WITH EFFECT FROM THE ACADEMIC YEAR 2013-2014

SCHEME OF INSTRUCTION & EXAMINATION
BE IV/IV (REGULAR)
ELECTRICAL & ELECTRONCS ENGINEERING

Semester II

Sl.No	Code No	Subject	Scheme of Instruction		Scheme of Examination		
			Periods per Week		Duration in Hours	Maximum Marks	
			L/T	D/P		Univ. Exam	Sessional
		THEORY					
1.	**EE 451**	Utilization	4	-	3	75	25
2.	**EE/ EC /LA/CE**	Elective – II	4	-	3	75	25
3.	**EE/CS/ EN**	Elective - III	4	-	3	75	25
4.	**ME 472**	Industrial Administration and Financial Management	4	-	3	75	25
		PRACTICALS					
1.	**EE 481**	Digital Signal Processing Lab	-	3	3	50	25
2.	**EE 482**	Project	-	6	Viva Voce	Grade*	50
3.	**EE 483**	Seminar	-	3	3	-	25
		Total	**16**	**12**	**18**	**350**	**200**

NOTE: * Excellent / Good / Satisfactory / Unsatisfactory

Elective II

EE 452: Electrical Power Distribution Engg.
EE 453: Advanced Control Systems
EE 454: Optimization Methods
EE 455: Renewable Energy Sources
EC 405: VLSI Design
LA 454: Intellectual Property Rights
CE 452: Disaster Management

Elective III

EE 456: Transducers
EE 457: Power System Reliability
EE 458: Electronic Instrumentation Systems
CS 413: Image Processing
CS 460: Internet Programming
CS 462: Soft Computing
EN 459: Technical Writing & Presentation Skills

EE 451

UTILIZATION

Instruction	:	4 periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 marks
Sessional	:	25 marks

UNIT I

Industrial Heating: Advantages and methods of electric heating.Description, operation and performance of resistance ovens. Design of elements. Core type furnace, Coreless type furnace, High frequency eddycurrent heating, Dielectric heating, Arc furnace. Electric Welding: Resistance welding, Welding transformer and its rating. Various types of Electric arc welding and Electric resistance welding.

UNIT II

Schematic Utilization and connection diagram for motor control. Two supply sources for 3-phase Induction motors. Direct reversing, remote control operation, Jogging operation of induction motor. Contactor control circuit. Pushbutton control stations. Over load relays, limit switches, Float switches. Interlocking methods for reversing control. Starting of Synchronous motor and motor protection.

UNIT III

Illumination: Introduction, nature and production of light, Sensitivity of the eye, Units of light. The inverse square law and cosine law, Solid angle, Lighting calculations, determination of M.S.C.P,Rousseau's construction, Discharge lamps, Sodium vapour lamps, Mercury vapour lamps,Flourescent lamps, Starting and power factor corrections, Stroboscopic effects, Neon signs, Application to factory lighting, Street lighting and Flood lighting.

UNIT IV

Electric Traction: System of Electric Traction, transmission of Drive, system of track electrification, Traction mechanics, Speed time curves,tractive effort, Power of Traction motor, Specific energy consumption, Mechanics of train movement, Coefficient of adhesion.

UNIT V

Traction Motors: Desirable characteristics, d.c series motors, a.c series motors, 3-phase induction motors, d.c motor series & parallel control, Shunt bridge transition, Energy saving. Batteries: Lead acid batteries, SMF batteries, Construction and maintenance, Charging and rating of batteries.

Suggested Reading:

1. Partab G,Art and Science of Utilization of Electric Power,Dhanpatrai & Sons,1990.
2. K.B.Raina & S.K.Bhattacharya, Electrical Design, Estimating and Costing, Wiley Eastern Ltd., 1991.
3. G.K.Dubey, Fundamentals of Electric Drives, Narosa Public house, Delhi, 2001.

EE 452

ELECTRICAL POWER DISTRIBUTION ENGINEERING
(Elective II)

Instruction	:	4 periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 marks
Sessional	:	25 marks

UNIT-I

Introduction, load characteristics, Diversified demand, Non-coincident demand, Coincidence factor, Contribution factor problems, Rate structure, Customer billing, Application of Distribution transformers, Types of Distribution transformers, single-phase transformer connections, Three- phase transformer connections, Auto-transformer, Booster transformer, phasor diagrams.

