# *Electrical Engineering Department*
# *Government College of Engineering, Karad*

# *Curriculum for SY Electrical from Academic Year 2020-21*

| ***Institute Vision*** |
|---|
| To emerge as a technical Institute of national repute driven by excellence in imparting value based education and innovation in research to face the Global needs of profession |
| ***Institute Mission*** |
| To *create* professionally competent engineers *driven* with the sense of responsibility towards *nature and society* |
| ***Department Vision*** |
| To produce Electrical Engineers to meet the requirements of Industry with *professional, ethical* and *social* responsibility |
| ***Department Mission*** |
| To impart *quality* education in Electrical Engineering<br>To *upgrade* curriculum continuously to meet the industrial requirements<br>To develop ability to research, *innovation* and entrepreneurship<br>To promote *awareness* about social and ethical responsibility |

## *Program Educational Objectives*

| | |
|---|---|
| PEO 1 | Student will have a sound foundation of mathematical, scientific and engineering *fundamentals* necessary to *formulate, solve* and *analyse* engineering problems and to *prepare* them for *graduate studies* as well as *research* and *innovation* |
| PEO 2 | Student will have an excellent *academic ambience* of collaborative learning which will help them to *assimilate* difficult theoretical concepts through modelling, simulation, well designed laboratory sessions, industrial training etc by ***using modern tools***. |
| PEO 3 | *Employability* of students will be enhanced by continually *upgrading* the curricula to *satisfy* dynamic *industry* requirements in tune with the state-of-the-art *scientific and technological developments* and *entrepreneurship skills* will be inculcated |
| PEO 4 | Students will demonstrate professional, *ethical* attitude and ability to relate engineering issues to broader *environmental and social* context through life-long learning |

## *Program Outcomes (POs)*

**Engineering Graduates will be able to:**

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions insocietal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## *PROGRAM SPECIFIC OUTCOME (PSO)*

1. Design solution for power system problems using appropriate tool and design power apparatus that meet specific needs with appropriate consideration to its social impact

# Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Programme: Electrical Engineering

Scheme of Instructions :Second Year B. Tech. in Electrical Engineering

Semester – III

| Sr. No. | Course Category | Course Code | Course Title | L | T | P | Contact Hrs/Wk | Course Credits | EXAM SCHEME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | CT-1 | CT-2 | TA/CA | ESE | TOTAL |
| 1 | HSMC | EE2301 | Innovations | 2 | - | - | 2 | 2 | - | - | 50 | 50 | 100 |
| 2 | BSC | EE2302 | Mathematics – III | 4 | - | - | 4 | 4 | 15 | 15 | 10 | 60 | 100 |
| 3 | ESC | EE2303 | Fundamentals of Electrical & Electronics Engineering | 3 | - | - | 3 | 3 | 15 | 15 | 10 | 60 | 100 |
| 4 | ESC | EE2304 | Electrical Engineering Materials | 3 | - | - | 3 | 3 | 15 | 15 | 10 | 60 | 100 |
| 5 | PCC | EE2305 | Electrical circuit Analysis | 3 | 1 | - | 4 | 4 | 15 | 15 | 10 | 60 | 100 |
| 6 | ESC | EE2306 | Fundamentals of Electrical & Electronics Engineering Lab | - | - | 2 | 2 | 1 | - | - | 25 | 25 | 50 |
| 7 | PCC | EE2307 | Electrical circuit Analysis Lab | - | - | 2 | 2 | 1 | - | - | 50 | 50 | 100 |
| 8 | PCC | EE2308 | Software Lab-I | | | 2 | 2 | 1 | | | 50 | 50 | 100 |
| 9 | P/S/IT | EE2309 | Technical Training & Presentation in vernacular | - | 1 | - | - | 1 | - | - | 25 | 25 | 50 |
| | | | **Total** | **15** | **02** | **06** | **22** | **20** | **60** | **60** | **240** | **440** | **800** |

L- Lecture T-Tutorial P-Practical

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2 ESE- End Semester Examination (For Laboratory End Semester performance)

| Course Category | HSMC (Hum., Soc. Sc, Mgmt.) | BSC (Basic Sc.) | ESC (Engg. Sc.) | PCC (Programme Core Courses) | PEC (Programme Elective Courses) | OEC (Open Elective courses from other discipline) | MCC (Mandatory Courses) | Project / Seminar / Industrial Training |
|---|---|---|---|---|---|---|---|---|
| **Credits** | 02 | 04 | 08 | 05 | -- | -- | -- | 01 |
| **Cumulative Sum** | 05 | 22 | 24 | 05 | -- | -- | -- | 01 |

**PROGRESSIVE TOTAL CREDITS :37+20 =57**

# Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Programme: Electrical Engineering

Scheme of Instructions : Second Year B. Tech. in Electrical Engineering

Semester – IV

| Sr. No. | Course Category | Course Code | Course Title | L | T | P | Contact Hrs/Wk | Course Credits | EXAM SCHEME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | CT-1 | CT-2 | TA/CA | ESE | TOTAL |
| 1 | OEC | EE2401 | Digital Electronics | 3 | - | - | 3 | 3 | 15 | 15 | 10 | 60 | 100 |
| 2 | ESC | EE2402 | Signal Processing for Electrical Engg. | 3 | - | - | 3 | 3 | 15 | 15 | 10 | 60 | 100 |
| 3 | PCC | EE2403 | Electrical Machines-I | 3 | - | - | 3 | 3 | 15 | 15 | 10 | 60 | 100 |
| 4 | PCC | EE2404 | Power System-I | 3 | - | - | 3 | 3 | 15 | 15 | 10 | 60 | 100 |
| 5 | PCC | EE2405 | Electrical Measurements and instrumentation | 3 | - | - | 3 | 3 | 15 | 15 | 10 | 60 | 100 |
| 6 | OEC | EE2406 | Digital Electronics Lab | - | - | 2 | 2 | 1 | - | - | 25 | 25 | 50 |
| 7 | PCC | EE2407 | Electrical Machines-I Lab | - | - | 2 | 2 | 1 | - | - | 25 | 25 | 50 |
| 8 | PCC | EE2408 | Power System-I Lab | - | - | 2 | 2 | 1 | - | - | 25 | - | 25 |
| 9 | PCC | EE2409 | Electrical Measurements and Instrumentation Lab | - | - | 2 | 2 | 1 | - | - | 25 | 25 | 50 |
| 10 | MCC | EE2410 | Environmental Science | 2 | - | - | 2 | Audit | - | - | - | - | - |
| 11 | HSMC | EE2411 | Technical Presentation | - | 1 | - | 1 | 1 | | | 25 | - | 25 |
| | | | **Total** | **17** | **01** | **08** | **26** | **20** | **75** | **75** | **175** | **375** | **700** |

L- Lecture T-Tutorial P-Practical

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2 ESE- End Semester Examination (For Laboratory End Semester performance)

| Course Category | HSMC (Hum., Soc. Sc, Mgmt.) | BSC (Basic Sc.) | ESC (Engg. Sc.) | PCC (Programme Core courses) | PEC (Programme Elective courses) | OEC (Open Elective courses from other discipline) | MCC (Mandatory Courses) | Project / Seminar / Industrial Training |
|---|---|---|---|---|---|---|---|---|
| Credits | 01 | -- | 03 | 12 | -- | 04 | Yes | -- |
| Cumulative Sum | 06 | 22 | 27 | 17 | -- | 04 | -- | 01 |

