Government College of Engineering, Karad
Second Year B. Tech (Electrical) Semester - III
EE301: Engineering Mathematics III

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Tutorial	1 Hrs/week	**CT2**	15
Total Credits:	5	**TA**	10
		ESE	60
		Total	100

Course Objectives:

1 To familiarize the students with concept and application of linear algebra.
2 To introduce the concept and application of vector calculus.
3 To familiarize the students applications of linear algebra and vector calculus.
Note: Scope of the syllabus as per textbook mentioned.

Course Contents

		Hours
Unit I	Linear Systems of Equations. Gauss Elimination, Linear Independence. Rank of a Matrix. Vector Space, Solutions of Linear Systems: Existence, Uniqueness, Inverse of a Matrix. Gauss–Jordan Elimination, Vector Spaces, Inner Product Spaces. Linear Transformations	**8**
Unit II	The Matrix Eigenvalue Problem, Determining Eigenvalues and Eigenvectors, Some Applications of Eigenvalue Problems, Symmetric, Skew-Symmetric, and Orthogonal Matrices, Eigenbases. Diagonalization. Quadratic Forms, Complex Matrices and Forms	**6**
Unit III	Numerical Linear Algebra : Linear Systems: Gauss Elimination, Linear Systems: LU-Factorization, Matrix Inversion, Linear Systems: Solution by Iteration, Linear Systems: Ill-Conditioning, Norms, Least Squares Method, Matrix Eigenvalue Problems: Introduction, Power Method for Eigenvalues, Tri diagonalization and QR-Factorization	**6**
Unit IV	Vectors in 2-Space and 3-Space, Inner Product (Dot Product), Vector Product (Cross Product), Vector and Scalar Functions and Their Fields. Vector Calculus: Derivatives	**6**

Unit V Curves, Arc Length, Curvature, Torsion, Calculus Review: Functions of Several Variables, Gradient of a Scalar Field. Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field **6**

Unit VI Path Independence of Line Integrals, Calculus Review: Double Integrals. Green's Theorem in the Plane, Surfaces for Surface Integrals, Surface Integrals, Triple Integrals. Divergence Theorem of Gauss, Further Applications of the Divergence Theorem, Stokes's Theorem **8**

Course Outcome:

1 Student will be able to solve linear system of equations and will be able to apply linear algebra concept to solve engineering problems.
2 Student will understand and apply fundamental problem of linear algebra i.e. eigen value problem.
3 Student will be able to apply vector calculus concept to the other engineering subject

Text Books:

1 Advanced Engineering Mathematics – Erwin Kreyszig; 10th Edition John Wiley 2011.

References:

1 Advanced Engg Mathematics – Peter O Neil ; 7th edition Cengage learning, 2010

Useful Links:

1 www.ocw.mit.edu(Courses by Prof. G. Strang)
2 www.nptel.iitm.ac.in (Video courses Engg. maths-2 and 3)

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	√	√	√	√					√			√		
CO2	√	√	√	√					√			√		
CO3	√	√	√	√	√	√			√			√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech (Electrical) Semester - III
EE302: Basic Circuit Theory

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	2Hrs/week	**CT2**	15
Total Credits:	5	**TA**	10
		ESE	60
		Total	100

Course Objectives:

To make students ready to

1 Analyze the D.C. Circuit
2 Apply network theorems to solve problems
3 Solve problem on coupled circuit
4 Solve problem on two port network

Course Contents

		Hours
Unit I	**Analysis of D.C. Circuit:** Types of Sources, Dependent and Independent sources, Source transformation, Star/delta Transformation, Ladder Network, Nodal and Mesh Analysis.	**6**
Unit II	**Network Theorems:** Superposition theorem, Millman's theorem, Norton's theorem, Thevenin's theorem, Maximum power transfer theorem, Reciprocity theorem, compensation theorem, Tellegen's Theorem.	**6**
Unit III	**Energy storage element sand coupled circuits:** Capacitor, Charging and discharging of Capacitor, Energy stored in capacitor, series/ parallel connections. Inductor, series / parallel connections, energy stored in Inductor. Initial conditions in network elements. Self and Mutual Inductance, Dot convention, Energy in coupled circuits, Ideal Transformer.	**6**
Unit IV	**First order circuits and Second order circuits:** Source free R-C Circuit, Source free R-L Circuit, Step Response of R-C Circuit, Step Response of R-L Circuit, Transient analysis. Initial condition of switched circuits,, unit step, ramp and impulse function. Response of R-C, R-L series circuit to these signals. Second order circuits: Source free Series RLC circuit, Step response of series R-L-C Circuit, General second order circuits	**6**

Unit V **Sinusoidal steady state analysis:** **6**

Properties of sinusoidal functions, Phasor, Impedance and admittance, Series and parallel resonance, Q factor, Selectivity and band width, A.C. network solution using Norton's theorem, Thevenin's theorem, Superposition theorem.

Unit VI **Two port networks:** **6**

Single port and two port networks, Driving point function, Transfer function of two port network. Z parameters, Y parameters, Hybrid parameters, ABCD parameters, Inter relation between parameters, parameters of interconnected two port networks.

Course Outcome:

1 Students will be able to analyze the D.C. circuits
2 Students will be able to learn the various network theorems
3 Students will be able to learn Energy storage elements and coupled circuits
4 Students will be able to learn two port networks

Text Books:

1 C. K. Alexander, M. N. O. Sadiku: Electrical Circuits, Second Edition Tata McGraw-Hill

References:

1 L.P. Huelsman, Basic circuit theory, Third edition, PHI Publication.
2 Van Valkenburg: Network Analysis, Third Edition, PHI publication.
3 William H. Hayt, Jack E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill international, fifth edition

Useful Links:

1 http://nptel.ac.in/courses/117107095
2 http://nptel.ac.in/courses/117103064

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	√	√	√		√						√	√		
CO2	√	√	√	√	√	√					√	√		
CO3	√	√	√	√	√						√	√		
CO4	√	√	√		√	√					√	√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech(Electrical) Semester - III
EE303: Industrial Management And Economics

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/Week	**CT1**	15
Laboratory	-	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60

Course Objectives:

Students will

1 Understand Industrial management concept
2 Understand importance of Financial Management in Industry
3 Understand importance of MIS.
4 Understand industrial Rules

Course Contents

		Hours
Unit I	**Introduction:** Definition of management, characteristics of management, functions of management, Principles of management, Administration and management, Nature of management, levels of management, managerial skills, managerial roles, Forms of Organizations. Forms of ownerships, Indian Electricity Rules, Industrial Safety Rules.	**6**
Unit II	**Strategic Management:** Military origins of strategy, Strategic Management Process. Preparing an Environmental Threat and Opportunity Profile (ETOP) – Industry Analysis. BCG Matrix – GE 9 Cell Model - Balanced Scorecard, Generic Competitive Strategies: Low cost, Differentiation, Focus.	**6**
Unit III	**Quality Management:** Definition of quality, continuous improvement definition of quality, types of quality, Quality Management Assistance Tools, quality circles, TQM, Kaizen, Five S (5S), Six sigma Quality Management Standards, The ISO 9001:2000 Quality Management System Standard- The ISO 14001:2004 Environmental Management System Standard- ISO 27001:2005 Information Security Management System.	**6**

Unit IV **Financial & Project Management:** **6**

Capital Structure, Fixed & working capital, Role of Securities and Exchange Board of India (SEBI), function of money market and capital Market, sources of finance. Introduction to capital budgeting, Techniques of capital budgeting. Break even analysis, Project Management, Project network analysis, CPM, PERT and Project crashing and resource Leveling.