UNIT-II

Design of sub-transmission lines and distribution substations, Sub-station bus schemes, Rating of distribution substation, Service area with multiple feeders, Sub-station application curves, Percent voltage drop calculations.

UNIT-III

Design considerations of primary systems, Radial type, Loop type primary feeder, primary feeder loading, Uniformly distributed load application to a long line, Design consideration of secondary systems, secondary Banking, Secondary networks, Network transformers, General Total Annual cost(TAC), equation with and without constraints, Unbalanced loads and voltages.

UNIT-IV

Voltage drop and power loss calculations, 3-phase, Non 3-phase primary lines, Single phase two-wire laterals with ungrounded neutral, Single phase two wire ungrounded laterals. Application of capacitors to distribution systems, Effect of series and shunt capacitors, power factor correction, Economic justification for capacitors, Best capacitor location.

UNIT-V

Distributed Automation: Project planning, Communication, SCADA, Consumer Information Service (CIS), Automatic Meter Reading (AMR)

Suggested Reading:

1. Turan Gonen, Electric Power Distribution Engineering, McGraw Hill Book Co., International student edition, 1986.
2. A.S.Pabla, Electric Power Distribution, Tata McGraw Hill Publishing Ltd., 1997.
3. “Electrical power Systems for Industrial Plants”, Kamalesh das, Jaico Publishing House, 2007.

EE 453

ADVANCED CONTROL SYSTEMS
(Elective II & Common to EEE & IE)

Instruction	:	4 periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 marks
Sessional	:	25 marks

UNIT I

Review of state-space representation of continuous time systems and their solution, state models for discrete time systems described as difference Equations and transfer functions, Transfer function from State model, State-Transition matrix and solution of state equations for discrete time systems.

UNIT II

Controllability and Observability: Concepts of Controllability and Observability, Controllability tests for continuous time, discrete-time, time-invariant systems. Observability tests for continuous time, discrete-time, time-invariant systems. And Controllability and Observability modes in State. Jordan's canonical form, Controllable and Observable companion forms for single input single output Systems, pole placement by State feedback.

UNIT III

Nonlinear systems: Behavior of Nonlinear systems, jump resonance, Sub-harmonic oscillation, Limit cycles, common physical non-linearities, Singular points, phase plane-method, Construction of phase plane trajectories, Isoclines method, Delta method, Computation of time.

UNIT IV

Stability: Lyapunov`s stability criteria, Theorems, Direct method of Lyapunov For linear systems, Non-Linear Systems, Methods of constructing Lyapunov function, Krasovki`s Method, Variable gradient method.

UNIT V

Optimal Control: Formulation of optimal control problem, calculus of variations, Minimization of functionals. Formulation of variational calculus using Hamiltonian method.

Suggested Reading:

1. Gopal.M., Modern Control System Theory,Wiley Eastern Limited, 2004
2. Schulz D.G., Melsa J.L., State Functions of Linear Control Systems, McGrawHill.

EE 454

OPTIMIZATION METHODS
(Elective II & Common to EEE & IE)

Instruction	:	4 Periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

UNIT I

Introduction to classical optimization techniques: Statement of optimization problem, Objective function, Classification of optimization problems.

Classical optimization techniques: Single-variable & Multi-variable optimization without constraints. Multi-variable optimization with equality constraints. Lagrange multiplier method, Multi-variable optimization with inequality constraints, kuhn-Tucker conditions.

UNIT II

Linear programming: Standard form, Formulation of the LPP, Solution of simultaneous equations by Pivotal condensation, Graphical method, Simplex algorithm, Big M method, Two phase Simplex method, Duality principle, Dual Simplex method.

UNIT III

Non-Linear Programming:

One dimensional Search method: Fibonacci method, Golden Section method.

Direct Search method: Uni-variate Search and Pattern Search methods, Powell's method.

Unit IV

Gradient method: Steepest Descent, Conjugate Gradient and Quasi-Newton method, Fletcher-Reeves method of Conjugate gradients.

Unit V

Dynamic Programming: Multistage design process, Types, Principle of optimality, Computational procedure in Dynamic programming, Examples using Calculus method and Tabular method of solutions.

Suggested Reading:

1. S.S.Rao, Engineering Optimization Theory and Applications, New Age International, 3rd Edition, 1998.
2. Jasbir S.Arora, Introduction to Optimum Design, McGraw Hill International Edition, 1989.
3. S.D.Sharma, Operational Research, Kedarnath Ramnath & Co., 2004.