**PROGRESSIVE TOTAL CREDITS :57+20 =77**

## Government College of Engineering, Karad

## Second Year (Sem. – III) B. Tech. Electrical Engineering

## EE 2301 : Innovations

| Teaching Scheme | |
|---|---|
| Lectures | 02Hrs/week |
| Tutorials | 00Hrs/week |
| Total Credits | 02 |

| Examination Scheme | |
|---|---|
| CT – 1 | -- |
| CT – 2 | -- |
| TA/CA | 50 |
| ESE | 50 (Pattern of exam will be decided by instructor) |
| Duration of ESE | 02 Hrs |

**Course Outcomes (CO)**

Student will be able to

| | |
|---|---|
| **1.** | Discover the creative / innovative side within her/him. |
| **2.** | Hone entrepreneurial and leadership skills within his/her personality. |
| **3.** | Develop new ways of thinking and Learn the entire innovation cycle from Ideation to Go-To-Market. |
| **4.** | Study frameworks, strategies, techniques and business models for conceived ideas. |
| **5.** | Develop skills for evaluating, articulating, refining, and pitching a new product or service |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | Introduction to Innovation, Personal thinking preferences, 'Innovation' mind set, | **(04)** |
| **Unit 2** | Everyday creativity and eliminating mental blocks, Introduction to Innovation, Creative thinking techniques, Innovation types, Idea management and approaches, | **(04)** |
| **Unit 3** | Teaming techniques for creativity, Idea Conception, Idea Scoping, Self Evaluation, Idea Brainstorming sessions, Idea Verification, | **(04)** |
| **Unit 4** | Market Evaluation, Concept Evaluation, Idea Verification, Prototype Evaluation, Protection/Patent review, Innovation Case Study, | **(04)** |
| **Unit 5** | Idea Presentations, Idea Incubation, Product and Market Plan, Product and Market Development, | **(04)** |
| **Unit 6** | Innovation Case Studies, Idea Incubation and Product Launch, Marketing and selling, Post Launch Review | **(04)** |

**Tutorials**

| | |
|---|---|
| | Assignments will be based on development of idea and its presentation for Teacher's assessment |

**Text Books**

| | |
|---|---|
| **1.** | Jeff Dyer, Hal Gregersen, Clayton M. Christensen, " The Innovator's DNA: Mastering the Five Skills of Disruptive Innovators, Harvard Business Review Press, 2011. |
| **2.** | Paddy Miller, Thomas Wedell-Wedellsborg, "Innovation as Usual: How to Help Your People Bring Great Ideas to Life , Harvard Business Review Press, Kindle Edition. |
| **3.** | |

**Useful Links**

| | |
|---|---|
| **1.** | youtube " The Innovator's DNA" |

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – III) B. Tech. Electrical Engineering |
| EE 2301 : Innovations |

## Mapping of COs and POs

| Course Outcomes (CO) | |
|---|---|
| Student will be able to | |
| **1.** | Discover the creative / innovative side within her/him. |
| **2.** | Hone entrepreneurial and leadership skills within his/her personality. |
| **3.** | Develop new ways of thinking and Learn the entire innovation cycle from Ideation to Go-To-Market. |
| **4.** | Study frameworks, strategies, techniques and business models for conceived ideas. |
| **5.** | Develop skills for evaluating, articulating, refining, and pitching a new product or service. |

| PO → CO ↓ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO12 | PSO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 2 | 2 | 2 | 2 | | 2 | 2 | | 2 | | | 2 | |
| CO 2 | 2 | 2 | | 2 | | 2 | | | 2 | | | | 2 |
| CO 3 | | | | 2 | | | | | 2 | | | | |
| CO 4 | | | | | | | | | | | 3 | | |
| CO 5 | | | | | | | | | | 2 | 2 | | 2 |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | 5 |
| Understand | | | | 5 |
| Apply | | | 10 | 10 |
| Analyse | | | 15 | 20 |
| Evaluate | | | 10 | 10 |
| Create | | | 15 | |
| TOTAL | | | 50 | 50 |

## Government College of Engineering, Karad

## Second Year (Sem – III) B. Tech. Electrical Engineering

## EE2302: Mathematics-III

| Teaching Scheme | |
|---|---|
| Lectures | 04 Hrs/week |
| Tutorials | 00 Hrs/week |
| Total Credits | 04 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

**Course Outcomes (CO)**

Students will be able to

| | |
|---|---|
| **1.** | Obtain solution of Electrical Engineering systems using Laplace and z Transforms |
| **2.** | Formulate and solve problems involving random variables using probability and statistics. |
| **3.** | Apply statistical methods for analysing experimental data. |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | **Laplace Transform**: Properties of Laplace Transform, Laplace transform of standard functions. Initial value theorem, final value theorem. Finding inverse Laplace transform by different methods, convolution theorem, Evaluation of integrals, solving electrical circuits using Laplace transform. | **(10)** |
| **Unit 2** | **Fourier Transform:** Fourier sine and cosine integrals, Fourier sine Transform, Fourier cosine Transform, Inverse Fourier transform. | **(08)** |
| **Unit 3** | **Z Transform**: Introduction, Definition, Region of convergence, Properties of Z-Transform, Inverse Z-Transform. | **(06)** |
| **Unit 4** | **Curve Fitting :** Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. | **(06)** |
| **Unit 5** | **Testing of Hypothesis for Large samples**: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard Deviations. | **(06)** |
| **Unit 6** | **Testing of Hypothesis for Small Samples:** T-distribution for small sample -Test for single mean, difference of means and correlation coefficients, test for ratio of variances, F-test for equality of population variances. Chi-square test for goodness of fit and independence of attributes. | **(06)** |

**Text Books**


| | |
|---|---|
| **1.** | H.K.Das "Advance Engineering Mathematics" S.Chand publications. |
| **2.** | N.P. Bali and M. Goyal, "A text book of Engineering Mathematics", Laxmi Publications, 2016. |
| **3.** | S. C. Gupta "Fundamentals of Statistics",Himalaya Publishing House. |


**Reference books**


| | |
|---|---|
| **1.** | E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2006. |
| **2.** | P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", UniversalBook Stall, 2003. |
| **3.** | S. Ross, "A First Course in Probability", Pearson Education India, 2002. |
| **4.** | B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 2000. |
| **5.** | T. Veerarajan, "Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2010. |

EE2302

| Government College of Engineering, Karad |
|---|
| Second Year (Sem. – III) B. Tech. Electrical Engineering |
| EE2302: Mathematics-III |

## Mapping of COs and POs

| Course Outcomes (CO) | |
|---|---|
| Students will be able to | |
| **1.** | Obtain solution of Electrical Engineering systems using Laplace and z Transforms |
| **2.** | Formulate and solve problems involving random variables using probability and statistics. |
| **3.** | Apply statistical methods for analysing experimental data. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | | 3 | 1 | 2 | | | | | | | 3 | |
| CO 2 | 3 | 3 | 1 | 1 | | | | | | | | 3 | |
| CO 3 | 3 | | 3 | 1 | 2 | | | | | | | 3 | 2 |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | 5 |
| Understand | | | | 5 |
| Apply | 5 | 5 | 3 | 20 |
| Analyse | 5 | 5 | 3 | 15 |
| Evaluate | 5 | 5 | 4 | 15 |
| Create | | | | |
| TOTAL | 15 | 15 | 10 | 60 |

## Government College of Engineering, Karad

## Second Year (Sem. – III) B. Tech. Electrical Engineering

## EE 2303 : Fundamentals of Electrical and Electronics Engineering

| Teaching Scheme | |
|---|---|
| Lectures | 03Hrs/week |
| Tutorials | 00Hrs/week |
| Total Credits | 03 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