Unit V **Human Resource Development:** **6**

Strategic importance HRM; objectives of HRM; challenges to HR professionals; role, Responsibilities and competencies of HR professionals; HR department operations; Human Resource Planning - objectives and process; human resource information system. Talent acquisition; recruitment and selection strategies, career planning and management, training and development, investment in training program, executive development.

Unit VI **Management Information Systems:** **6**

Concept of data and information, characteristics of information, types of information, Definition of MIS, Need, Purpose and Objectives, Contemporary Approaches to MIS, Components of an information system, Classification of information systems,

Course Outcomes:

1 Student will understand industrial Management concept.
2 Student will understand importance of Financial Management.
3 Student will understand MIS.
4 Student will be aware of Industrial Laws.

Text Books:

1 Dr. Jean Ann Larsen; Management Engineering, CRC Press, Second Edition
2 S.K. Basu, K.C. Sahu, B Rajiv; Industrial Management and organization, PHI, second Edition.

References:

1 P. Crowson; Economic for Managers, Macmillon, London, Fourth Edition
2 Prasana Chandra; Financial Management, TMH Pvt. Ltd, Third Edition

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		√	√		√	√	√				√	√		
CO2	√	√	√	√	√	√					√	√		
CO3	√			√	√						√	√		
CO4		√	√	√	√	√					√	√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech(Electrical) Semester - III
EE304: Signals and Systems

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Tutorials	1 Hrs/week	**CT2**	15
Total Credits	5	**TA**	10
		ESE	60

Course Objectives:

1. To introduce the student to the idea of signal and system analysis and characterization.
2. To provide a foundation to numerous other courses that deal with signal and system concepts directly or indirectly: viz: communication, control, instrumentation, and so on.
3. Formalize signals: energy and power signals, signal properties: periodicity, absolute integrability
4. To understand and apply various transforms like CTFT , DTFT , LAPLACE AND Z transforms

Course Contents

		Hours
Unit I	**Introduction to Signals and Systems:** Basic continuous-time signals, basic discrete-time signals, similarities and differences, transformation of the independent variable, properties of systems, linear time-invariant systems, convolution, impulse response. **Systems Represented by LCCDE:** Linear constant coefficient differential equations and their solutions, complementary function and particular integral, zero-input response and zero-state response.	**8**
Unit II	**Continuous-Time Fourier series:** Exponential Fourier series, computing the series coefficients, the Fourier spectrum, amplitude and phase spectra, effect of symmetry, convergence, properties of Fourier series.	**4**
Unit III	**Continuous-Time Fourier Transform:** From Fourier series to the Fourier transform, the Fourier integral and its inversion, conditions for the existence of the Fourier transform, transforms of some useful functions, properties of the Fourier transform, Fourier transform of periodic signals, frequency response of systems with rational transfer function.	**6**

Unit IV	**Laplace Transform:** Definition, region of convergence and its properties, Laplace transform properties, inverse Laplace transform through the method of partial fraction expansion, unilateral Laplace transform, application of the unilateral Laplace transform for solving RLC circuits with initial conditions, system response to a suddenly applied input.	**6**
Unit V	**Discrete-Time Fourier Transform (DTFT):** Complex exponentials as Eigen signals of LTI systems, DTFT definition, inversion formula, properties, relationship to continuous-time Fourier series (CTFS). Z-Transform: Generalized complex exponentials as eigen signals of LTI systems, z-transform definition, region of convergence (ROC), properties of ROC, properties of the z-transform, inverse z-transform methods (partial fraction expansion, power series method, contour integral approach), pole-zero plots, time-domain responses of simple pole-zero plots, ROC implications of causality and stability.	**8**
Unit VI	**State Variable Analysis:** Introduction to the notion of 'state', systematic procedure for determining state equations, solution of state equations using Laplace transform, definition of exp (**A**) where **A** is a matrix, time domain solution of state equations.	**4**

Course Outcomes:

1. Student will get introduced to the concept of signals and systems.
2. Student will understand other courses that deal with signal and system concepts directly or indirectly.
3. Student will be able to formalize signals such as energy and power signals and signal properties such as periodicity, absolute inerrability.
4. Student will understand and apply various transforms like CTFT, DTFT, LAPLACE and Z-Transforms.

Text Books:

1. **Signals and Systems** by A.V. Oppenheim and A.S. Willsky, second edition, 1996, Prentice Hall, Upper Saddle River, NJ.

References:

1. **Signal Processing and Linear Systems** by B.P. Lathi, second international edition, 2009, Oxford University Press.

Useful Links:

1. www.ocw.mit.edu(Courses by Prof. Oppenheim and Prof Freeman)
2. www.nptel.iitm.ac.in (Web course by Prof. Gadre and Video course by Prof. K. S. Venkatesh

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	√	√	√		√	√						√		
CO2	√		√	√	√	√						√		
CO3	√	√	√	√	√	√						√		
CO4	√	√	√	√	√							√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech (Electrical) Semester - III
EE305: Electronic Devices and Circuits

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Total	100

Course Objectives:

1. This course gives an overview of various semiconductor devices.
2. Students will understand operating principal and characteristics of various electronic devices.
3. At the end of this course, the students will be able to analyze and design amplifier circuits, oscillators and filter circuits employing BJT, FET devices also will able to design various op-amp application circuits

Course Contents

		Hours
Unit I	**Semiconductor devices and It's Application:** Introduction to different types of diode, characteristics and its applications Rectifiers: HWR, FWR, DBR, filters, Regulators (series and shunt).	**6**
Unit II	**Transistors:** Introduction to transistor and its characteristics, Transistor as a Switch and an amplifier, Operating point of a BJT, Bias stability, Thermal runaway, Use of a heat sink, BJT- CB, CE, CC configurations, Hybrid model, Determination of H parameters, limitations of H-parameters, FET biasing, MOSFET and its types, and biasing**,** Darlington connection.	**6**
Unit III	**Feedback amplifiers:** Feedback amplifiers, Barkhausen criterion, Stability, Distortion Voltage /current, series / shunt feedback amplifiers , Operation and analysis of RC phase shift, Wien bridge, Hartely, colpitts and crystal oscillators.	**6**
Unit IV	**Operational Amplifier:** Ideal op-amp characteristics, Non ideal characteristics, DC characteristics, Input bias current, Input offset voltage, Input offset current, Thermal drift, AC characteristics, Frequency response, Frequency compensation, Slew rate. Op-amp pin diagram. Configurations, Open loop and Feedback Modes, Inverting and Non Inverting Modes.	**6**

Unit V	**Applications of Operational Amplifier** **General applications:** Summing amplifier, Difference amplifier, Voltage follower, Differentiator, Integrator, Sample and hold Circuit, Multiplier- Instrumentation amplifier. **Precision Op-amps:** Definition- Applications- Precision rectifiers- Clipper, Clamper. **Waveform generators:** Comparator, Applications, Schmitt Trigger, Square, triangular, sine wave generators.	**6**
Unit VI	**Active Filters and special IC applications** Active filters: Active filters: low pass filter, high pass filter, band-pass filters, band reject filters, all pass filters. IC 555: Timer functional diagram, Monostable mode, A stable mode- Phase locked loops- operating principles, 565 PLL applications.	**6**

Course Outcome:

1. Student will able to study the fundamentals of Electronics (Transistor and operational amplifier)
2. Student will able to study and design the Diode applications and BJT configurations
3. Student will able to study and design biasing of FET and MOSFET and Power amplifiers
4. Student will able to study the fundamentals of op-amp 741and to design op-amp application circuits using Software and hardware

Text Books:

1. Electronic Devices and Circuit Theory by Robert L. Boylestad and Louis Nashelsky, PEARSON Education, 9th Edition, 2007.
2. Op-Amps and Linear Integrated Circuits by Ramakant A. Gayakwad, Prentice Hall of India, 4Th Edition,2000.