EE 455

RENEWABLE ENERGY SOURCES
(Elective II & Common to EEE & IE)

Instruction	:	4 periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 marks
Sessional	:	25 marks

UNIT I

Statistics on conventional energy sources and supply in developing countries. Definition, Concepts of NCES, Limitations of RES, Criteria for assessing the potential of NCES, Classification of NCES, Solar, Wind, Geothermal, Biomass, Ocean energy sources, Comparison of these energy sources.

UNIT II

Solar Energy: Definition, Energy available from Sun, Solar radiation data, solar energy conversion into heat, Flat plate and Concentrating collectors, Principle of natural and forced convection, Solar Engines: Stirling, Brayton engines, Photo voltaics: p-n junctions. Solar cells, PV systems, Standalone, Grid connected solar power satellite, Calculation of energy through photovoltaic power generation.

UNIT III

Wind Energy: Energy available from wind, General formula, Lift and drag. Basis of Wind energy conversion, Effect of density, Frequency variances, Angle of attack, Wind speed, Windmill rotors, Horizontal axis and Vertical axis rotors, Determination of torque coefficient, Induction type generators, Working principle of wind power plant.

UNIT IV

Nature of Geothermal sources: Definition and classification of resources, Utilization for electricity generation and direct heating, Wellhead power generating units. Basic features: Atmospheric exhaust and condensing, Exhaust types of conventional steam turbines. Pyrolysis of Biomass to produce solid, liquid and gaseous fuels. Biomass gasification, Constructional details of gasifier, Usage of biogas for chullas, various types of chullas for rural energy needs.

UNIT V

Wave, Tidal and OTEC energy, Difference between tidal and wave power generation. Principles of tidal and wave power generation, OTEC power plants, Operation of small open-cycle experimental facility, Design of 5 MW OTEC pro-commercial plant. Economics of OTEC, Environmental impacts of OTEC, Status of multiple product OTEC systems.

Suggested Reading:

1. Ashok Desai V, Non-Conventional Energy, Wiley Eastern Ltd, 1990
2. Mittal K.M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, 1997
3. Ramesh R, Kurnar K.U, Renewable Energy Technologies, Narosa Publishing House, New Delhi, 1997.

EC 405

VLSI DESIGN
(Elective II)

Instruction	:	4 periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 marks
Sessional	:	25 marks

LA 454

INTELLECTUAL PROPERTY RIGHTS
(Elective II)

Instruction	:	4 Periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

CE 452

DISASTER MANAGEMENT
(Elective II)

Instruction	:	4 Periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

EE 456

TRANSDUCERS
(Elective III)

Instruction	4 Periods per Week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT I

Basic methods of measurement, A generalized measurement system configuration, Basic characteristics of measuring devices: Accuracy, Precision, Error, Linearity, Hysteresis, Threshold, Repeatability, Reliability and maintainability, Span, Calibration.

UNIT II

Performance characteristics of Instrumentation system, Generalized Mathematical model of system, Transfer function representation, Sinusoidal transfer function: Zero. First and Second order instruments, Impulse, Step, Ramp and Frequency responses of above instruments, Specification and testing of Dynamic response.

UNIT III

Transducer: Definition, Electrical Transducers: Classification. Basic requirement of transducers, Variable resistance transducers, Construction and characteristics of Potentiometers, Application, Electrical Strain gauge: Theory of operation of Resistance Strain gauge, Gauge factor, Types of Electric Strain gauges: Wire gauges. Unbonded and bonded Strain gauges, Foil gauges, Semiconductor Strain gauges. Materials for Strain Gauges, Installation of Strain gauges, Strain measuring circuits, Related problems.

UNIT IV

Resistive type temperature measuring transducers: Platinum resistance transducer, Thermistor, Thermocouples: Types of thermocouples, Variable inductance and Capacitive transducers, Construction details of different types of inductance transducers: LVDT, Application, Induction Potentiometers. Types of Variable Capacitive Transducers, Applications.

UNIT V

Other Transducers: Piezo-Electric transducers, Characteristics, Hall effect sensors, Eddy current sensors, Digital Transducers, Fiber-optic sensors, Electro-optic transducers. Semiconductor sensors.

