeper motor angle control.
7. Study of implementation of DC Motor control using PWM method.
8. Study and observation of Position control of Servo Motor.
9. Study of Programming and Transmission and Reception of data through serial port.
10. To study implementation and programming of Pressure measurement.
11. To study implementation and programming of Temperature measurement.
12. Study and analysis of interfacing of graphical LCD using PIC Microcontroller.
13. To interface PWM based voltage regulator using PIC Microcontroller.
14. Study and interface of IR (RC5 Protocol) and RF Communication using PIC Microcontroller

EIA-602
Biomedical Instrumentation

EIA-602	Biomedical Instrumentation	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble

1. To provide students with an understanding of various medical instruments and latest techniques used in the hospital for diagnostic purpose.
2. To learn and understand electrical hazards of medical instruments and patient's safety.

Course Outcomes

1. Describe different general devices used in biomedical applications.
2. Explain instruments for recording Bio-potentials.
3. Explain different techniques and related instruments for measuring blood pressure, blood flow and heart sounds.
4. Describe radiography and explain recent biomedical instruments.
5. Describe electrical hazards, safety in hospital design.

UNIT-I (10H)

Introduction to Bio medical Instrumentation: General characteristics of medical instrumentation like linearity, range, frequency response, signal to noise ratio and stability. Amplifiers for Bio medical Applications: Differential, Carrier amplifiers. Recorders and display devices for Bio medical applications. General features of ink jet, thermo sensitive and optical recorders. General features of display devices for bio signals. Data acquisition and display using micro computers

UNIT-II (10H)

Electro Cardiograph(ECG) recording system: Block Schematic diagram of ECG machine, Amplifiers and circuits for ECG, ECG Leads, Noise problems and their elimination.

Electro Encephalography (EEG): Block schematic diagram of EEG recording system, General features of different blocks, Specification of EEG amplifiers, Qualitative requirements. 10 -20 electrode placement system, resting rhythms and sleep stages.

Electro Myography (EMG): Block schematic diagram of EMG recording system. EMG amplifiers. Design considerations of EMG amplifiers. Data display for EMG.

UNIT-III (10H)

Blood pressure and Blood Flows: Electronic Techniques for indirect and direct measurement of blood pressure. Measurement of blood flow by Electromagnetic, Doppler and Plethysmo graphic methods

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Phonocardiography: Origin of heart sounds, Phonocardiography instrumentation consisting of microphone, filters and signal conditioners.

UNIT-IV (6H)

Introduction to Radiography: Physical properties of X-Rays, principles of generation of X-Rays. Radiation energy distribution, collimators and grids, fluoroscopy, and image intensifiers.

Recent Trends: Medical imaging, X-rays, laser applications, ultrasound scanner, echo cardiography, CT scan MRI/NMR, Cine angiogram, color Doppler systems, Holter monitoring, endoscopy.

UNIT-V (6H)

Electrical hazards during Bio electric monitoring: Safety codes and Standards, Micro and Macro shock and their physiological effects. Leakage currents and protection by the use of isolation transformers, Equipotential grounding and earth free monitoring. Electrical factors in Hospital Design: Electrical power supply systems in a Hospital building. Proper installation and grounding for providing safe patient electrical environment.

Reference Book:

1. Leslie Cromwell, Fred J. Weibell and Erich A. Pfeiffer, "Biomedical Instrumentation and Measurements", 2nd Edition, Prentice Hall, New Delhi, 1998.
2. John G. Webstar, Medical instrumentation -Application & Design, John Wiley & Sons Inc., 3rd Edition, 2003.
3. R.S. Khandpur, Hand Book of Biomedical Instrumentation, Tata McGraw Hill Publishing Company Ltd., 2nd Edition, New Delhi, 2003
4. Joseph J.Carr and John M.Brown, Introduction to Biomedical Equipment Technology, Pearson Education, 2001.
5. L. A. Geddes, Principles of Applied Bio-Medical Instrumentation, John Wiley and Sons, New York, USA, 1975.
6. Geddes L. A. and Baker L. E., "Principles of Applied Biomedical Instrumentation", 3rd Edition, John Wiley, New York, 1989.
7. Richard Aston, "Principles of Bio-medical Instrumentation and Measurement", Merril Publishing Company, New York, 1990

EIA-602	Biomedical Instrumentation	0L:0T:2P	1 credits	2 Hrs/Week

Experiment List

1. Design of pre amplifiers to acquire bio signals along with impedance matching circuit using suitable IC's
2. Design of ECG Amplifiers with appropriate filter to remove power line and other artifacts.
3. Design of EMG amplifier

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4. Design a suitable circuit to detect QRS complex and measure heart rate
5. Design of frontal EEG amplifier
6. Design of EOG amplifier to detect eye blink
7. Design a right leg driven ECG amplifier.
8. Design and study the characteristics of optical Isolation amplifier
9. Design a Multiplexer and Demultiplexer for any two biosignals.
10. Measurement of pulse-rate using Photo transducer.