References:

1. Electronic Devices and Circuits by David A. Bell, OXFORD, 5th Edition, 2008.
2. Millman's Integrated Electronics by Jacob Millman, Halkias, Chetan D Parikh, McGraw Hill, 2nd Edition,2012.
3. Electronic Circuit Analysis and Design, Donald A. Neamen, Tata McGRAW Hill, 2nd Edition, 2002.

Useful Links:

1. http://www.iitg.ac.in/apvajpeyi/ph218.html
2. http://www.vidyarthiplus.in/2011/11/electronic-device-and-circuits-edc.html

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	√	√	√	√	√	√						√		
CO2	√	√	√	√	√	√						√		
CO3	√	√	√	√	√	√						√		
CO4	√	√	√	√	√	√						√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech(Electrical) Semester - III
EE306: Basic Circuit Theory Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	50
Total Credits	1	**ESE**	50
		Total	100

Course Objectives:

After completion of the course student should acquire the skill to

1 Perform experiment on the D.C. Circuit
2 Perform experiment on various network theorems
3 Perform experiment on step response of RC, RL circuit
4 Perform experiment on two port network

Course Contents

Experiment 1 Study of Ladder Network

Experiment 2 Verification of Star Delta transformation

Experiment 3 Verification of Superposition Theorem

Experiment 4 Verification of Maximum power transfer Theorem

Experiment 5 Verification of Thevenin's Theorem

Experiment 6 Verification of Norton's Theorem

Experiment 7 Study of step response of R-C , R-L and R-L-C Series circuit and verification using spice

Experiment 8 Calculations of Z, Y, ABCD and Hybrid parameters of two port network

Three programs of Network solution based on spice/ MATLAB / SCILAB software.

List of Submission:

Total number of Experiments - 8.

Course Outcomes(CO):

1 Students will be able to analyze the D.C. circuits
2 Students will be able to learn the various network theorem
3 Students will be able to find step response of RC, RL circuit
4 Students will be able to find various parameters of two port network

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	√	√	√		√						√	√		
CO2	√	√	√	√	√	√					√	√		
CO3	√	√	√	√	√						√	√		
CO4	√	√	√		√	√					√	√		

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	CA
Assembling									
Testing	√	√	√	√	√	√	√	√	
Observing	√	√	√	√	√	√	√	√	
Analysing	√	√	√	√	√	√	√	√	
Interpreting	√	√	√	√	√	√	√	√	
Designing	√	√	√	√	√	√	√	√	
Creating									
Deducing Conclusions	√	√	√	√	√	√	√	√	

Government College of Engineering Karad
Second Year B. Tech(Electrical) Semester - III
EE307: Electronic Devices and Circuits Lab

Laboratory Scheme		**Examination Scheme**	
Laboratory	2 Hrs/week	**CA**	50
Total Credits	1	**ESE**	50
		Total	100

Course Objectives:

1 This course gives an overview of various semiconductor devices.

2 At the end of this course, the students will be able to analyze and design amplifier circuits, oscillators and filter circuits employing BJT, FET devices also will able to design various op-amp application circuits .

Course Contents

Experiment 1 To study VI characteristics of PN junction diode and zener diode also find the voltage regulation of a given Zener diode.

Experiment 2 To study the use of Transistor as a switch and amplifier.

Experiment 3 Design and verify the operations of RC phase shift / Wien bridge / Hartely / Colpitts oscillators.

Experiment 4 Design and realize Non-Inverting amplifier using IC 741 Op-amp.

Experiment 5 Design and realize Inverting amplifier using IC 741 Op-amp

Experiment 6 To study the operation of buffer or voltage follower using Op-Amp.

Experiment 7 Design & verify the operations of op-amp as an adder and substractor circuit.

Experiment 8 Design and Verify the operation of a differentiator circuit and a integrator circuit using op-amp 741.

Experiment 9 Design and Verify the operation of a Schmitt Trigger circuit using op-amp 741.

Experiment 10 Design and Verify the operation of a Astable Multivibrator using IC 555.

Experiment 11 Design and Verify the operation of a MonostableMultivibrator using IC 555.

At least 10 experiments should be from above list. Softwares like Multisim, Pspice or appropriate software are extensively used for Lab Course.

List of Submission:
Minimum 8 Experiments from above list

Course Outcomes(CO):

1 Student will able to design the Diode applications and BJT configurations
2 Student will able to design Oscillator Circuits
3 Student will able to design op-amp application circuits using Software and hardware

Useful Link:

1 http://www.iitg.ac.in/apvajpeyi/ph218.html

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	√	√	√	√	√	√						√		
CO2	√	√	√	√	√	√						√		
CO3	√	√	√	√	√	√						√		

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	CA
Assembling											
Testing	√	√	√	√	√	√	√	√	√	√	
Observing	√	√	√	√	√	√	√	√	√	√	
Analyzing	√	√	√	√	√	√	√	√	√	√	
Interpreting	√	√	√	√	√	√	√	√	√	√	
Designing	√	√	√	√	√	√	√	√	√	√	
Creating											
Deducing Conclusions	√	√	√	√	√	√	√	√	√	√	

Government College of Engineering Karad
Second Year B. Tech.
CC 301: Environmental Studies

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Laboratory	-	**CT2**	15
Total Credits	0 (Audit)	**TA**	10
		ESE	60

Course Objectives:

1. To learn key concepts from Economic and Social analysis as they pertain to design and evaluation of environmental policies and institutions.
2. To learn concepts and methods from ecological and physical sciences and their applications in environmental problem solving.
3. To study the ethical, cross cultural and historical context of environmental issues and the links between human and natural systems.

Course Contents

		Hours
Unit I	**Natural Resources and Associated Problems:** Nature of Environmental Studies**:** Definition, scope and importance. Multidisciplinary nature of environmental studies Need for public awareness. a) Environment resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.	**8**
Unit II	**Ecosystems:** Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem :-	**6**

a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit III **Biodiversity and its conservation :** **6**

Introduction- Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega- diversity nation. Western Ghat as a biodiversity region. Hot-spot of biodiversity. Threats to biodiversity habitat loss, poaching of wildlife, man- wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit IV **Environmental Pollution:** **6**

Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of a individual in prevention of pollution.

Unit V **Social Issue and Environment:**

Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, Social Environment, sustainability nuclear accidents and holocaust. Wasteland exclamation. **8**
Consumerism and waste products.

Unit VI **Environmental Protection :** **8**

From Unsustainable to Sustainable development. Environmental Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Population Growth and Human Health, Human Rights, Environment Impact Assessment, Green Tribunals.

Field Work :

Visit to a local area to document environmental assets-river/Forest/Grassland/Hill/Mountain.
OR
Visit to a local polluted site - Urban / Rural / Industrial /Agricultural.
OR
Study of common plants, insects, birds.
OR

Study of simple ecosystems - ponds, river, hill slopes, *etc*.

Course Outcome:

1. Students will explain key concepts from Economic, and Social analysis as they pertain to design and evaluation of environmental policies and institutions.
2. Student will appreciate concepts and methods from ecological and physical sciences and their applications in environmental problem solving.
3. Student will appreciate the ethical, cross cultural and historical context of environmental issues and the links between human and natural systems.
4. Student will reflect critically about their roles and identities as citizens, consumers, environmental actors in a complex and interconnected world.