Suggested Reading:

1. C.S.Rangan. G.R.Sarma and V. S.V.Mani, Instrumentation Devices & Systems. Tata McGraw Hill Publications, 1983.

2. D.V.S.Murthy, Transducers and Instrumentation, Prentice Hall of India (P) Ltd., 1997.

EE 457

POWER SYSTEM RELIABILITY
(Elective III)

Instruction	:	4 Periods per week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

UNIT I

Elements of probability theory - Probability distributions : Random variables, density and distribution functions, Mathematical expectation- Mean and Variance, Binominal distribution, Poisson distribution, Normal distribution, Exponential distribution, Weibull distribution.

UNIT II

Definition of Reliability. Component reliability, Hazard rate, derivation of the reliability function in terms of the hazarad rate. Causes of failures, types of failures. Bath tub curve, MTTR, MTBF. Reliability logic diagrams for series, parallel, series-parallel, non-series-parallel configurations. Minimal cut-set and decomposition methods

UNIT III

Discrete Markov Chains: General modeling concepts, stochastic transitional probability matrix, time dependent probability evaluation and limiting state probability evaluation. Absorbing states. Continuous Markov Processes: Modeling concepts, State space diagrams, Stochastic Transitional Probability Matrix, Evaluating limiting state Probabilities. Reliability evaluation of repairable systems.

UNIT IV

Generating System Reliability Analysis: Generation system model – capacity outage probability tables – Recursive relation for capacitive model building – sequential addition method – unit removal – Evaluation of loss of load and energy indices. Frequency and Duration methods – Evaluation of equivalent transitional rates of identical and non-identical units – Evaluation of cumulative probability and cumulative frequency of non-identical generating units – 2-level daily load representation - merging generation and load models

UNIT V

Distribution System Reliability Analysis: Radial networks –Evaluation of Basic reliability indices, performance indices - load point and system reliability indices – customer oriented, loss and energy oriented indices. Parallel networks- inclusion of bus bar failures, scheduled maintenance – temporary and transient failures – weather effects – common mode failures –Evaluation of various indices.

Suggested Reading:

1. Reliability Evaluation of Engineering Systems", Roy Billinton and Ronald N Allan, Plenum Press.
2. Reliability Evaluation of Power Systems by Roy Billinton and Ronald N. Allan, Plenum press, New York and London (Second Edition), 1996.
3. Reliability Modeling in Electric Power Systems by J. Endrenyi, John Wiley and Sons, 1978. (First Edition)

EE 458

ELECTRONIC INSTRUMENTATION SYSTEMS
(Elective III)

Instruction	:	4 Periods per Week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

UNIT I

Analog and Digital Measuring Systems: Interfacing Active and Passive Transducers. Amplifiers: Instrumentation amplifiers (Fixed and Programmable gain types and its specifications), Isolation amplifiers (Types and its specifications).

Digital to Analog Converters: R-2R ladder and Inverted ladder DACs. Main DAC specifications. Analog to Digital Converter: R-2R Ladder and Inverted Ladder DACs, Main DAC specifications, Analog to Digital Converters: Parallel (or Flash) ADC successive approximation, ADC Microprocessor compatibility, Dual slope ADC, Principal specifications of an ADC.

UNIT II

Digital Voltmeters and Multimeters: Simple D.C Voltage attenuator, Current to Voltage converter, Resistance to Voltage Converter, Automatic ranging and Automatic zeroing RMS detector in DMM and RMS and True RMS, Digital Frequency and Time measurements, Frequency Measurements, frequency ratio Time Interval and Pulse width measurements, Scaling and Checking modes. Counting errors, Input signal conditioning, Trigger level, Hysteresis.

UNIT III

Signal Analysis: Wave Analyzers: Signal analysis and wave Analyzer: Type and Applications. Harmonic Distortion Analyzers: harmonic Distortion, heterodyne harmonic Analyzer or Wave meter, Tuned circuit, Fundamental Suppression. Spectrum Analysis: Block Diagram, Phase locked circuit for the local oscillator, Successive Limiting type of Log IF amplifier.

UNIT IV

Computer Controlled Test Systems: Testing an Audio amplifier, Radio Receiver instruments used in computer controlled instrumentation, Frequency counter, Synthesized signal generator interfaced with IEEE 488 Bus, Relay switched attenuator, IEEE 488 Electrical Interface.

UNIT V

Cathode ray Oscilloscope: Block Diagram, Basic Concepts, Vertical amplifier, Time Base, Trigger Delay line and their role in a CRO, Digital storage Oscilloscope, Magnetic Recorders, Digital Interface for Programmable Instrumentation, Description and Sample examples of Automatic Instrumentation.