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Program Elective-II
EIA-603(A)
Instrumentation in Aerospace and Navigation

EIA-604(A)	**Instrumentation in Aerospace and Navigation**	**3L:0T:0P**	**3 credits**	**3 Hrs/Week**

Course Preamble:

1. To expose the students to the field of aerospace engineering
2. To impart basic knowledge of its navigation instrumentation

Course Outcomes:

1. To understand the basics of aerospace and navigation
2. To know the technical aspects of this subject
3. To know about various troubles in aircrafts

UNIT-I (10H)
Introduction To Aviation: History of aviation and space flight anatomy of airplane and space vehicle with emphasis on control surfaces. Airfoil nomenclature, basics of aerodynamics to illustrate lift and drag, types of drag, finite wings, swept wings, flaps Airplane performance, thrust, power, rate of climb, absolute and service ceiling, range and endurance.

UNIT-II (10H)
Aircraft Instrumentation: Basic of engine instruments, capacitive fuel content, gauges, standard atmosphere, altimeters, aneroid, radio altimeters. Aircraft compass, remote indicating magnetic compass, rate of climb indicator, pilot static system, air speed indicator, mach meters, integrated flight instruments, flight testing and recording of flight tests.

UNIT-III (10H)
Radio Navigation Aids: Automatic direction finder distance measuring equipments, instrument landing system visual Omni range, radar, optical instruments, engine instruments and control, pressure measurements, thermal meter control, tachometer, accelerometer, smoke and fire detection, propeller controls, twin blade control, cabin pressure and temperature.

UNIT-IV (6H)
Satellite and space vehicle instrumentations: Satellite and space vehicle instrumentation, propulsion controls, sun sensors, horizon sensors, star tracker, stabilization controls.

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UNIT-V (6H)

Electrical Troubles: Hydraulic systems trouble, landing gear troubles, cabin conditioning troubles, indication of unsafe canopy, Boeing condition, radio troubles, separate generator, system troubles, trouble indicator light, advantages of instrument flag, black box and its use.

REFEREANCE BOOK

1. John D Anderson JR, "Introduction to flight", McGraw hill
2. Pallett E.G.H, " Aircraft instrumentation and integrated systems", Longman scientific and Technical,1992
3. Nagaraja N.S, "Elements of electronic navigation", McGrawHill , New Delhi 1975

Reliability Engineering
EIA-603(B)

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

Course Preamble

1. To understand the concepts of different types of probability distributions importance of reliability evaluation of networks.
2. To make the students understand about Reliability, availability model of Power Systems and markov modeling of Power Plants. With identical and no identical units.

Course Outcomes

1. Able to understand the meaning of discrete and continuous random variables and their significance, causes of failures of a system.
2. Able to acquire the knowledge of different distribution functions and their applications.
3 .Able to develop reliability block diagrams and evaluation of reliability of different Systems

UNIT- I (10H)

Discrete and Continuous Random Variables: probability density function and cumulative distribution function, Mean and Variance, Binomial, Poisson, Exponential and Weibull distributions.

UNIT, II (10H)

Failure and Causes of Failure: Failure rate and failure density, Reliability function and MTTF, Bath tub curve for different systems, parametric methods for above distributions, Non-Parametric methods from field data.

UNIT- III (10H)

Reliability Block Diagram: Series and parallel systems, Network reduction technique, Examples, Evaluation of failure rate, MTTF and reliability, Active and Standby Redundancy, r out of n configuration. Non-series, parallel systems. Path based and cut set methods.

UNIT- IV (6H)

Availability, MTTR and MTBF: Markov models and State transition matrices, Reliability models for single component, two components, Load sharing and standby systems, Reliability and availability models of two unit parallel system with repair and standby systems with repair.