Text Books:

1. Text Book of Environmental Studies by Dr. P.D. Raut from Shivaji University. (Edition 2013)
2. Concise Environmental Studies by Dr. Madhukar Bachulkar, B.V. Kulkarni, Sharvil A. Shah. R.K. Publications. (Edition 2014)
3. Miller T.G. Jr., Environmental Science. Wadsworth Publications Co. (Edition 2007)
4. Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science. (Edition 2012)
5. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno- Science Publications. (Edition 2010)

References:

1. Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner. (Edition 2011)
2. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (Edition 2008)
3. Cunningham, W.P. Cooper, T.H.Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p (Edition 2010)
4. De A.K., Environmental Chemistry, Wiley Wastern Ltd. (Edition 2014)
5. Down to Earth , Centre for Science and Environment , New Delhi. (Edition 2011)
6. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II, Environmental Media. (Edition 2014)
7. The Water (Prevention and Control of Pollution) Act, 1974
8. The Air (Prevention and Control of Pollution) Act, 1981
9. The Environment (Protection) Act, 1986
10. Hazardous Wastes (Management and Handling) Rules, 1989
11. The Forest (Conservation) Act, 1980
12. The Wildlife Protection Act, 1972
13. The National Environment Tribunal Act, 1995

14 The Noise Pollution Act, 1974

Mapping of CO and PO

	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		√	√	√	√	√	√		√	√	√	√		
CO2	√		√	√	√	√	√		√		√			
CO3		√		√	√	√	√		√	√	√	√		
CO4	√	√	√	√	√	√	√			√		√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech (Electrical) Semester - IV
EE401: Engineering Mathematics IV

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorials	1	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Course Objectives:

1. To familiarizes students with complex analysis
2. To introduce students, the concept and application of Probability theory.
3. To introduce to student to concept and application of random variable
4. To satisfy program specific criteria of IEEE.

Note for Instructor: Scope of the syllabus as per textbook mentioned.

Course Contents

		Hours
Unit I	Complex numbers and their geometric representation, polar form powers and roots, derivative and analytic function, Cauchy-Riemann equations, exponential trigonometric and hyperbolic functions, Euler's formula. Logarithm general power and principal value.	**8**
Unit II	Line integrals in the complex plane Cauchy's integral theorem, Cauchy's integral formula derivatives of analytic function. Sequences series and convergence tests. Power series Taylor McLaurin series Laurents series, residue integration method conformal mapping	**8**
Unit III	**Introduction to Probability:** Sets, Events, Axioms of Probability, Conditional Probability and Independence, Bayes Theorem and MAP Decision Rule **Random Variables:** Definitions, Cumulative Distribution Functions, mass and density functions, joint and conditional distributions, Functions of Random Variables	**6**
Unit IV	**Expectations:** Mean, Variance, Moments, Correlation, Chebychev and Schwarz Inequalities, Moment-generating and Characteristic Functions, Chernoff Bounds, Conditional Expectations	**6**
Unit V	**Random Vectors:** Jointly Gaussian random variables, Covariance Matrices, Linear Transformations, Diagonalization of Covariance Matrice	**6**

Unit VI **Random Sequences:** Sequences of independent random variables, correlation functions, wide-sense stationary sequences, LTI filtering of sequences **6**

Course Outcomes:

1 Student will be able to solve complex analysis for engineering problem.
2 Student will be able to understand and apply Probability theory to solve engineering problem.
3 Student will be able to understand and apply random variable to solve engineering problem.

Text Books:

1 Advanced Engineering Mathematics – Erwin Kreyszig; 10th Edition John Wiley 2011

References:

1 Advanced Engg Mathematics – Peter O Neil; 7th edition Cengage learning 2010
2 Stark and Woods: Probability and Random Processes with Applications to Signal Processing, 3rd Edition, 2002, Pearson Education

Useful Links:

1 www.ocw.mit.edu(Courses by Prof. G. Strang)

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1	√	√	√	√	√							√		
CO 2	√	√	√	√	√							√		
CO 3	√	√	√	√	√							√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech (Electrical) Semester - IV
EE402: Electrical Measurements and Instrumentations

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorials	-	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60

Course Objectives:

1 To Discuss the basic concepts of measurements and different measuring instruments.
2 To Identify errors in the instruments.
3 To Solve the numerical on range extension of meters and different circuit parameters.
4 To Demonstrate digital and advance instruments.
5 To Examine theoretically the performance of CT's and PT's.
6 To Discuss the contemporary issues in Instrumentation and Measurements.

Course Contents

		Hours
Unit I	**Fundamentals of Measurement:** Performance characteristics (static, dynamic), Types of Error, Type of Uncertainties, Various Standards, Electrical standards. Absolute and secondary instruments, types of Secondary Instruments: indicating, integrating, and recording, analog and digital Ammeter and Voltmeter, Moving Iron (MI), Dynamometer type instruments. Range Extension: Multi range ammeter and voltmeter (Analog and Digital), shunts, multipliers, DMM.	**6**
Unit II	**Measurement of Resistance, Inductance and Capacitance:** Types of AC and DC bridges. Measurement of low, medium and high resistance.	**6**
Unit III	**Measurement of Power and Energy:** Active and reactive power measurement in three phase system for balanced and unbalanced load using two wattmeter method and one wattmeter method. Calibration of energy meter. Digital Energy Meter, block diagram and operation of electronic energy meter.	**6**

Unit IV **Oscilloscope and Transducers:** **6**

Block diagram and working of CRO and Digital Storage Oscilloscopes. Transducers: Introduction, Selection of Transducer, Electrical transducer, Resistive transducer, Resistance thermometer, inductive transducer, Pressure inductive transducer, capacitive transducer(pressure), High pressure measurement using electric methods, low pressure measurement by McLeod gauge and Pirani gauge, Piezo-electric and photo electric transducer, temperature transducers.

Unit V **Level and Displacement measurement:** **6**

Introduction and importance of level measurement, level measurement methods, LVDT and RVDT – construction, working, application, null voltage, specifications, advantages, disadvantages, effect of frequency on performance. Strain Gauge: Introduction, definition of strain, types of strain gauge.

Unit VI **Recent developments in Instrumentation and Measurements:** **6**

Introduction to PLC, Wave Analyzers and Harmonic Distortion, Power Analyzer, Torque measurement, Fiber Optic Transducers, Micro sensors, Smart Sensors, Virtual Instrumentation. Instrument Transformers: Construction, connection of CT and PT in the circuit. Hall effect transducers.

Course Outcomes:

1. Student will be able to analyze errors in measuring instruments and statistics of it.
2. Student will be able to work on the bridges, instruments and equipments.
3. Student will be able to apply modern techniques of instrumentation and measurements.

Text Books:

1. Instrumentation: Measurement and Analysis, Nakra and Chaudhari, Tata McGraw Hill, New Delhi.
2. Electronic Instrumentation, 3rded, H. S. Kalsi, McGraw Hill Eduction.

References:

1. Electrical Measurement and Measuring Instruments, Fifth edition, by E. W. Golding and Widdies, A. H. Wheeler and Co. Ltd.
2. A Course in Electrical and Electronic measurements and Instrumentation – by A. K. Sawhney, Dhanpat Rai and Sons.