**Course Outcomes (CO)**

Students will be able to

| | |
|---|---|
| **1.** | Comprehend the basics of Electrical and Electronics Engineering and practical implementation of the fundamentals. |
| **2.** | Solve the basic DC/AC/ magnetic circuits and develop numerical solutions to fundamental electrical and electronics engineering problems. |
| **3.** | Demonstrate the skills for electric wiring, selection of protective systems and PLC programming. |
| **4.** | Compare and contrast the characteristics of various power devices. |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | **DC Circuits**:<br>Voltage and current sources, Kirchhoff's laws, analysis of simple circuits with dc excitation. Heating effect of current.<br>Magnetic Circuit: Flux, flux density, Reluctance, field intensity, Magnetisation curves, Series & parallel magnetic circuits, Principles of Electromagnetic induction self and mutual induction coefficient of coupling and Energy stored in magnetic circuit. | **(8)** |
| **Unit 2** | **Single phase and polyphase circuits**:<br>a) Single phase alternating sinusoidal voltages and currents, effective and rms values. Rms value of non-sinusoidal voltages.<br>b) Single phase A.C. Series circuit with Resistance Inductance, Capacitance and phasor diagrams ,Series resonance. Parallel circuit with Resistance Inductance, capacitance and phasor diagrams, Parallel resonance. Impedance Triangle Active, Reactive and apparent power, power factor and power factor improvement by capacitor method.<br>c) Three phase balanced AC supply: Three phase generation, Star and Delta balanced load, Relationship of phase and line values of voltage and current for Star and Delta connections**.** Power in three phase circuits. | **(8)** |
| **Unit 3** | **Earthing:**<br>Necessity of Earthing, Earthing methods, Fuse, MCB, ELCB, single line diagram of domestic wiring, types of wiring, basic principle and working of contactor, relay and circuit breaker. | **(4)** |
| **Unit 4** | **Power semiconductor devices:**<br>Silicon Controlled Rectifiers (SCR's), BJT, Power MOSFET, Power IGBT and their characteristics and other thyristors, Basic theory of operation of SCR, Static characteristics. Dynamic characteristics of SCR.<br>**AC-DC Converters:**<br>Single Phase Controlled Rectifiers: Phase control technique – Single-phase Line commutated converters – Midpoint and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load. | **(7)** |
| **Unit 5** | **Programmable Logic Controllers (PLCs):**<br>Introduction; definition & history of the PLC; Principles of Operation; Various Parts of a PLC: CPU & programmer/ monitors; PLC input & output modules; Solid state memory; power supplies.PLC versus Computers, PLC Applications. | **(6)** |
| **Unit 6** | **Switches:**<br>On-OFF push-buttons AC motor Starters, Star delta starters, limit switches, proximity switches<br>Automatic water level controllers, pressure, temperature controller (thermostat)float, Latching relay and phase failure relay (single phasing Preventer), | **(7)** |

| | | |
|---|---|---|
| | Simple on-off motor control circuit using contactors, Over current protection<br>Timers. Electrical Panel Design. | |

| | | | | |
|---|---|---|---|---|
| **Text Books** | | | | |
| **1.** | D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010. | | | |
| **2.** | Frank D. Petruzella “Programmable Logic Controllers” fifth edition McGraw Hill | | | |
| **3.** | Rashid M.H, “Power Electronics: Circuits Devices and Applications”, 3rd Edition, Pearson, 2011. | | | |
| **Reference Books** | | | | |
| **1.** | L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011. | | | |
| **2.** | E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010. | | | |
| **3.** | Principles of Power Electronics, John G. Kassakian, martin F. Schlect, Geroge C. Verghese, Pearson Education. | | | |
| **4.** | Bolton “ Programmable Logic Controllers “, fifth edition published by Elsevier | | | |
| **5.** | D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009. | | | |
| **Useful Links** | | | | |
| **1.** | https://nptel.ac.in/courses/117/106/117106034/ | | | |
| **2.** | https://nptel.ac.in/courses/108108076/ | | | |
| **3.** | https://nptel.ac.in/courses/108105062/ | | | |

EE2303

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – III) B. Tech. Electrical Engineering |
| EE 2303 : Fundamentals of Electrical and Electronics Engineering |

## Mapping of COs and POs

| Course Outcomes (CO) | |
|---|---|
| Students will be able to | |
| **1.** | Comprehend the basics of Electrical and Electronics Engineering and practical implementation of the fundamentals. |
| **2.** | Solve the basic DC/AC/ magnetic circuits and develop numerical solutions to fundamental electrical and electronics engineering problems. |
| **3.** | Demonstrate the skills for electric wiring, selection of protective systems and PLC programming. |
| **4.** | Compare and contrast the characteristics of various power devices. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | | | | | 2 | 3 |
| CO 2 | 3 | 2 | 3 | 1 | 2 | 3 | 1 | | | | | 2 | 3 |
| CO 3 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | | | | | 2 | 3 |
| CO 4 | 2 | 2 | 2 | 1 | 2 | 1 | | | | | | | 3 |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | |
| Understand | | | | |
| Apply | 5 | 5 | 3 | 20 |
| Analyse | 5 | 5 | 3 | 20 |
| Evaluate | 5 | 5 | 4 | 20 |
| Create | | | | |
| TOTAL | 15 | 15 | 10 | 60 |

# Government College of Engineering, Karad

## Second Year (Sem. – III) B. Tech. Electrical Engineering

## EE2304 : Electrical Engineering Materials

| Teaching Scheme | |
|---|---|
| Lectures | 03Hrs/week |
| Tutorials | 00 Hrs/week |
| Total Credits | 03 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

**Course Outcomes (CO)**

Students will be able to

| | |
|---|---|
| **1.** | Understand and select the insulating materials, magnetic materials, conducting materials & semi-conducting materials for cables, transmission lines, transformers and machines. |
| **2.** | Update him/herself with advancement in nanomaterial technology |
| **3.** | Test the conducting, insulating and magnetic materials. |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | **Conducting Materials:** Introduction of Classification of materials into conducting, semi conducting and insulating materials, Resistance and factors affecting it such as alloying and temperature, Classification of conducting material as low resistivity and high resistivity materials , their practical applications, Super conductivity materials. | **(06)** |
| **Unit 2** | **A) Insulating Materials, Properties & Application:** Introduction, Characteristics of Good Insulating Material, Classification, Solid Insulating Materials-Paper, Press Board, Fibrous Materials, Ceramics, Mica & Asbestos, Resins, Polymers Ceramics, Enamels. Liquid Insulating Materials such as Transformer Oil, Varnish , Askarel, Insulating Gases like Air, SF6, Insulating Materials for Power & Distribution Transformers, Rotating Machines, Capacitors, Cables, Line Insulators and Switchgears. Crystal defects.<br>**B) Dielectric Breakdown:** Introduction, Concept of Primary and Secondary Ionization of Gases (Descriptive treatment only),Breakdown Voltage, Breakdown Strength, Factors affecting Breakdown Strengths of Gaseous, Liquid and Solid Dielectric Materials. | **(06)** |
| **Unit 3** | **Magnetic Materials:** Introduction, Parameters of Magnetic material, Diamagnetism, Para magnetism, Ferromagnetism, Ferri-magnetism, Ferro-magnetic behaviour below Critical Temperature, Spontaneous Magnetization & Curie-Weiss law, Anti-ferromagnetism, Ferrites, Applications of Ferro-magnetic Materials, Magnetic materials for Electric Devices such as Transformer Core ,Core of Rotating Machines, Soft Magnetic Materials, Hard Magnetic Materials, Magnetic Recording Materials, Compact Discs. Introduction to laser and magnetic strip technology. | **(06)** |
| **Unit 4** | **Semi- Conducting Materials:** Introduction - Semi-conductors and their properties, different semiconducting materials (silicon and germanium) used in manufacture of various semiconductor devices , Materials used for electronic components. | **(06)** |
| **Unit 5** | **Nanotechnology :**Introduction, Concepts of Energy bands & various Conducting Mechanism in Nano-structures, Carbon Nano-structures, Carbon Molecules, Carbon Clusters, Carbon Nano-tubes, Applications of Carbon Nano-tubes, Special Topics in Nano Technology such as Single Electron Transistor, Molecular Machines, BN Nanotubes, Nano wires. | **(06)** |
| **Unit 6** | **Testing of Materials:** Explanation of following with objectives, equipments required, circuit diagrams and observations to be taken.<br>1. Measurement of Dielectric Loss Tangent (tan δ) by Schering Bridge-IS 13585-1994.<br>2. Measurement of Dielectric Strength of Solid Insulating Material-IS 2584.<br>3. Measurement of tan delta, resistivity and dielectric Strength of Liquid Insulating Material –IS 6798.<br>4. Measurement of Dielectric Strength of Gaseous Insulating Material –IS 2584.<br>5. Measurement of Power factor and partial discharge of high voltage cables.<br>6. Measurement of Flux Density by Gauss-meter.<br>7. Measurement of dielectric strength of resins and polymers. | **(06)** |