UNIT- V (6H)

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Repairable Systems: Maintainability, Preventive maintenance, Evaluation of reliability and J1TTF, Overhauling and replacement, Optimum maintenance policy, Markov model of a power plant with identical units and non-identical unit, Capacity outage probability table.
Frequency of failures and Cumulative frequency

Reference Book

1) Charles E.Ebeling, "**Reliability and Maintainabelity Engineering**", McGraw Hill International Edition, 1997.
2) Balaguruswamy, "**Reliability Engineering,**"Tata McGraw Hill Publishing company Ltd,1984.
3) R.N.Allan. "**Reliability Evaluation of Engineering Systems**", Pitman Publishing, 1996.
4) Endrenyi. "Reliability Modelling in Electric Power Systems" JohnWiley& Sons, 1978.

Digital Image & Video Processing
EIA-604(A)

EIA-604(A)	Digital Image & Video Processing	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.

UNIT-IV(6H)

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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

Speech and Audio Processing
EIA-604(A)

EIA-604(A)	Speech and Audio Processing	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, WileyInterscience, 2003

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Introduction to MEMS
EIA-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.

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Text/Reference Book:

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.

Digital System Design using HDL
Verilog

EIA-605(B)

EIA-605 (B)	Digital System Design using HDL Verilog	**3L:0T:0P**	**3 credits**	**3 Hrs/Week**

Course Preamble

1. Describe Verilog hardware description languages (HDL).
2. Develop Verilog HDL code for combinational digital circuits.
3. Develop Verilog HDL code for sequential digital circuits.
4. Develop Verilog HDL code for digital circuits using switch level modeling and
5. describes system tasks, functions and compiler directives
6. Describes designing with FPGA and CPLD.

Course Outcomes

1. To understand syntax of various commands, data types and operators available with
2. verilog HDL
3. To design and simulate combinational circuits in verilog
4. To design and simulate sequential and concurrent techniques in verilog
5. To write Switch level models of digital circuits
6. To implement models on FPGAs and CPLDs

UNIT I (10H)

Introduction to Verilog HDL: Levels of Design Description, Concurrency, Simulation and Synthesis, Function Verification, System Tasks, Programming Language Interface, Module, Simulation and Synthesis Tools

Verilog Data Types and Operators: Binary data manipulation, Combinational and Sequential logic design, Structural Models of Combinational Logic, Logic Simulation, Design Verification and Test Methodology, Propagation Delay, Truth Table models using Verilog.

UNIT II (10H)

Combinational Logic Circuit Design using Verilog: Combinational circuits building blocks: Multiplexers, Decoders , Encoders , Code converters, Arithmetic comparison circuits, Verilog for combinational circuits , Adders-Half Adder, Full Adder, Ripple-Carry Adder, Carry Lookahead Adder, Subtraction, Multiplication.

UNIT III (10H)

Sequential Logic Circuit Design using Verilog: Flip-flops, registers & counters, synchronous sequential circuits: Basic design steps, Mealy State model, Design of FSM using CAD tools, Serial Adder Example, State Minimization, Design of Counter using sequential Circuit approach.

UNIT IV (10H)

Switch Level Modeling: Basic Transistor Switches, CMOS Switches, Bidirectional Gates, Time Delays with Switch Primitives, Instantiation with Strengths and Delays, Strength Contention with Trireg Nets.

System Tasks Functions and Compiler Directives: Parameters, Path Delays, Module Parameters. System Tasks and Functions, File Based Tasks and Functions, Computer Directives, Hierarchical Access, User Defined Primitives.

UNIT V

Designing with FPGAs and CPLDs: Simple PLDs,ComplexPLDs,Xilinx 3000 Series FPGAs, Designing with FPGAs, Using a One-Hot State Assignment, Altera Complex Programmable Logic Devices (CPLDs), Altera FLEX 10K Series CPLDs.

Reference Book:

1) T.R. Padmanabhan, B Bala Tripura Sundari, "**Design Through Verilog HDL**", Wiley 2009.
2) Samir Palnitkar, "**Verilog HDL**", 2nd Edition, Pearson Education, 2009.
3) Stephen Brown, ZvonkoVranesic , "**Fundamentals of Digital Logic with Verilog Design**, TMH, 2nd Edition 2003.

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Minor Project
EIA-606

EIA-606

EIA -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 design work with a focus on electronic circuit design.
2.The Minor project may be a complete hardware or a combination of hardware and software.
3.The software part in Minor project should be less than 50% of the total work.
3Minor 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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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 & Instrumentation Engineering

Minutes of Board of Studies Committee Meeting Dated : 09.06.2020

The Board of Studies Committee Meeting was held in the room of HOD (EI) at 02:30 PM on 09.06.2020.