Useful Links:

1 http://www.journals.elsevier.com/flow-measurement-and-instrumentation/
2 http://www.irsst.qc.ca/en/publications-and-tools/useful-links/category/c/19/n/measurement-and-instrumentation

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	√	√	√		√						√			
CO 2	√	√	√		√						√			
CO 3	√	√	√		√						√			

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech (Electrical) Semester - IV
EE403: Electrical Machines-I

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorials	-	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60
		Total	100

Course Objectives:

1. To expose the student to the concept of DC machines, single phase transformer, three phase transformer and their industrial application.
2. To set a firm and solid foundation in Electrical machine with strong analytical skills and conceptual understanding of theorems and analysis methods in D.C. Machines and A.C. Machines.
3. To make students aware of protective system with industry oriented learning.

Course Contents

		Hours
Unit I	**Electromechanical Energy Conversion Principle:** Singly Excited Magnetic System and Doubly Excited Magnetic system. Physical concept of torque production; Electromagnetic torque and Reluctance torque. Concept of General terms pertaining to Rotating Machines: Electrical and Mechanical degree, Pole pitch, Coil, Generated EMF in full pitched coil, Generated EMF in a short pitched coil, EMF polygon, Distribution factor, Pitch factor. MMF produced by Distributed Windings, MMF of a coil, MMF of single phase distributed Winding, MMF waveform of Commutator machines	**6**
Unit II	**Batteries:** Primary cell, Secondary cell, differences, Atomic Battery, Earth Battery, electric vehicle Battery, redox flow battery, Nickel Zinc Battery, silicon air battery, nickel-hydrogen battery, lithium air Battery, their types, principal, construction, working, use and application.	**6**
Unit III	**D.C. machines constructions, operation:** Types, characteristics and applications of D.C. generators. Parallel operation of D.C. generators, Construction of D.C. machines, commutator and brush arrangement, EMF equation, torque equation, armature winding and its types, armature reaction: Demagnetization and cross magnetization ampere turns, compensating winding, methods to minimize the effect of armature reaction, permanent magnet D.C. motor Separately and self: excited motors.	**6**

Unit IV	**D.C. machines characteristics and testing:** Commutation with improvement Methods, concept of Motoring, types of motor, Concept of back emf, characteristics of D.C. motors, Method of speed controls, concept of braking of DC separately excited motors (Rheostatic, Regenerative and plugging). Parallel and series operation of motor, starters, Design of grading of resistance of starters, various tests to find Losses, efficiency. Applications of Motor. Introduction to Brushless DC motors	**6**
Unit V	**Transformer-single/Three phase:** Transformer construction, Transformer reactance's and equivalent circuits, Effect of load on power factor, Phasor diagrams, Testing of Transformer, Parallel Operation,3-Phase transformer**:** Determination of polarity and connections, heat run test, Sumpner's test, Equivalent delta. Effect of unbalanced loading, Harmonics and its suppression, Choice of Transformer connections, Phase convrsion, Scott connection, On: Off load tap changing Transformers.	**6**
Unit VI	**Special transformers:** Potential transformer, Current transformer, Pulse transformer, Audio frequency transformer, Grounding transformer, welding transforms, Autotransformer:- Autotransformer Working, Advantages of Autotransformer over Two winding Transformer, Isolation Transformer and its applications, High Frequency Transformer.	**6**

Course Outcomes:

1 Student will be able to understand concepts of DC machines.
2 Student will be able to acquired knowledge of DC machine and its testing's.
3 Student will be able to understand transformer fundamentals and various test preform on it.
4 Student will be understanding application of DC machines and special transformers.

Text Books:

1 Alexander S Langsdorf, Theory of Alternating Current Machinery, 2nd edition, Tata Mc Graw-Hill, 2001
2 Kothari D.P, Nagrath I.J., Electric Machines, TMH Publications, 4th Edition.
3 Dr. Bimbhra P.S., "Electric Machinery", Khanna Publisher, Fifth Edition

References:

1 M.G. Say and E. O. Taylor, Alternating current machines, Pitman publication
2 Irving L Koskow, Electric Machinery and transformer, 2nd Edition, Prentice Hall India

Useful Links:

1 nptel.ac.in/courses/108105017/
2 www.nptelvideos.in/2012/11/electrical-machines-i.html by D Kashta, IIT Khargpur

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	√	√	√	√	√	√	√					√		
CO 2	√	√	√	√	√	√			√	√	√	√		
CO 3	√	√	√	√	√	√			√	√	√	√		
CO 4	√	√	√		√	√			√			√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	2	4	-	8
Understand	4	4	4	16
Apply	4	2	2	12
Analyze	2	2	2	8
Evaluate	3	2	2	12
Create	-	1	-	4
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech(Electrical) Semester - IV
EE404: Digital Electronics

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60
		TOTAL	100

Course Objectives:

1. To introduce number systems, codes, basic postulates of Boolean algebra and shows the correlation between Boolean expressions and also to introduce the methods for simplifying Boolean expressions.
2. To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits.
3. To introduce the concept of memories, programmable logic devices and digital ICs

Course Contents

		Hours
Unit I	**Fundamentals of Digital Systems:** Various types of gates and its operation, Boolean algebra, examples of IC gates, number systems, binary arithmetic, one's and two's complement arithmetic, codes, error detecting and correcting codes.	**6**
Unit II	**Digital logic families and Simplification of Boolean functions:** Digital logic families, characteristics of digital ICs, interfacing CMOS and TTL, Tri-state logic. Simplification of Boolean function: The K-map method- 2, 3 and 4 variable K-maps. Product of sums and sum of products simplification, Don't care conditions.	**6**
Unit III	**Combinational logic Design:** Adders, Substractor, Binary parallel adder, 4-Bit parallel substractor, serial adder, BCD adder, Excess-3 adder, Code converters, Comparators, Encoders, Decoder, Multiplexers, Demultiplexers.	**6**
Unit IV	**Sequential Circuits and Systems:** Types of Flip flop, Edge Triggered flip flop, applications of flip-flops, Registers, shift registers and its applications, serial to parallel converter, parallel to serial converter, Counters, Counter design using flip-flops, asynchronous sequential circuits, ALU.	**6**

Unit V **A/D and D/A Converters:** **6**

Digital to analog converters, Specification for D/A converter, Example of D/A converter IC, sample and hold circuit.
Analog to digital converters, quantization and encoding, A/D converter using voltage to frequency and voltage to time conversion, Specification for A/D converter, Example of A/D converter IC.

Unit VI **Memories and Programmable Logic Devices (PLD's):** **6**

Memory organization and operation, expanding memory size, classification and characteristics of memories, commonly used memory chips, ROM as a PLD, Programmable Logic Array, Programmable Array Logic, Complex Programmable logic Devices (CPLDs), Field Programmable Gate array (FPGA).

Course Outcome:

1. Student will be able to represent numerical values in various number systems and perform number conversions between different number systems.
2. Student will be able to represent numerical values in various number systems and perform number conversions between different number systems.
3. Students will be able to analyze and design A/D Converter and D/A Converter.
4. Students will gain knowledge of the nomenclature and technology in the area of memory devices: ROM, RAM, PROM, PLD, FPGA etc.

Text Books:

1. R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill, Fourth Edition, 2011.
2. Anand Kumar, "Fundamentals of Digital Circuits", Prentice-Hall India, Second Edition 2013.

References:

1. Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and Applications". Tata McGraw Hill, Seventh Edition, 2012.
2. Morris Mano, Digital Design, Prentice Hall of India, 4th Edition, 2008.