Suggested Reading:

1 A.J.Owens, Digital Instrumentation, McGraw Hill International Edition, 1995
2 H.S.Kalsi, Electronic Instrumentation,Tata McGraw Hill
3 Helfrick and Copper, Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India,2002
4 Tran Tien Lang, Electronic Measuring Systems, John Wiley and Sons, 1987.

CS 412

IMAGE PROCESSING
(Elective III)

Instruction	:	4 Periods per Week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

CS 460

INTERNET PROGRAMMING
(Elective III)

Instruction	:	4 Periods per Week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

CS 462

SOFT COMPUTING
(Elective III)

Instruction	:	4 Periods per Week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

EN 459

TECHNICAL WRITING AND PRESENTATION SKILLS
(Elective III)

Instruction	:	4 Periods per Week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

ME 472

INDUSTRIAL ADMINISTRATION AND FINANCIAL MANAGEMENT

Instruction	:	4 Periods per Week
Duration of University Examination	:	3 Hours
University Examination	:	75 Marks
Sessional	:	25 Marks

EE 481

DSP LAB
(COMMON to EEE & IE)

Instruction	:	3 Periods per week
Duration of University Examination	:	3 Hours
University Examination	:	50 Marks
Sessional	:	25 Marks

1. Waveform generation –Square, Triangular and Trapezoidal.
2. Verification of Convolution Theorem-comparison of Circular and Linear Convolutions.
3. Computation of DFT,IDFT using Direct and FFT methods.
4. Verfication of Sampling Theorem
5. Design of Butterworth and Chebyshev of LP & HP filters.
6. Design of LPF using rectangular and Hamming,Kaiser Windows.
7. 16 bit Addition,Integer and fractional multiplication on 2407 DSP trainer kit.
8. Generation of sinewave and square wave using DSP trainer kit.
9. Response of Low pass and High pass filters using DSP trainer kit.
10. Linear convolution using DSP trainer kit.
11. PWM Generation on DSP trainer kit.
12. Key pad interfacing with DSP.
13. LED interfacing with DSP.
14. Stepper Motor Control using DSP.
15. DC Motor 4- quadrant speed control using DSP.
16. Three phase IM speed control using DSP.
17. Brushless DC Motor Control.

At least ten experiments should be completed in the semester

EE 482

PROJECT

Instruction	:	6 Periods per Week
Duration of University Examination	:	Viva
University Examination	:	Grade*
Sessional	:	50 Marks

'Solving the Real Life Problem' should be the focus of U.G.Project.Faculty members should prepare the Project brief well in advance, which should be made available to the students at the Departmental library. The Project may be classified as hardware, software, modeling and simulation. It should involve one or many elements of techniques such as analysis, design, synthesis etc.

The Department will appoint a Project co-coordinator who will coordinate the following:

- Grouping of students(a maximum of three in a group)
- Allotment of Projects and Project guides
- Project monitoring at regular intervals

All Project allotments are to be completed by 4th week of IV year 1st Semester so that students get sufficient time for completion of the Project.

All Projects will be monitored at least twice in a semester through students presentation.Sessional marks should be based on the grades/marks, awarded by a monitoring committee of faculty members and marks given by the supervisor.

Efforts should be made that some of the Projects are carried out in Industries with the help of Industry co-coordinators. Problems can also be invited from the Industries to be worked out through U.G.Project.

Common norms will be established for final documentation of the Project report by the respective Department.

*Excellent / Good / Satisfactory / Unsatisfactory.

Note: Three periods of contact load will be assigned to each Project guide.

EE 483

SEMINAR

Instructions	:	3 Periods per Week
Sessional	:	25 Marks

Oral presentation is an important aspect of Engineering education. The objective of the Seminar is to prepare the student for systematic & independent study of state of the art of topics in broad area of his/her specialization.

Topics of Seminar may be chosen by the students with the advice from faculty members. Students are to be exposed to following aspects of Seminar presentations

- Literature survey
- Organization of material
- Preparation of OHP Slides / PC presentation
- Technical writing

Each student is required to
1. Submit one page synopsis of the Seminar talk for display on notice board
2. Give a 20 minutes presentation through OHP, PC, Slide projector, followed by 10 Minutes of discussion
3. Submit a report on the Seminar topic with list of references and slides used.

Seminars are to be scheduled from 3 week to the last week of the Semester and any change in the schedule should be discouraged.
The sessional marks will be awarded to the students by at least two faculty members on the basis of an oral and a written presentation as well as involvement in the discussions.