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 EI-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 provide industry ready competency among learners.
10. Necessary certification curses Inculcation of societal and ethical concern etc., regarding

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SEMESTER – VII

Opto-Electronic Instrumentation
EIA-701

EIA-701	Opto-Electronic Instrumentation	3L:0T:P	3 credits	3Hrs/Week

Course Preambles:

1.To expose to the students on the basics of optical sources and detectors, optical fiber and fiber optic sensors.
2.To impart knowledge on the characteristics of optical sources and detectors.
3.To introduce about the Industrial applications of fiber optic sensor and laser

Course Outcomes

1. Describe the properties, construction & classification of Lasers.
2. Explain operation & applications of Laser instruments with their safety measures.
3. Analyse operation & transmission in Optical fiber with their modulation techniques.
4. Express a fiber optic instrument to measure Electrical & Non Electrical parameters.
5. Analyse various optoelectronic sensors and display devices

UNIT-I (10H)

Laser fundamentals: Mechanisms Properties of Laser Generations, Optical Feedback, And Classification of LASER: Solid, Liquid, Gas, Lasers and their Respective Enginery Level Diagrams. Construction of Dye,Nd-YAG, Argon and carbon dioxide lasers, Characteristics of stabilization Q- switching and mode locking.

UNIT-II (10H)

Laser Instruments: Laser interferometers, laser strain gauges, pulse echo technique, Beam modulation telemetry. Laser welding, Laser machining and Laser spectroscopy, Line shape function, lasing threshold, Application of lasers in Engineering and Medicine, safety with lasers.

UNIT- III (10H)

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Optical fibers Fundamentals: Introduction to optical fibers, Fundamentals of Transmission theory, FiberFabrication and Manufacturing techniques, fiber Splicing, Connectors and Jointing Technique, Electro-Optic, Mechano - Optic and Acousto-optic Modulation techniques, Losses in Optical fibers.

UNIT-IV (6H)

Fiber Optic Instrumentation: Classification and Principle of fibers optic sensors. Optical time Domain Reflectometer. Multimode passive and active fibers sensors phase modulated sensors. Measurements of currents, Voltage, pressure, Temperature, Displacement, Acceleration, and Fluid level using optical fibers.

UNIT- V (6H)

Optoelectronic Devices and Components: Photo diodes, LDRs, PIN diodes, Solar cells, LED, S phototransistors LCD, plasma Display, Opt isolators, Photo Couplers.

Reference Book:

1. Wilson & J.F.B. Hawkers, Optoelectronics- An Introduction Prentice Hall of India 2ndEdtions
2. Amar K. Ganguly, Optical &Opto Electronic Instrumentation, Narosa Publishing House.
3. Shukbir Kumar Sarkar, Optical Fibers and fiber Optics Instrumentation, 2nd edition.S. Chand &Company
4. R.P. KharaFibre optics & Optical Commecam

EIA-701	Opto-Electronic Instrumentation	0L:0T:2P	1credits	2Hrs/Week

LIST OF EXPERIMENTS

1. Setting up Fiber Optic Analog Link and Digital Link
2. Study of Intensity Modulation Technique using Analog input signal
3. Pulse Width Modulation in Fiber Optic Link.
4. Measurement of propagation or attenuation loss in optical fiber.
5. Measurement of bending loss in optical fiber.
6. Numerical Aperture (NA) of the fiber.
7. Study of Diffraction gratings.
8. Study of Michelson Interferometer.
9. Study of Reflection Holography.
10. Study of Transmission Holography

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Analytical Instrumentation
EIA-702

EIA-702	Analytical Instrumentation	3L:0T:0P	3 Credit	3Hrs/Week

Course Preambles:

1. To make the students equipped about the analysis of materials as it is an important requirement of process control and quality control in industry.
2. To expose the students to principles of various analytical methods.
3. To impart the knowledge on various instruments used in the analysis of materials.

Course Outcomes

1. Acquire knowledge of electromagnetic radiation with matter and apply analytical techniques.
2. Describe the relevance of material sampling and analysis in process control and quality control in industry.
3. Apply the knowledge of chromatography to separate the constituents from a complex mixture.
4. Identify the physical principles behind the various widely used analytical methods in the industry.
5. Select an appropriate analyser for an industrial requirement

UNIT-I (10H)

Review of basic components of analytical instrumentation, Calorimeter and Spectrophotometers, Electromagnetic radiation, Beer –Lamberts Law, Absorption instruments, Calorimeters, Spectrophotometers
sources of error and calibration.