Useful Links:

1. http://web.iitd.ac.in/~shouri/eel201/lectures.php
2. http://www.daenotes.com/electronics/digital-electronics
3. http://www.satishkashyap.com/2012/02/digital-electronic-circuits-by-shouri.html

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	√	√	√	√	√	√	√					√		
CO 2	√	√	√	√	√							√		
CO 3	√	√	√	√	√							√		
CO 4	√	√	√	√	√						√	√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering, Karad
B. Tech. Second Year(Electrical) Semester - IV
EE405: Power System – I

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60
		Total	100

Course Outcome:

1. Students will able to understand generation of electric power and basic principles of power system
2. Students will able to understand transmission line parameters and calculations
3. Students will able to understand economic aspects of power generation.

Course Contents

		Hours
Unit I	**Generation of Electric Energy and Power System Components:** Study of Hydro power plant, Thermal power plant and Nuclear power plant, Diesel power plant, Single line diagram, Basic structure of an AC power system. Introduction to Power system elements.	**6**
Unit II	**Basic Concept:** Introduction, Power in single-phase AC circuits ,Complex power ,Power Triangle, Direction of power flow ,Voltage and Current in balanced three-phase circuits ,Power in balanced three-phase circuits ,Per-unit quantities , Changing the base of Per-unit quantities ,Node equations, Single-line diagram, Impedance and Reactance diagram	**6**
Unit III	**Series Impedance of Transmission Lines:** Types of Conductors, Resistance, Inductance of conductor due to internal flux, Flux linkages between two points external to an isolated conductor, Inductance of a single phase two wire line , Flux linkages of one conductor in a group, Inductance of a three phase lines with equilateral spacing, Inductance of a three phase lines with Unsymmetrical spacing.	**6**
Unit IV	**Capacitance of Transmission Lines:** Electric field of a long straight conductor , potential difference between two points due to a charge, Capacitance of two wire line, Capacitance of a three phase line with equilateral spacing , Capacitance of a three phase line with unsymmetrical spacing, Effect of earth on the capacitance of three phase transmission lines.	**6**

Unit V **Current and Voltage relations of Transmission Line:** **6**

Representation of Lines, short Transmission line, medium –length line, long transmission line: Solution of differential equations, long transmission line: Interpretation of the equation, Power flow through a transmission lines, Transmission-line Transients.

Unit VI **Economic Aspects of Power Generation:** **6**

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, Utilization and plant use factors. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method. Tariff Methods: Flat Rate, Block-Rate, two-part, three –part and power factor tariff methods

Text Books:

1 Grainger John J and W D Stevenson Jr., Power System Analysis, McGraw Hill, 1994, latest edition

2 I. J. Nagrath, D. P. Kothari, Modern Power System Analysis, 3rd Edition, Tata McGraw Hill Publishing Co. Ltd., 2003

References:

1 J. D. Glover and M. Sarma, Power System Analysis and Design, 3rd Edition, Brooks/ Cole Publishing, 2002

2 Weedy B M, Cory B J, John, Electric Power Systems, Wiley Publication

3 Hadi Sadat, Power System Analysis, McGraw Hill International, fiftht edition

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	√	√	√	√	√	√						√			
CO2	√	√	√	√	√							√			
CO3	√	√	√	√	√	√						√			

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	-	-	5	20
Understand	5	5	5	10
Apply	5	5	-	10
Analyze	-	-	-	10
Evaluate	5	5	-	10
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech(Electrical) Semester - IV
EE406: Electrical Measurements and Instrumentations Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25
		Total	50

Course Objectives:

After completion of the course student should acquire the skill to

1. Perform experiment on the power measurement
2. Perform experiment on measurement of R, L, and C parameter
3. Perform experiment on various transducers
4. Perform experiment on power analyzer

Course Contents

Experiment 1 Study of various analog measuring instruments and demonstration of working parts of various types of meter by opening the instrument and explanation of symbols and notations used on instruments.

Experiment 2 Measurement of Active and reactive power in three phase circuit using two wattmeter method (Balanced and Unbalanced Loads).

Experiment 3 Calibration of Single phase Induction type energy meter at different power factors. (Or Electronic Energy Meter).

Experiment 4 Measurement of Reactive Power by one wattmeter with all possible connections of current coil and pressure coil.

Experiment 5 Measurement of resistance by ammeter voltmeter method.

Experiment 6 Measurement of voltage, current, time period and frequency using CRO and frequency measurement by lissajous pattern.

Experiment 7 Measurement of resistance using appropriate bridge.

Experiment 8 Measurement of Inductance using appropriate bridge.

Experiment 9 Measurement of Capacitance using appropriate bridge.

Experiment 10 Displacement measurement by LVDT.

Experiment 11 Electrical methods for measurement of liquid level.

Experiment 12 Measurement of strain produced by a force on the wires using Strain Gauge.

Experiment 13 Study of Digital Meters and Oscilloscopes.

Experiment 14 Study of Power Analyzers.

Experiment 15 Study of C.T. and P.T.

List of Submission:

Total number of Experiments - 8.

Course Outcomes(CO):

1 Students will be able to understand power measurement.
2 Students will be able to understand measurement of R, L, and C parameter
3 Students will be able to learn various transducers.

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	√	√	√		√			√	√		√			
CO 2	√	√	√		√			√	√		√			
CO 3	√	√	√		√			√	√		√			

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	CA
Assembling									
Testing	√	√	√	√	√	√	√	√	
Observing	√	√	√	√	√	√	√	√	
Analysing	√	√	√	√	√	√	√	√	
Interpreting	√	√	√	√	√	√	√	√	
Designing	√	√	√	√	√	√	√	√	
Creating									
Deducing Conclusions	√	√	√	√	√	√	√	√	

Government College of Engineering Karad
Second Year B. Tech(Electrical) Semester - III
EE407: Electrical Machines Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25
		Total	50

Course Objectives:

1. To make students aware of dc concepts of DC machine
2. To make students aware of solving numerical related DC machines circuits/designs
3. To make students aware of calculation of regulation and efficiency of single and three phase transformer
4. To make students understand working and applications of various DC machines, single and three phase transformer
5. Student will be aware of various electrical safety measures

Course Contents

Experiment 1	O.C.C. of Separately Excited DC generator
Experiment 2	Load test on DC Shunt Motor
Experiment 3	Load test on DC Series Motor
Experiment 4	Load test on DC Compound Motor
Experiment 5	Speed Control of DC Shunt Motor(Armature and Field Control)
Experiment 6	Swinburne's Test
Experiment 7	Hopkinson's Test
Experiment 8	Field's Test
Experiment 9	To Find equivalent circuit parameter from O.C and S.C Test by single phase transformer
Experiment 10	Sumpner's Test on single phase transformer
Experiment 11	Load test on single phase transformer and three phase transformer
Experiment 12	Parallel operation of single phase transformer

Experiment 13 Scott connection

Experiment 14 Equivalent Delta test or Heat run Test for three phase transformer

List of Submission:

Minimum 8 experiments to be performed and evaluated in journal

Course Outcomes(CO):

1 Student will be able to analyze and perform for understanding various tests on DC machine.
2 Students will be able to analyze and understanding the parameters calculation from performing experiment of DC machines.
3 Student will able to understand various tests on transformer.