| | | | | |
|---|---|---|---|---|
| | | | | |
| **Tutorials** | | | | |
| **Text Books** | | | | |
| **1.** | A Course in Electrical Engineering Materials, by S. P. Seth, DhanpatRai and Sons publication. | | | |
| **2.** | Material Science for Electrical Engineering, by P.K. Palanisamy, Scitech Pub.(India) Pvt.Ltd.,Chennai. | | | |
| **3.** | Electrical Engineering Materials, by K. B. Raina& S. K. Bhattacharya, S. K. Kataria& Sons. | | | |
| **Reference Books** | | | | |
| **1.** | A.J. Dekker "Electrical Engineering Materials", PHI, 2006. (2nd Edition) | | | |
| **2.** | Electrical Power Capacitors-Design & Manufacture, by D. M. Tagare, Tata McGraw Hill Publication. | | | |
| **3.** | Electrical Engineering Materials, by C. S. Indulkar& S. Thiruvengadam, S. Chand &Com.Ltd, | | | |
| **4.** | Introduction to Material Science for Engineering, Sixth Edition by James F. Shackelford & M.K. Muralidhara, Pearson Education. | | | |
| **5.** | Introduction to Nanotechnology by Charles P. Poole, Jr. Frank & J. Ownes (Wiley Student Edition) | | | |
| **Useful Links** | | | | |
| | | | | |

EE2304

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – III) B. Tech. Electrical Engineering |
| EE2304 : Electrical Engineering Materials |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to | |
| **1.** | Understand and select the insulating materials, magnetic materials, conducting materials & semi-conducting materials for cables, transmission lines, transformers and machines. |
| **2.** | Update him/herself with advancement in nanomaterial technology |
| **3.** | Test the conducting, insulating and magnetic materials. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 2 | 2 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 2 |
| CO 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 |
| CO 3 | 2 | 2 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 2 |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | |
| Understand | 5 | 5 | 2 | 25 |
| Apply | 5 | 5 | 3 | 25 |
| Analyse | 5 | 5 | 3 | 10 |
| Evaluate | | | 2 | |
| Create | | | | |
| TOTAL | 15 | 15 | 10 | 60 |

## Government College of Engineering, Karad

## Second Year (Sem. – III) B. Tech. Electrical Engineering

## EE2305: Electrical Circuit Analysis

| Teaching Scheme | |
|---|---|
| Lectures | 03Hrs/week |
| Tutorials | 01 Hr./week |
| Total Credits | 04 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

**Course Outcomes (CO)**

Student will be able to

| | |
|---|---|
| **1.** | Apply network theorems for the analysis of electrical circuits |
| **2.** | Obtain the transient and steady-state response of electrical circuits |
| **3.** | Analyse circuits in the sinusoidal steady-state (single-phase and three-phase). |
| **4.** | Analyse two port circuit behaviour |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | **Analysis of DC Circuit:** Types of sources, Dependent and Independent sources, source transformation, star/delta transformation, Ladder network, Node and Mesh Analysis. | **(6)** |
| **Unit 2** | **Network Theorems** Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfertheorem, Reciprocity theorem, Compensation theorem. Analysis with dependent currentand voltage sources. | **(8)** |
| **Unit 3** | **Solution of First and Second order networks** Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C circuits, initial and final conditions in network elements, forced and free response, timeconstants, steady state and transient response. | **(8)** |
| **Unit 4** | **Sinusoidal steady state analysis** AC circuit analysis, Mutually coupled circuits, Dot Convention in coupled circuits,Ideal Transformer. | **(8)** |
| **Unit 5** | **Electrical Circuit Analysis Using Laplace Transforms** Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform forstandard inputs, convolution integral, inverse Laplace transform, transformed network withinitial conditions. | **(8)** |
| **Unit 6** | **Two Port Network and Network Functions** Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters. Driving point and transfer functions and their characteristics | **(6)** |

**Tutorials**

Minimum 2 tutorials based on each unit

**Text Books**


| | |
|---|---|
| **1.** | C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004. |
| **2.** | D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998 |


**Reference Books**


| | |
|---|---|
| **1.** | M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006. |
| **2.** | W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013. |


**Useful Links**

| | |
|---|---|
| **1.** | https://nptel.ac.in/courses/108/104/108104139/ |
| **2.** | http://nptel.ac.in/courses/117107095 |
| **3.** | http://nptel.ac.in/courses/117103064 |

EE2305

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – III) B. Tech. Electrical Engineering |
| EE2305: Electrical Circuit Analysis |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to | |
| **1.** | Apply network theorems for the analysis of electrical circuits |
| **2.** | Obtain the transient and steady-state response of electrical circuits |
| **3.** | Analyse circuits in the sinusoidal steady-state (single-phase and three-phase). |
| **4.** | Analyse two port circuit behaviour |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | 3 | 1 | 1 | | | | | | | | 2 | 3 |
| CO 2 | 3 | 3 | 1 | | | | | | | | | 3 | 3 |
| CO 3 | 3 | 3 | | | | | | | | | | 3 | 3 |
| CO 4 | 3 | 2 | 2 | | | | | | | | | 3 | 3 |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | 10 |
| Understand | | | | 10 |
| Apply | 5 | 5 | 3 | 14 |
| Analyse | 5 | 5 | 3 | 12 |
| Evaluate | 5 | 5 | 4 | 14 |
| Create | | | | |
| TOTAL | 15 | 15 | 10 | 60 |

## Government College of Engineering, Karad

## Second Year (Sem – III) B. Tech. Electrical Engineering

## EE 2306 : Fundamentals of Electrical and Electronics Engineering Lab

| Teaching Scheme | | Examination Scheme | |
|---|---|---|---|
| Lectures | --- | CT – 1 | --- |
| Tutorials | --- | CT – 2 | --- |
| Practicals | 02 Hrs/week | CA | 25 |
| Total Credits | 01 | ESE | 25 |
| | | Duration of ESE | 3 Hrs |