UNIT-II (10H)

Infra –red Spectrophotometers infra-red Spectroscopy, Basic Components types of IR Spectrometry, sample handling techniques, FT-IR Spectroscopy, Calibration, Mass Spectrometers, Basic mass Spectrometer, types, Components, Resolution and application of Mass Spectroscopy.

UNIT-III (10H)

NMR, Principle of NMR Spectroscopy, Different types of NMR Spectrometers, Chromatography, Basic of Gas Chromatography, Methods of measurement of peak areas, Liquid chromatography, types of amino acid analysers.

UNIT-IV(6H)

Electro- Mechanical instruments, Electro-Chemical cell, Types of electrodes, potentiometers, conductivity

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meters, polar – graphs, PH-meters, Principle of measurements, Electrodes, Selective Ion electrode, chemically sensitive semiconductor devices, Bio- Sensors.

UNIT-V(6H)

Industrial gas Analysers, Types, Para–magnetic Oxygen analyser, Magnetic wind instruments, Infra-red gas
analyser, Thermal conductivity analyser, Analyser based on gas density, Methods based on ionization.
Environmental pollution monitoring instruments: Air pollution monitoring instruments, Co-S02 –No wet Chemical air analysis, Water pollution monitoring instruments.

Reference Book

1. H.M Willard, L.L. Merit, J. A. Dean, Instrumental Methods of Analysis CBS Publishers, Delhi.
3. R.S. Khandpur, Analytical instruments, Tata McGraw Hills1989.

EIA-702	Analytical Instrumentation	0L:0T:2P	1 Credit	2 Hrs/Week

LIST OF EXPERIMENTS

1. Study of Gas chromatograph
2. Study of X-Ray Spectrometer
3. Study of Ultraviolet & Visible Spectrophotometer
4. Study of Mass spectrometer
5. Viscosity measurement
6. Turbidity measurement

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Program Elective-IV
EIA-703(A)
Non-Conventional
Energy Sources

EIA-703(A)	Non-Conventional Energy Sources	3L:0T:0P	3 Credit	3Hrs/Week

Course Preambles

1.To impart the knowledge of basics of different non-conventional types of power generation & power plants
in detail so that it helps them in understanding the need and role of Non-Conventional Energy sources particularly when the conventional sources are scarce in nature

Course Outcomes

1. Understand the different nonconventional sources and the power generation techniques to generate
electrical power.
2. Understand the Solar energy power development and different applications.
3. Understand different wind energy power generation techniques and applications.
4. Design a prescribed engineering sub-system
5. Recognize the need and ability to engage in lifelong learning for further developments in this field

UNIT-I (10H)

Review of Conventional and Non-Conventional energy sources - Need for non-conventional energy sources
Types of Non- conventional energy sources - Fuel Cells - Principle of operation with special reference to H2
°2 Cell - Classification and Block diagram of fuel cell systems - Ion exchange membrane cell – Molten carbonate cells - Solid oxide electrolyte cells - Regenerative system- Regenerative Fuel Cell - Advantages
and disadvantages of Fuel Cells-Polarization - Conversion efficiency and Applications of Fuel Cells.

UNIT-II (10H)

Solar energy - Solar radiation and its measurements - Solar Energy collectors -Solar Energy storage systems
- Solar Pond - Application of Solar Pond - Applications of solar energy.

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UNIT-III (10H)

Wind energy- Principles of wind energy conversion systems - Nature of wind - Power in the Wind-Basic
components of WECS -Classification of WECS -Site selection considerations -Advantages and disadvantages of WECS -Wind energy collectors -Wind electric generating and control systems - Applications of Wind energy -Environmental aspects.

UNIT- IV (6H)

Energy from the Oceans - Ocean Thermal Electric Conversion (OTEC) methods - Principles of tidal power generation -Advantages and limitations of tidal power generation -Ocean waves - Wave energy conversion devices -Advantages and disadvantages of wave energy - Geo-Thermal Energy - Types of Geo-Thermal Energy Systems - Applications of Geo-Thermal Energy.

UNIT-V (6H)

Energy from Biomass - Biomass conversion technologies / processes - Photosynthesis – Photosynthetic efficiency - Biogas generation - Selection of site for Biogas plant - Classification of Biogas plants – Details of commonly used Biogas plants in India - Advantages and disadvantages of Biogas generation –Thermal gasification of biomass -Biomass gasifiers.