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	√	√	√	√	√	√	√					√		
CO 2	√	√	√	√	√	√			√	√	√	√		
CO 3	√	√	√	√	√	√			√	√	√	√		

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	Exp 13	Exp 14	CA
Assembling				√	√	√	√	√	√			√		√	
Testing	√	√	√		√	√	√	√	√	√	√	√	√	√	
Observing	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Analyzing	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Interpreting		√	√	√	√	√	√	√	√		√			√	
Designing		√	√			√	√		√		√	√			
Creating				√	√	√	√	√	√		√	√			
Deducing conclusions		√	√	√	√	√	√	√	√	√	√	√	√	√	

Government College of Engineering Karad
Second Year B. Tech (Electrical) Semester - IV
EE408: Digital Electronics Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25
		Total	50

Course Objectives:

To impart the concepts of digital electronics practically and train students with all the equipments which will help in improving the basic knowledge.

Course Contents

Experiment 1 To study various Logic Gates.

Experiment 2 To Study and Verify Boolean Laws and D Morgan's theorem.

Experiment 3 To study and verify the operation of Half adder and Full Adder.

Experiment 4 To study and verify the operation of Half Substractor and Full Substractor.

Experiment 5 To Study and Verify operation of Multiplexer and Demultiplexer.

Experiment 6 To Study and Verify operation of Magnitude Comparator.

Experiment 7 To Study and Verify operation of Binary to Gray and Gray to Binary Converter.

Experiment 8 To Study and Verify operation of S-R, J-K, T, D type Flip Flop.

Experiment 9 Study of Counters using IC's: Up down, Decade, Synchronous, Binary, BCD counter.

Experiment 10 Study of Ring Counter, Johnson Counter etc.

Experiment 11 Study of D/A and A/D converters (Any one of each class): R-2R ladder, weighted register method. Successive Approximation, Voltage to frequency conversion.

Experiment 12 Design of Decoder driver to drive 7 segment LED display.

Experiment 13 Interfacing of CMOS logic family with TTL logic family.

At least 10 experiments should be from above list. Softwares like Xilinx, Labview or appropriate software are extensively used for Lab Course.

List of Submission:

Total number of Experiments: 10.

Course Outcomes(CO):

1. Students will be able to analyze and design Combinational circuits and Sequential Circuits.
2. Students will be able to analyze and design A/D Converter and D/A Converter.

Useful Links:

1. http://web.iitd.ac.in/~shouri/eep201/experiments.php
2. http://dannicula.ro/books/edEngLab/

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	√	√	√	√	√						√	√		
CO 2	√	√	√	√	√						√	√		

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	CA
Assembling											
Testing	√	√	√	√	√	√	√	√	√	√	
Observing	√	√	√	√	√	√	√	√	√	√	
Analyzing	√	√	√	√	√	√	√	√	√	√	
Interpreting	√	√	√	√	√	√	√	√	√	√	
Designing	√	√	√	√	√	√	√	√	√	√	
Creating											
Deducing Conclusions	√	√	√	√	√	√	√	√	√	√	

Government College of Engineering Karad
B. Tech. Second Year(Electrical) Semester - IV
EE409: Power System – I Lab

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CA**	50
Total Credits	1	**Total**	50

Course Outcome:

1. Student will able to calculate power system parameter and performance of Transmission line
2. Students will able to calculate various economic factors of power generation
3. Student will be able to understand various aspects of substation.

Course Contents

Term work should consist of following:

8 experiments using available softwares from following list:

Experiment 1 To find various parameters of AC circuits

Experiment 2 To calculate inductance of overhead transmission line

Experiment 3 To calculate capacitance of overhead transmission line.

Experiment 4 To find the parameters of the short transmission line.

Experiment 5 To find the parameters of the medium transmission line.

Experiment 6 To find the parameters of the long transmission line.

Experiment 7 To calculate various economic factors of power generation

Experiment 8 Technical report on substation visit

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	√	√	√	√	√							√		
CO 2	√	√	√	√	√	√						√		
CO 3	√	√	√		√	√	√		√		√	√		

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	CA
Assembling											
Testing											
Observing/ implementing	√	√	√	√	√	√	√	√	√	√	
Analyzing	√	√	√	√	√	√	√	√	√	√	
Interpreting	√	√	√	√	√	√	√	√	√	√	
Designing	√	√	√	√	√	√	√	√	√	√	
Creating	√	√	√	√	√	√	√	√	√	√	
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	

Government College of Engineering Karad.
Second Year B. Tech(Electrical) Semester - IV
EE410: Scilab Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2Hrs/Week	**CA**	50
Total Credits	1	**Total**	50

Course Objectives

1. Student will be able to use the SCILAB Software.
2. Student will be able to do vector, matrices and polynomial calculations in SCILAB.
3. Student will be able to develop programme and Simulink Model in SCILAB.

Course Contents

		Hours
Unit I	**Introduction to SCILAB Language**: Introductions, Scilab environment, help feature, types of files, Platform, Search path, Some useful Scilab commands. Character set, Constant, Data Types, Scilab syntax, Data-Type Related functions, Overloading.	**4**
Unit II	**Matrices:** Matrices of Numbers, Sparse Matrices of Numbers, Matrices of Polynomials, Boolean Matrices, Sparse Boolean Matrices, String Matrices, Lists, Typed Lists, Functions of Rational Matrices.	**4**
Unit III	**Graphics:** The Media, Global plot parameters, Two and Three dimensional plotting, Basic syntax, specialized plotting functions and tools, Captions and Presentation, Plotting Geometric Figures, Mixing 2-D and 3-D Graphics.	**4**
Unit IV	**Linear Algebra and Polynomials:** QR Factorization, Singular value Decomposition, Schur Form and Eigenvectors, Fine Structure, Subspaces, Polynomial and Rational Function Manipulation, General purpose functions, Matrix Pencils	**4**
Unit V	**Advance Programming:** Functions and Primitives, The Call Function, Building Interface Programs, Accessing "Global" Variables within a Wrapper, Intersci, Dynamic Linking, Static Linking	**4**

Unit VI **SCICOS Basics:** **4**

Hybrid System Formalism, Getting Started, Constructing a Simple Model, Model simulation, Symbolic Parameters and "Context", use of super block, basic concepts, basic blocks, inheritance and time dependence, synchronization, Block Construction

List of Experiments:

Experiments 1 Experiments on the character set and Data type.

Experiments 2 Experiments on the constant, Variable and Data-Type Related functions.

Experiments 3 Experiments on the vector and Matrices

a) Create vector and matrices
b) Create vector and matrices by using ':'notation
c) Identify the element from the vector and matrix

Experiments 4 Experiments on the Matrices

a) Matrix Calculation
b) Calculate Matrix inverse and system of linear equation
c) Matrix Computation and its Manipulation
d) Solve Boolean Matrices
e) Generation of special matrices, Sparse Boolean Matrices, etc.

Experiments 5 Experiments on Scilab Graphics.

a) Draw a two and three dimensional plots by using Style options and legend command.
b) Draw a multiple plot by using Sub-plot command

Experiments 6 Experiments on Polynomials

a) Find out the roots of polynomial
b) Addition ,Subtraction, multiplication, division of polynomial

Experiments 7 Experiments on Advance Programming.

a) Program based on Loop Structure (for loop, nested for loop ,while loop)
b) Program using if, switch, break, continue, error statement.

Experiments 8 Experiments on SCICOS.

a) Draw a Simulink model with subsystem.
b) Solve a first order differential equation model using Simulink.

(Note: Programs on certain concepts taught in earlier semester should be included)

List of Submission:

Total number of Experiments:08

Course Outcome:

1 Students will understand Basics of SCILAB
2 Students will understand vector, matrix and polynomial calculation in SCILAB
3 Students will understand Control structure and graphics in SCILAB.
4 Students will understand SCICOS basics.