**Course Outcomes (CO)**

Student will be able to

| | |
|---|---|
| **1.** | Implement and Demonstrate the various functions, purpose and operations of PLC. |
| **2.** | Comprehend the basics of Electrical Engineering and practical implementation of Electrical fundamentals. |
| **3.** | Solve the basic DC/AC/ magnetic circuits and develop numerical solutions to fundamental electrical engineering problems |
| **4.** | Develop/Create a PLC project using PLC software and demonstrate the fundamentals of power devices. |

| | Experiments: The list given here is illustrative list and course coordinator is encouraged to design new experiments. | |
|---|---|---|
| Experiment 1 | Verify Kirchoffs current law and voltage law for a given circuit. | |
| Experiment 2 | Verify the phasor relationship between voltage and current in single phase series R-L,R-C and R-L-C circuits. | |
| Experiment 3 | Verify the relationship between line and phase quantities for a 3 phase balanced star connected load | |
| Experiment 4 | Verify the relationship between line and phase quantities for a 3 phase balanced star connected load | |
| Experiment 5 | Measurement of single phase power and energy by using wattmeter. | |
| Experiment 6 | Implementation of various Logic Gates AND, OR, NOT, NOR, NAND, EX-OR and EX-NOR in PLC using Ladder Diagram programming language. | |
| Experiment 7 | To Implement the Given Boolean Functions, write PLC Ladder Diagram programme, e.g.<br>function F(w,x,y)=∑(1,3,5,7)<br>F(a,b,c,d)=∑(0,1,2,3,5,7,9,11) | |
| Experiment 8 | Design the logic circuit with two outputs (Y1, Y2) for the following conditions. Also, develop a PLC program in Ladder Logic for the same.<br>Y1=1 if the input binary number is 5 or less than 5.<br>Y2=1 if the input binary number is 9 or more than 9.<br>( The input to combinations logic circuit is a 4-bit binary number ) | |
| Experiment 9 | To Implement SR (Set-Reset), Flip Flop in PLC write Ladder diagram programme. | |
| Experiment 10 | To Implement 4:1 multiplexer in PLC developer Ladder Diagram programming language. | |
| Experiment 11 | Write a PLC program to perform operations on Mathematical functions. | |

**EE2306**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – III) B. Tech. Electrical Engineering |
| EE 2306 : Fundamentals of Electrical and Electronics Engineering Lab |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to | |
| **1.** | Impliment and Demonstrate the various functions, purpose and operations of PLC. |
| **2.** | Comprehend the basics of Electrical Engineering and practical implementation of Electrical fundamentals. |
| **3.** | Solve the basic DC/AC/ magnetic circuits and develop numerical solutions to fundamental electrical engineering problems |
| **4.** | Develop/Create a PLC project using PLC software and demonstrate the fundamentals of power devices. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | | | | | 2 | 3 |
| CO 2 | 3 | 2 | 2 | 1 | 2 | 3 | | | | | | | 2 |
| CO 3 | 3 | 1 | 1 | 2 | 3 | 2 | 1 | | | | | 2 | 3 |
| CO 4 | 2 | 2 | 2 | 1 | 1 | 1 | | | | | | | 3 |

## Assessment Pattern

1. Assessment for laboratory work will be based on skills acquired by students during the course.
2. Continuous Assessment Sheet (CAS) will be maintained for each student.

| Knowledge Level | CT 1 | CT 2 | CA | ESE |
|---|---|---|---|---|
| Remember | | | | |
| Understand | | | | |
| Apply | | | 10 | 10 |
| Analyse | | | 10 | 10 |
| Evaluate | | | 5 | 5 |
| Create | | | | |
| TOTAL | | | 25 | 25 |

| Government College of Engineering, Karad | | | | | |
|---|---|---|---|---|---|
| Second Year (Sem. – III) B. Tech. Electrical Engineering | | | | | |
| EE2307 : Electrical Circuit Analysis Lab | | | | | |
| **Teaching Scheme** | | | **Examination Scheme** | | |
| Practical | 02Hrs/week | | CA | 50 | |
| | | | | | |
| Total Credits | 01 | | | | |
| | | | ESE | 50 | |
| | | | Duration of ESE | 3 hrs | |

| **Course Outcomes (CO)** | |
|---|---|
| Student will be able to | |
| **1.** | Apply network theorems for the analysis of electrical circuits |
| **2.** | Obtain the transient and steady-state response of electrical circuits |
| **3.** | Analyse circuits in the sinusoidal steady-state (single-phase and three-phase). |
| **4.** | Analyse two port circuit behaviour. |

Experiments: The list given here is illustrative list and course coordinator is encouraged to design new experiments.

| | |
|---|---|
| **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 Reciprocity Theorem |
| **Experiment 7** | Verification of Norton's Theorem |
| **Experiment 8** | Obtain step response of R-C Series circuit |
| **Experiment 9** | Evaluateimpedance parameters of two port network |
| **Experiment 10** | Evaluate admittance parameters of two port network |
| **Experiment 11** | Evaluate hybrid parameters of two port network |

**EE2307**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – III) B. Tech. Electrical Engineering |
| EE2307 Electrical Circuit Analysis Lab |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Apply network theorems for the analysis of electrical circuits |
| **2.** | Obtain the transient and steady-state response of electrical circuits |
| **3.** | Analyse circuits in the sinusoidal steady-state (single-phase and three-phase). |
| **4.** | Analyse two port circuit behaviour. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | 3 | 1 | 1 | | | | | | | | 2 | 3 |
| CO 2 | 3 | 3 | 1 | | | | | | | | | 3 | 3 |
| CO 3 | 3 | 3 | | | | | | | | | | 3 | 3 |
| CO 4 | 3 | 2 | 2 | | | | | | | | | 3 | 3 |

## Assessment Pattern

1.Assessment for laboratory work will be based on skills acquired by students during the course.

2.Continuous Assessment Sheet (CAS) will be maintained for each student.

## Government College of Engineering, Karad

## Second Year (Sem – III) B. Tech. Electrical Engineering

## EE 2308 : Software Lab-1

| Teaching Scheme | | Examination Scheme | |
|---|---|---|---|
| Lectures | --- | CT – 1 | |
| Tutorials | --- | CT – 2 | |
| Practicals | 02 Hrs/week | CA | 50 |
| Total Credits | 01 | ESE | 50 |
| | | Duration of ESE | 3 hrs |

**Course Outcomes (CO)**

Student will be able to:

| | |
|---|---|
| **1.** | Develop programs and codes and become self-sufficient in loading datasets. |
| **2.** | Analyse the given data and think in algorithms |
| **3.** | Apply statistics, process data and visualise results. |
| **4.** | Demonstrate proficiency in developing effective code |

| | Course Contents | |
|---|---|---|
| Unit-1 | **Introduction to Octave:** Installing and running Octave, Conventions, format of descriptions, A sample function description, a sample command description Invoking Octave from the Command Line | |
| Unit-2 | **Command Line Editing & Data Types:** Cursor motion and different commands, comments, Numeric objects, missing data, string objects, cell array objects, user defined data types, objects sizes, numeric data types Built-in Data Types, Numeric Data Types, Matrices, Matrices, strings | |
| Unit-3 | **Variables:** global variables, persistent variables, status of variables, expressions , Index Expressions Calling Functions, Boolean Expressions, Statements, switch Statement, for Statement, Functions and Scripts, Function Files, set operations | |
| Unit-4 | **Plotting:** High-Level Plotting, Two-Dimensional Plots, Three-Dimensional Plots, Graphics Object Properties, Advanced Plotting, Graphics Toolkits | |
| Unit-5 | **Matrix**: Matrix Manipulation, Finding Elements and Checking Conditions, Rearranging Matrices, Special Utility Matrices, Famous Matrices: Arithmetic, Linear Algebra, Nonlinear Equations, Diagonal and Permutation Matrices | |
| Unit-6 | **Polynomials:** Polynomial Manipulations, Evaluating polynomials, products of polynomials, derivatives/ integrals, transforms, polynomial interpolations, miscellaneous functions | |
| | | |
| | Experiments: The list given here is illustrative list and course coordinator is encouraged to design new experiments. | |
| Experiment 1 | Write octave script to Print “Custom Message” on screen. | |
| Experiment 2 | Study the various Arithmetic functions using Command Line in Octave<br>(use + (addition), - (subtraction), * (multiplication), / (division), and ^ (exponentiation) | |
| Experiment 3 | Study the Various Mathematical functions using Command Line in Octave.<br>➢ trigonometric functions: sin, cos, tan<br>➢ inverse trigonometric functions: asin, acos, atan<br>➢ natural and base 10 logarithms: log, log10<br>➢ exponentiation: exp<br>➢ absolute value: abs | |
| Experiment 4 | Write octave script to plot the given functions. ( example Plot of sin x verses x ) | |
| Experiment 5 | Write script that calculates the smallest positive integer n such that $a^n \geq b$ for some real numbers a and b | |
| Experiment 6 | Write script to generate two matrices of the same size, and perform element by element operations on them.( eg. element by element division(./ ) , multiplication (.*) and exponentiation (.^) | |
| Experiment 7 | Write script that calculates the greatest common divisor (GCD) of two positive integers. | |