Reference Book

1. Rai G.D, Non-Conventional Sources of Energy, Khandala Publishers, New Delhi, 1999.
2. M.M. El-Wakil, Power Plant Technology. McGraw Hill, 1984.

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Mixed Signal Design
EIA-703(B)

EIA-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
EIA-704(A)
Road Safety Engineering

EIA-704(A)	Road Safety Engineering	3L:0T:0P	3 Credit	3Hrs/Week

Course Preambles

1. Introduction to various factors considered for road safety and management
2. Explain the road safety appurtenances and design elements
3. Discuss the various traffic management techniques

Course Outcomes

1. Prepare accident investigation reports and database
2. Apply design principles for roadway geometrics improvement with various types of traffic safety appurtenances/tools
3.Manage traffic including incident management

UNIT – I (10H)

Road Accidents: Causes, scientific investigations and data collection, Analysis of individual accidents to arrive at real causes, statistical methods of analysis of accident data, Basic concepts of Road accident statistics, Safety performance function: The empirical Bayes method Identification of Hazards road location. Application of computer analysis of accident data.

UNIT – II (10H)

Safety in Road Design: Operating the road network for safety, highway operation and counter measures, road safety audit, principles-procedures and practice, code of good practice and checklists, vehicle design factors& Driver characteristics influencing road safety.

UNIT – III (10H)

Road Signs and Traffic Signals: Classification, Location of Signs, measures of sign effectiveness, Types of visual perception, sign regulations, sign visibility, sign variables, Text versus symbols. Road Marking:
Role of Road markings, Classification, visibility. Traffic Signals: Need, Signal face. Illumination and location of Signals, Factors affecting signal design, pedestrians' safety, fixed and vehicle actuated signals. Design of signals, Area Traffic control. Delineators, Traffic Impact Attenuators, Road side rest areas,
Safety Barriers, Traffic Aid Posts.

UNIT – IV (6H)

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Traffic Management Techniques: Integrated safety improvement and Traffic Calming Schemes, Speed and load limit, Traffic lights, Safety cameras, Tests on driver and vehicles, pedestrian safety issues, Parking,Parking enforcement and its influence on Accidents. Travel Demand Management; Methods of Trafficmanagement measures: Restriction of Turning Movements, One-way streets, Tidal Flow Operation Methods, Exclusive Bus Lanes and Closing Side-streets; Latest tools and techniques used for Road safety and traffic management. Road safety issues and various measures for road safety; Legislation, Enforcement, Education and Propaganda, Air quality, Noise and Energy Impacts; Cost of Road Accidents.

UNIT – V (6H)

Incident Management: Introduction, Characteristics of Traffic Incidents, Types of Incidents, Impacts,Incident management process, Incident traffic management; Applications of ITS: Motorist information,Equipment used; Planning effective Incident management program, Best practice in Incident managementprograms. National importance of survival of Transportation systems during and after all natural disasters especially cyclones, earthquakes, floods etc. and manmade disasters like sabotage, terrorism etc.

Reference Book

1. Guidelines on Design and Installation of Road Traffic Signals, IRC:93.
2. Specification for Road Traffic Signals, IS: 7537-1974.
3. Principles and Practice of Highway Engineering by L.R. Kadiyali and N.B. Lal.
4. Hand Book of T.E. Myer Kutz, Editor McGraw Hill, 2004.

EIA-704(B)
Principles of Electronic Communications

EIA-704(B)	Principles of Electronic Communications	3L:0T:0P	3 Credit	3Hrs/Week

Course Preambles

1. Provide an introduction to fundamental concepts in the understanding of communications systems.
2. Provide an introduction to network model and some of the network layers including physical layer,

data link layer, network layer and transport layer.

3. Provide an introduction to the evolution of wireless systems and current wireless technologies.

Course Outcomes

1. Understand the working of analog and digital communication systems
2. Understand the OSI network model and the working of data transmission
3. Understand the evolution of communication technologies from traditional telephony systems to modern wireless communication systems.

UNIT – I (10H)

Introduction to communication systems: Electromagnetic Frequency Spectrum, Signal and its representation, Elements of Electronic Communications System, Types of Communication Channels.
Signal Transmission Concepts: Baseband transmission and Broadband transmission,
Communication Parameters: Transmitted power, Channel bandwidth and Noise, Need for modulation **Signal Radiation and Propagation:** Principle of electromagnetic radiation, Types of Antennas, Antenna Parameters and Mechanisms of Propagation.