Text Books:

1 Claude Gomez, etal, Engineering and Scientific Computing with Scilab, 1st edition, Springer-Science+ Business Medi.

Reference:

1 Philippe Roux, Scilab, from theory to practice Scilab: I. Fundamentals Perrine Mathieu, Philippe Roux, 2016.
2 H. Ramchandran, A.S. Nair, Scilab (A Free Software to Matlab), S. Chand Publication, 2011.
3 Gaby Alez, Scilab, Introduction, License, Applications, 2012.

Mapping of CO and PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	√	√	√	√	√				√			√		
CO 2	√	√	√	√	√				√			√		
CO 3	√	√	√	√	√				√			√		
CO 4	√	√	√	√	√				√			√		

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	CA
Assembling											
Testing											
Observing/ implementing	√	√	√	√	√	√	√	√	√	√	
Analyzing	√	√	√	√	√	√	√	√	√	√	
Interpreting	√	√	√	√	√	√	√	√	√	√	
Designing	√	√	√	√	√	√	√	√	√	√	
Creating	√	√	√	√	√	√	√	√	√	√	
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	

Government College of Engineering Karad.
Second Year B. Tech
HS002: General Proficiency-II

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CA**	50
Practical	2 Hrs/week		
Total Credits	3		

Course Objectives:

1. To introspect, develop a thorough understanding of oneself by identifying one's strengths & weakness
2. To map one's competence /employability skills & improve upon as per the same
3. To improve one's intrapersonal & interpersonal communication by mastering the art of listening & assert oneself while communicating for developing harmonious relationships
4. To identify latent talents and sharpen them into effective tools for success in career
5. To apply practical knowledge for self development focusing upon various skill sets as per industry requirement
6. To live up to the popular saying "the first impression is the last impression", the focus is on building a pleasing personality leading to positive branding of oneself
7. To keep oneself abreast with the social & professional etiquette by working on power dressing, elegant presentation & one's brand management
8. To map one's competence /employability skills & improve upon as per the same

Course Contents
Section I - Language Skills
Duration – 15 hrs

Unit I **Domain: Letter Writing**

The domain letter writing is transacted based on the theme material possession. There are five modules under this domain. Each module has a specific outcome. Each module is dealt with the help of a linguistic tool that is interaction

Module 1 **Duration: 3 hrs**

Objective: Produce & role play a conversation

A trigger (picture/Image/video/ Audio/ Script) is used to initiate interaction through this the class arrives at a common theme. Understands the features of conversation & role play it.

- To read the text critically
- To track one’s own reading process.

- To come out with graphical organisers.
- Constructing multiple texts from the given.

Module 2 **Duration: 3 hrs**

Objective: Reading an article

Based on the trigger (picture/Image/video/ Audio/ Script) related to the theme to process reading. Through this learners understand how to read a text effectively & understand the sensory perceptions and emotions involved. At the end of this process the learners come out with graphical organizers and there by construct multiple texts out of it.

Module 3 **Duration: 3 hrs**

Objective: Write a letter

To read the different forms of letter and identify the various features of a letter. Make the learners understand the correct way of writing letters through group editing.

Module 4 **Duration: 3 hrs**

Objective: Reading a news report

Based on the trigger (picture/Image/video/ Audio/ Script) related to the theme a text is given to process reading. The text given here is a news report. Through this learners understand the features of news report, learn to read a text critically & track their own reading process. At the end of this process the learners come out with graphical organizers and there by construct multiple texts out of it.

Module 5 **Duration: 3 hrs**

Objective: Writing a news report

Based on the trigger (picture/Image/video/ Audio/ Script) write a news report keeping all the features of a news report in mind. To present a news report orally and edit a news report.

Section II - Soft Skills

Duration – 24hrs

Unit II **Self-Awareness** **Duration – 6 hrs**

The module self awareness has three different topics that are**:**

- Personality Assessment
- Competency Mapping
- Self-Concept

This capsule focuses on the following:

- To introspect & develop a thorough understanding of one's personality.
- To Identifying the key traits in oneself comprising of attitude skill & knowledge
- To correlate the trait in oneself with the employability skill required for success

- To identify ones strength& weakness

To move from an imaginary self-concept to real self-concept

Unit III Communication Skill Duration – 6 hrs

The module communication skills has two different topics that are**:**

- Interpersonal Behavioral Styles
- Assertive Communication

This capsule focuses on the following:

- Being able to listen and use other appropriate communication techniques including an appreciation of non-verbal communication.
- To identify different behavioral styles & assert ones communication according to style.

Unit IV Self Management Duration – 6 hrs

The module self management has two different topics that are**:**

- Response Able Behaviour
- Beginning with End in Mind

This capsule focuses on the following:

- To develop skills and techniques to cope with daily challenges
- To gain practical solutions for day-to-day issues
- To set career goals to improve one's wellbeing and quality of life
- To understand how to calculate percentage of any numbers
- To understand how to calculate percentage of any numbers
- To develop and implement an action plan

Unit V Image Management Duration – 6 hrs

The module Image Management has two different topics that are**:**

- Presentation Skills
- Grooming and Etiquette

This capsule focuses on the following:

- To make the first impression always the best impression.
- To understand & follow the social norms in public.
- To know the importance of personal hygiene & grooming

Section III - Aptitude Skills

Duration-21 hrs

Unit VI **Basic concept 1** **Duration – 3 hrs**

The module basic concepts 1 has two different topics that are**:**

- Percentages
- Profit and loss

This module focuses on the following:

- To understand how to calculate percentage of any numbers
- To understand how to calculate percentage of any numbers
- To improve upon calculations
- To understand when & how to calculate profit% & loss%

Unit VII **Basic concept 2** **Duration – 3 hrs**

The module basic concept 2 has two different topics that are**:**

- Time and work

This module focuses on the following:

- To understand how to calculate efficiencies of the person's
- To understand when to take positive or negative work

Unit VIII **Basic concept 3** **Duration – 3 hrs**

The module basic concepts 2 has two different topics that are**:**

- Time and distance
- Problems on trains

This module focuses on the following:

- To understand how to calculate Speed or Distance or Time when two unknown's are given
- To understand how to calculate Relative speed
- To understand how to calculate length of the train or bridge or platform

Unit IX **Reasoning 1** **Duration – 3 hrs**

The module reasoning 1 has the following topic:

- Puzzle test

This module focuses on the following:

- To understand & analyze the given information

Unit X **Reasoning 2** **Duration – 3 hrs**

The module reasoning 2 has two different topics that are**:**

- Directions sense
- Blood relations

This capsule focuses on the following:

- To understand how to calculate the direction and distance
- To understand how to say proper relations

Unit XI Reasoning 3 Duration – 3 hrs

The module reasoning 3 has the following topic**:**

- Coding & decoding

This capsule focuses on the following:

- To understand how to start depending on the different types of coding

Unit XII Reasoning 4 Duration – 3 hrs

The module reasoning 4 has the following topic**:**

- Number series
- Oddman out

This capsule focuses on the following:

- To understand how to calculate the series depending on the information
- To understand how to pick right answer from the given information

Course Outcome (CO):

1 To understanding of one's personality.
2 To Identifying the key traits in oneself comprising of attitude skill & knowledge
3 To correlate the trait in oneself with the employability skill required for success
4 To move from an imaginary self-concept to real self-concept
5 To identify different behavioral styles & assert ones communication according to style.
6 To set career goals to improve one's wellbeing and quality of life
7 To be responsible for ones actions
8 To make the first impression always the best impression.