| | | |
|---|---|---|
| Experiment 8 | Study the different SET operations ( set union , differentiation, intersection ) on given two set namely A with contents 1,2,3 and b with contents 3,4,5. | |
| Experiment 9 | Computes the matrix exponential of a given square matrix. | |
| Experiment 10 | Write the octave script for the give condition using basic decision making statements. | |
| Experiment 11 | Write octave script to calculate mean of the given values. | |

| | |
|---|---|
| **Text Books** | |
| **1.** | Jesper Schmidt Hansen " GNU Octave Beginners Guide" PACKT publishing |
| **2.** | Svein linge and Hans Petter Langtangen "Programming for Computations - MATLAB/Octave: published by Springer |
| **Reference Books** | |
| **1.** | John W. Eaton, David Bateman, Soren Hauberg, Rik Wehbring "GNU Octave Free your Numbers" , A high-level interactive language for numerical computations Edition 5 for Octave version 5.1.0 February 2019 , published by the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301–1307, USA. |
| **2.** | S. Nakamura "GNU Octave Primer for Beginners" CreateSpace Independent Publishing Platform, 2016 |
| **Useful Links** | |
| **1.** | https://en.wikibooks.org/wiki/Octave_Programming_Tutorial/ |
| **2.** | https://octave.org/ |

**EE2308**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – III) B. Tech. Electrical Engineering |
| EE 2308 : Software Lab-1 |

## Mapping of COs and POs

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Develop programs and codes and become self-sufficient in loading datasets. |
| **2.** | Analyse the given data and think in algorithms |
| **3.** | Apply statistics, process data and visualise results. |
| **4.** | Demonstrate proficiency in developing effective code |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 1 | 1 | | 1 | | 1 | 1 | | | | | 1 | |
| CO 2 | 2 | 1 | 2 | 1 | 2 | 1 | | | | | | 1 | |
| CO 3 | 1 | 1 | 1 | | 1 | | 1 | | | | | 2 | |
| CO 4 | 1 | 1 | 1 | 1 | | 1 | | | | | | | |

## Assessment Pattern

1. Assessment for laboratory work will be based on skills acquired by students during the course.
2. Continuous Assessment Sheet (CAS) will be maintained for each student.

| Knowledge Level | CT 1 | CT 2 | CA | ESE |
|---|---|---|---|---|
| Remember | | | | |
| Understand | | | | |
| Apply | | | 20 | 20 |
| Analyse | | | 20 | 20 |
| Evaluate | | | 10 | 10 |
| Create | | | | |
| TOTAL | | | 50 | 50 |

## Government College of Engineering, Karad

## Second Year (Sem – III) B. Tech. Electrical Engineering

## EE 2309 : Technical Training and Presentation in Vernacular

| Teaching Scheme | | Examination Scheme | |
|---|---|---|---|
| Lectures | 00Hrs/week | CT – 1 | 00 |
| Tutorials | 01 Hrs/week | CT – 2 | 00 |
| Total Credits | 01 | TA | 25 |
| | | ESE | 25 |
| | | Duration of ESE | |

**Course Outcomes (CO)**

Student will be able to:

| | |
|---|---|
| **1.** | Understand the importance of presentations and their inherent problems and Identify the audience, purpose, organization, flow, style, and delivery of presentations. |
| **2.** | Use natural sounding linking phrases and expressions when navigating and explaining presentation content. |
| **3.** | Deliver a presentation from notes with comprehensible pronunciation |
| **4.** | Control nerves and deliver a presentation with confidence and authority |

| | Course Contents | Hours |
|---|---|---|
| Technical Training: | Student is supposed to present technical report on the industrial training or electrical engineering related in-house training of not less than fifteen days completed during summer vacation. The presentation can be in any language where student will be assessed for the technical knowledge he/she has gained during training period. | |
| Presentation in Vernacular | Students need to present his/her thought on any contemporary issue of his/her interest. Student is supposed to present thoughts in any language using presentation tools. The assessment of this presentation will be done on presentation skills of student. | |

**Tutorials**

**Text Books**

| | |
|---|---|
| **1.** | Brian Tracy; How to Present With Power in Any Situation, McGraw-Hill Publication |
| **2.** | Edward R. Tufte; The Visual Display of Quantitative Information, Graphic Press, 2nd Edition |
| **3.** | |

**Reference Books**

| | |
|---|---|
| **1.** | Scott Berkun;Confessions of a Public Speaker;Oreilly Publication |
| **2.** | Garr Reynolds; Presentation Zen, Simple Ideas on Presentation Design and Delivery; New Riders publication, 2nd Edition |

**Useful Links**

| | |
|---|---|
| **1.** | http://buildingpublicunderstanding.org/assets/files/presentationzen.pdf |
| **2.** | https://www.google.com/search |
| **3.** | https://www.semanticscholar.org/paper/The-visual-display-of-quantitative-information-Tufte |

**EE2309**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – III) B. Tech. Electrical Engineering |
| EE 2309 : Technical Training and Presentation in Vernacular |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Understand the importance of presentations and their inherent problems and Identify the audience, purpose, organization, flow, style, and delivery of presentations. |
| **2.** | Use natural sounding linking phrases and expressions when navigating and explaining presentation content. |
| **3.** | Deliver a presentation from notes with comprehensible pronunciation |
| **4.** | Control nerves and deliver a presentation with confidence and authority |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | | | | 3 | 1 | 2 | | 3 | 3 | 2 | 3 | 1 |
| CO 2 | | | | | | 1 | | 1 | 2 | 3 | 1 | 3 | |
| CO 3 | 3 | | | | 2 | | | 1 | 2 | 3 | | 3 | 3 |
| CO 4 | | | | | | | | 1 | 2 | 3 | | 3 | |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | 8 | 8 |
| Understand | | | 8 | 8 |
| Apply | | | 3 | 0 |
| Analyse | | | 2 | 6 |
| Evaluate | | | 2 | 2 |
| Create | | | 2 | 0 |
| TOTAL | | | 25 | 25 |

## Government College of Engineering, Karad

## Second Year (Sem. – IV) B. Tech. Electrical Engineering

## EE 2401 : Digital Electronics

| Teaching Scheme | |
|---|---|
| Lectures | 03 Hrs/week |
| Tutorials | -- |
| Total Credits | 03 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

**Course Outcomes (CO)**

Student will be able to:

| | |
|---|---|
| **1.** | Understand fundamental concepts and techniques used in digital electronics. |
| **2.** | Analyse combinational and sequential circuits. |
| **3.** | Apply Analog to Digital and Digital to Analog conversion to implement digital systems. |
| **4.** | Study the concept of memories, programmable logic devices and digital ICs. |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | **Fundamental of Digital System and Logic Families:** Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic. | **(08)** |
| **Unit 2** | **Combinational Digital Circuits:** Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices. | **(07)** |
| **Unit 3** | **Sequential Circuits:** RS Latches, Level Clocking, D Latches, Edge-Triggered D Flip-Flops, Edge-Triggered. JK Master slave Flip-Flop. applications of flipflops. Buffer Registers, Shift Registers, Controlled Shift Registers, applications of Registers Ripple Counters, Synchronous Counters, Ring counters, Other counters, applications of Counters. | **(07)** |
| **Unit 4** | **A/D and D/A Converters:** Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using Voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs. | **(07)** |
| **Unit 5** | **Memories:** ROMs PROMs and EPROMs, RAMs. commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA). | **(06)** |
| **Tutorials** | | |