UNIT – II (10H)

Analog and Digital Communications: Amplitude modulation and demodulation, FM modulation and demodulation, Digital converters, Digital modulation schemes – ASK, FSK, PSK, QPSK, Digital demodulation.

UNIT – III (10H)

Data Communication and Networking: Network Models, OSI Model, Data Link Layer – Media Access
control, Ethernet, Network Layer – Internet Protocol (IPv4/IPv6), Transport Layer – TCP, UDP.

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UNIT – IV (10H)

Telecommunication Systems: Telephones, Telephone system, Paging systems, Internet Telephony.
Optical Communications: Optical Principles, Optical Communication Systems, Fiber –Optic Cables,
Optical Transmitters & Receivers, Wavelength Division Multiplexing.

UNIT – V (10H)
Wireless Communications: Evolution of Wireless Systems: AMPS, GSM, CDMA, WCDMA, OFDM.
Current Wireless Technologies: Wireless LAN, Bluetooth, PAN and ZigBee, Infrared wireless, RFID communication, UWB, Wireless mesh networks, Vehicular adhoc networks.

Reference Book
1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill, 2008.
2. Data Communications and Networking, Behrouz A. Forouzan, 5e TMH, 2012

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Project Stage-I
EIA-705

EIA -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 instrument 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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Self Study / GD/Seminar
EIA-706

EIA-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.

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Questioning

Through asking appropriate questions, students will demonstrate their understanding of discussions and spark further discussion.

Interdisciplinary Inquiry

Students will be able to reach across diverse disciplines to apply theories, methods and knowledge bases from multiple fields to a single question or problem.

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 recognizingcultural diversity and the ever-changing nature of what is regarded as important

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SEMESTER-VIII

Transducers and Sensors
EIA-801

EIA-801	Transducers and Sensors	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble:

1. To make students familiar with the constructions and working principle of different types of sensors and transducers.
2.To make students aware about the measuring instruments and the methods of measurement and the use of different transducers.

Course Outcomes:

1. Use concepts in common methods for converting a physical parameter into an electrical quantity
2. Classify and explain with examples of transducers, including those for measurement of temperature, strain, motion, position and light
3. Choose proper sensor comparing different standards and guidelines to make sensitive measurements of physical parameters like pressure, flow, acceleration, etc
4. Predict correctly the expected performance of various sensors
5. Locate different type of sensors used in real life applications and paraphrase their importance

UNIT 1 (10H)

Functional elements of an instrument; active &passive transducers ;analog & digital modes of operation; null & deflection methods; I/O configuration of measuring instruments &instrument system-methods of correction for interfering &modifying inputs. Generalized performance characteristics of Instruments: Static characteristics and static calibration-Meaning of static calibration, measured value versus true value, Some basic statistics least square calibration curves, calibration accuracy versus installed accuracy.

UNIT 2 (10H)

Motion and Dimensional measurement: Fundamental standards ,relative displacement stranslational and rotational, Calibration, Resistive potentiometers, differential transformers, variable inductance &variable reluctance pickups, capacitance pickup, Digital displacement transducers, Mechanical fly ball angular velocity sensor, Mechanical revolution counters .

UNIT 3 (10H)

Force, Torque, Shaft power: Standards & calibration; basic methods of force measurement; characteristics of elastic force transducer -Bonded strain gauge, differential transformer, Piezoelectric transducer, variable reluctance/FM-oscillator, digital systems.

UNIT 4 (6H)

Flow measurement: Local flow velocity, magnitude and direction. Flow Visualization. Velocity magnitude from pilot static tube. Velocity direction from yaw tube, dynamic wind vector indicator.Hot-film shock-tube velocity sensor. Laser Doppler anemo-meter; gross volume flow rate: calibration and standards .Constant-area, variable-pressure-drop meters (obstruction meters).Averaging pilot tubes..

UNIT 5 (6H)

Temperature measurement: Standards & calibration; thermal expansion methods-bimetallic thermometers, liquid-in-glass thermometers, pressure thermometers; RTD, thermistor and thermocouple (comparative study); digital thermometers. Radiation Methods - radiation fundamentals, radiation detectors: thermal and photon, monochromatic brightness radiation thermometers, two color radiation thermometers, black body tipped fiber optic radiation thermometer, Fluor optic temperature measurement, infrared imaging systems.