**Text Books**

| | |
|---|---|
| **1.** | Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and Applications". Tata McGraw Hill, |

| | |
|---|---|
| | Seventh Edition, 2012. |
| **2.** | Anand Kumar, "Fundamentals of Digital Circuits", Prentice-Hall India, Second Edition 2013. |
| **3.** | Morris Mano, Digital Design, Prentice Hall of India, 4th Edition, 2008 |
| **Reference Books** | |
| **1.** | Tabu and Shilling, "Digital Integrated Electronics", McGraw Hill |
| **2.** | R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill, Fourth Edition,2011. |
| **Useful Links** | |
| **1.** | http://web.iitd.ac.in/~shouri/eel201/lectures.php |
| **2.** | http://www.daenotes.com/electronics/digital-electronics |

**EE2401**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering |
| EE 2401 : Digital Electronics |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Understand fundamental concepts and techniques used in digital electronics. |
| **2.** | Analyse combinational and sequential circuits. |
| **3.** | Apply Analog to Digital and Digital to Analog conversion to implement digital systems. |
| **4.** | Study the concept of memories, programmable logic devices and digital ICs. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | | | | | 1 | 1 |
| CO 2 | 2 | 2 | 2 | 1 | 3 | | | | | | | 1 | |
| CO 3 | 3 | 1 | 2 | 1 | 3 | | | | | | 2 | 1 | 2 |
| CO 4 | 2 | 2 | 2 | 1 | 1 | | | | | | | 1 | 3 |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | 3 | | | |
| Understand | 3 | 3 | 2 | 05 |
| Apply | 3 | 3 | 2 | 10 |
| Analyse | 3 | 3 | 2 | 15 |
| Evaluate | | 3 | 2 | 15 |
| Create | | 3 | 2 | 15 |
| TOTAL | 15 | 15 | 10 | 60 |

## Government College of Engineering, Karad

## Second Year (Sem. – IV) B. Tech. Electrical Engineering

## EE2402 : Signal Processing for Electrical Engineering

| Teaching Scheme | |
|---|---|
| Lectures | 03Hrs/week |
| Tutorials | 00Hrs/week |
| Total Credits | 03 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

**Course Outcomes (CO)**

Student will be able to:

| | |
|---|---|
| **1.** | Compare CT and DT signals and analyse LTI systems in frequency domain. |
| **2.** | Analyse and design the time domain and frequency domain behavior of higher order systems |
| **3.** | Analyse and characterize of LTI systems using Laplace and Z Transforms |
| **4.** | Transform given set of state variables into another form by using different transform methods |

| | Course Contents | Hours |
|---|---|---|
| Unit 1 | **Signals and Systems:**<br>Continuous and Discrete Time Signals, Signal Energy and Power<br>CT and DT Exponential and Sinusoidal Signals<br>CT and DT Unit Impulse and Unit step signals<br>CT and DT systems-Basic System properties<br>Linear Time Invariant (LTI) Systems, Discrete time LTI System- Convolution Sum<br>Continuous time LTI systems-Convolution Integration<br>Causal LTI systems described by differential and difference equations<br>Singularity Functions | **08** |
| Unit 2 | **Fourier series representation and Fourier Transforms:**<br>Fourier series representation of CT periodic signals<br>Properties of CT Fourier series<br>Fourier series representation of DT periodic signals<br>Properties of DT Fourier series<br>Fourier Transform for periodic signals<br>Properties of CTFT<br>The Discrete Time Fourier transform (DTFT)<br>Properties of CTFT | **10** |
| Unit 3 | **Time and Frequency Characterization of Signals and Systems:**<br>The magnitude and phase representation of the frequency response of LTI systems<br>Ideal filters and time and frequency domain aspects of non-ideal filters.<br>First and second order CT systems<br>First and second order DT systems | **06** |
| Unit 4 | **Laplace and Z Transforms:**<br>Analysis and characterization of LTI systems using Laplace Transforms<br>Analysis and characterization of LTI systems using Z Transforms | **06** |
| Unit 5 | **State Space Analysis:**<br>State space equations<br>Solution of State Equations for Continuous Systems<br>Linear transformation of State Vector<br>Controllability and Observability<br>State space Analysis of Discrete system | **06** |
| Unit 6 | **Sampling**<br>Sampling theorem, Aliasing and reconstruction of signal from its samples<br>**Transformations**<br>Symmetrical components of unsymmetrical phasor<br>Park's Transformation and its applications | **06** |

| | | |
|---|---|---|
| | Clark's Transformation<br>**Harmonic Analysis of Electrical Signals**<br>Definition of harmonics, Fourier's theorem, Harmonic sources, Effects of harmonics | |
| **Text Books** | | |
| 1. | A. V. Oppenheim, A. S. Willsky and S. H. Nawab, "Signals and systems", Prentice Hall India, 1997. | |
| **Reference Books** | | |
| 1. | B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2009. | |
| 2. | S. Haykin and B. V. Veen, "Signals and Systems", John Wiley and Sons, 2007. | |
| 3. | Ned Mohan, "Power Electronics-Converters ,Applications and Design" | |
| 4. | J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw Hill Education | |
| **5.** | HadiSaadat, "Power System Analysis" Tata McGraw Hill Edition | |
| **Useful Links** | | |
| **1.** | https://nptel.ac.in/courses/108/104/108104100/ | |
| **2.** | https://nptel.ac.in/courses/108/105/108105055/ | |
| **3.** | https://nptel.ac.in/courses/117/101/117101055/ | |

**EE2402**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering |
| EE2402 : Signal Processing for Electrical Engineering |

**Mapping of COs and Pos**

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Compare CT and DT signals and analyse LTI systems in frequency domain. |
| **2.** | Analyse and design the time domain and frequency domain behavior of higher order systems |
| **3.** | Analyse and characterize of LTI systems using Laplace and Z Transforms |
| **4.** | Transform given set of state variables into another form by using different transform methods |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | 3 | 2 | 2 | 2 | | | | | | | 3 | 3 |
| CO 2 | 3 | 3 | 2 | 2 | 3 | | | | | | | 3 | 3 |
| CO 3 | 3 | 3 | 2 | 2 | 3 | | | | | | | 3 | 3 |
| CO 4 | 3 | 3 | 2 | 3 | 3 | | | | | | | 3 | 3 |

**Assessment Pattern (with revised Bloom's Taxonomy)**

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | - | - | - | - |
| Understand | - | - | - | - |
| Apply | 05 | 05 | 3 | 20 |
| Analyse | 05 | 05 | 3 | 20 |
| Evaluate | 05 | 05 | 4 | 20 |
| Create | - | - | - | - |
| TOTAL | 15 | 15 | 10 | 60 |

## Government College of Engineering, Karad

## Second Year (Sem. – IV) B. Tech. Electrical Engineering

## EE2403: Electrical Machines-I

| Teaching Scheme | |
|---|---|
| Lectures | 03Hrs/week |
| Tutorials | 00Hrs/week |
| Total Credits | 03 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