Text Book:

1. E. O. Doebelin and D.N. Manik,"Measurement systems application and designl, Tata McGraw Hill Publication.
2. Reference Book: 1. Arun K Ghosh, "Introduction to Transducers", PHI Publication. 2. Bela G. Liptak, "Process Measurement and Sensors

EIA-801	**Advance Programmable Logic Controller**	**0L:0T:2P**	**1 credits**	**2 Hrs/Week**

List of Experiments:

1. Characteristics of resistance transducer (i) Potentiometer (ii) Strain Gauge
2. Characteristics of LVDT.
3. Characteristics of capacitive transducer (i) Variable area (ii) Variable distance.
4. Characteristics of Thermistors
5. Characteristics of RTD.
6. Characteristics of Thermocouples

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7. Characteristics of LDR, Photo Diode, and Phototransistor: (i) Variable Illumination. (ii) Linear Displacement.
8. Measurement of resistance by Wheatstone bridge and measurement of bridge sensitivity.
9. Measurement of Capacitance by De'Sautys and Schering Bridge.
10. Measure of low resistance by Kelvin's double bridge.

Program Elective-V
EIA-802 (A)
Digital Control Systems

EIA-802(A)	Digital Control Systems	3L:0T:0P	3 credits	3Hrs/Week

Course Preamble:

1. To impart knowledge in the significance and features of design of discrete- time control system.
2. To review on the different transform techniques for digital control system design.
3. To impart knowledge on the techniques to analyse the system performance in the discrete-time domain.
4. To impart knowledge in discrete state space controller design.

Course Outcomes

1. Understand the various issues related to digital control systems such as effects of sampling and quantization, discrete time signals and models.
2. Represent a discrete-time control system using state space technique.
3. Design discrete control systems via pole placement.
4. Design observers for discrete control systems.
5. Analyse the stability of a discrete-time control system.

UNIT-I (10H)

Introduction to digital control Configuration of basic digital control system: discrete transfer function, discrete model sampled data systems using z- transform, transfer function model, signal analysis and dynamic response, zero-order hold equivalent, introduction to first-order-hold equivalent, transformationbetweensplane, z-plane and w-plane, z-Domain description of sampled continuous-time systems. Controllerdesign Controller Design using transform techniques: Root locus and frequency domain analysis compensator design.

UNIT-II (10H)

State space theory Control system analysis using state variable method: vector and matrices, statevariable representation, conversion of state variable to transfer function and vice versa, conversion oftransfer function to canonical state variable models, system realization, solution of state equations. Solutionof discrete-time state equation. Computational methods.

UNIT-III (10H)

State space design using state-space methods: controllability and observability, control law design, pole

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placement, pole placement design using computer aided control system design (CACSD).

UNIT-IV (6H)

Observer design: Full order and reduced order discrete observer design - Kalman filter and extended
Kalman filter design.

UNIT-V (6H)

Stability improvement by state feedback: Stability analysis and Jury's stability criterion, Lyapunovstability analysis to linear systems and discrete systems, Stability Improvement by state feedback.

Reference book

1. K. Ogata, Discrete Time Control Systems, Prentice Hall India, 2nd edition, 2005.
2. M. Gopal, Digital Control and state variable methods, Tata McGraw Hill, 3rd edition., 2008.

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Embedded systems

EIA-802 (B)

EIA-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.

   Sriram V Iyer, Pankaj Gupta, "Embedded Realtime Systems Programming", TMH

Open Core Elective - IV
EIA-803(A)
CAD of Digital Systems

EIA-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;

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GKS, PHIGS, CORE, IGES, DXF STEP DMIS AND VDI; ISO standard for exchange of Product Model data-STEP and major area application protocols.

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

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

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

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Engineering and Acoustics

EIA-803 (B)

EIA-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 sub disciplines, 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
EIA-804

EIA- 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

Astuden thasto undergo hisinductionprogramafterjoiningthe instituteandbeforethecommencementofclasses.Normalclassesoftheengineeringprogram shallbeginafterthestudentshaveundergoneathree-weeksinductionprogram.TheInduction programforstudentscomprisesofPhysicalactivities;Learninganartform;Literature&Cinema; SocialAwareness;Lectures&Visits;UniversalHumanValues;FamiliarizationtoDepartment/ 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 it; [f]

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

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(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	PO11	PO 12
		Engineering Knowledge	Problem Analysis	Design/ Development of Solution	Investigation	Modern 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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