### Course Outcomes (CO)

Student will be able to:

| | |
|---|---|
| **1.** | Apply engineering concepts in construction & working of DC machines. |
| **2.** | Formulate mathematical equations to model DC machines for obtaining various parameters under different loading conditions. |
| **3.** | Apply engineering concepts in construction & working of Transformers. |
| **4.** | Make selection of appropriate machine for different applications. |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | **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. | **(06)** |
| **Unit 2** | **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. | **(06)** |
| **Unit 3** | **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. | **(06)** |
| **Unit 4** | **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. | **(06)** |
| **Unit 5** | **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. | **(06)** |
| **Unit 6** | **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. | **(06)** |

### Text Books


| | |
|---|---|
| **1.** | Kothari D.P, Nagrath I.J., Electric Machines, TMH Publications, 4th Edition |

| | |
|---|---|
| **2.** | Alexander S Langsdorf, Theory of Alternating Current Machinery, 2nd edition, Tata McGraw-Hill, 2001 |
| **3.** | Dr. Bimbhra P.S., "Electric Machinery", Khanna Publisher, Fifth Edition |
| **Reference Books** | |
| **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 Indi |
| **Useful Links** | |
| **1.** | nptel.ac.in/courses/108105017/ |
| **2.** | www.nptelvideos.in/2012/11/electrical-machines-i.html by D Kashta, IIT Khargpur |

**EE2403**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering |
| EE2403: Electrical Machines-I |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Apply engineering concepts in construction & working of DC machines. |
| **2.** | Formulate mathematical equations to model DC machines for obtaining various parameters under different loading conditions. |
| **3.** | Apply engineering concepts in construction & working of Transformers. |
| **4.** | Make selection of appropriate machine for different applications. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 3 |
| CO 2 | 3 | 1 | | 1 | 2 | 1 | 1 | | | | | 2 | 3 |
| CO 3 | 2 | 1 | | 1 | 1 | | 3 | | | | | 1 | 3 |
| CO 4 | 1 | 1 | 1 | 1 | 2 | | | | | | | 1 | 3 |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | 5 |
| Understand | | | | 5 |
| Apply | 5 | 5 | 4 | 20 |
| Analyse | 5 | 5 | 2 | 20 |
| Evaluate | 5 | 5 | 4 | 10 |
| Create | | | | |
| TOTAL | 15 | 15 | 10 | 60 |

## Government College of Engineering, Karad

## Second Year (Sem. – IV) B. Tech. Electrical Engineering

## EE 2404 : Power System-I

| Teaching Scheme | |
|---|---|
| Lectures | 03Hrs/week |
| Tutorials | 00 Hrs/week |
| Total Credits | 03 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

**Course Outcomes (CO)**

Student will be able to:

| | |
|---|---|
| **1.** | Study and structured the evolution of power system. |
| **2.** | Signify the per phase impedance and reactancediagrams for a symmetrical three-phase system. |
| **3.** | Determine the different parameters of different type of transmission lines. |
| **4.** | Identify economic aspects of power generation. |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | **Evolution of Power Systems**<br>Evolution of Power Systems and Present-Day Scenario.<br>Structure of a power system: Bulk PowerGrids and Micro-grids.<br>Generation: Conventional and Renewable Energy Sources. Distributed Energy Resources. EnergyStorage.<br>Transmission and Distribution Systems: Line diagrams, transmission and distribution voltage levels and topologies (meshed and radial systems).<br>Synchronous Grids and Asynchronous (DC) interconnections.<br>Review of Three-phase systems. Analysis of simple three-phase circuits.Power Transfer in AC circuits and Reactive Power. | **(06)** |
| **Unit 2** | **Power System Components and Per Unit System**<br>Introduction to Power system elements.<br>Single phase representation of balanced three phase systems,<br>Per-unit system,Per unit representation of transformer, methods of voltage control. Changing the base of Per-unit quantities,<br>Nodeequations, Single-line diagram, Impedance and Reactance diagram. | **(06)** |
| **Unit 3** | **Series Impedance of Transmission Lines**<br>Types of Conductors, Resistance, Inductance of conductor due to internal flux,<br>Flux linkages between two points external to an isolated conductor,<br>Inductance of a single phase two wire line ,<br>Flux linkages of one conductor in a group,<br>Inductance of a three phase lines with equilateral spacing,<br>Inductance of a three phase lines with Unsymmetrical spacing. | **(08)** |
| **Unit 4** | **Capacitance of Transmission Lines**<br>Electric field of a long straight conductor ,<br>Potential difference between two points due to a charge,<br>Capacitance of two wire line,<br>Capacitance of a three phase line with equilateral spacing,<br>Capacitance of a three phase line with unsymmetrical spacing,<br>Effect of earth on the capacitance of three phase transmission lines. | **(08)** |
| **Unit 5** | **Current and Voltage relations of Transmission Line**<br>Representation of Lines, short Transmission line, medium –length line,<br>long transmission line: Solution of differential equations,<br>long transmission line: Interpretation of the equation,<br>Power flow through a transmission lines,<br>Transmission-line Transients. | **(06)** |
| **Unit 6** | **Economic Aspects of Power Generation** | **(06)** |

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

| | |
|---|---|
| **Text Books** | |
| **1.** | J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw Hill Education, 1994. |
| **2.** | D. P. Kothari and I. J. Nagrath, "Modern Power System Analysis", McGraw Hill Education,2003. |
| **Reference Books** | |
| **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, fifth edition |
| **Useful Links** | |
| **1.** | https://nptel.ac.in/courses/108/105/108105067/ |
| **2.** | https://nptel.ac.in/courses/108/102/108102047/ |
| **3.** | https://nptel.ac.in/courses/108/104/108104051/ |

**EE2404**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – VII) B. Tech. Electrical Engineering |
| EE 2404 : Power System-I |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Study and structured the evolution of power system. |
| **2.** | Signify the per phase impedance and reactancediagrams for a symmetrical three-phase system. |
| **3.** | Determine the different parameters of different type of transmission lines. |
| **4.** | Identify economic aspects of power generation. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 1 | 1 | 1 | 2 | 1 | 2 | | | | | | 2 | |
| CO 2 | 2 | 3 | 3 | 1 | 2 | 1 | | | | | | 2 | |
| CO 3 | 2 | 3 | 3 | 1 | 2 | 1 | | | | | | 2 | |
| CO 4 | 2 | 1 | 1 | 2 | 1 | 2 | | | | | | 3 | |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | - | - | - | - |
| Understand | - | - | - | 10 |
| Apply | 5 | 5 | 3 | 20 |
| Analyse | 5 | 5 | 3 | 20 |
| Evaluate | 5 | 5 | 4 | 10 |
| Create | - | - | - | - |
| TOTAL | 15 | 15 | 10 | 60 |

## Government College of Engineering, Karad

## Second Year (Sem. – IV) B. Tech. Electrical Engineering

## EE 2405: Electrical Measurements and instrumentation

| Teaching Scheme | |
|---|---|
| Lectures | 03Hrs/week |
| Tutorials | -- |
| Total Credits | 03 |

| Examination Scheme | |
|---|---|
| CT – 1 | 15 |
| CT – 2 | 15 |
| TA | 10 |
| ESE | 60 |
| Duration of ESE | 02 Hrs 30 Min |

**Course Outcomes (CO)**

Student will be able to:

| | |
|---|---|
| **1.** | Apply physical laws used in different measuring instruments. |
| **2.** | Analyze the dynamic response and the calibration of instruments. |
| **3.** | Recognise need of using advanced and contemporary instruments. |
| **4.** | Understand proper sensor technologies for specific applications |

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | Fundamentals of Measurement:<br>Performance characteristics (static, dynamic), Concepts relating to Measurements: True value, Accuracy, Precision, Resolution, Drift, Hysteresis, Dead-band, Sensitivity, Errors in Measurements, Basic statistical analysis applied to measurements: Mean, StandardDeviation, and Six-sigma estimation,Cp,Cpk.Current and Voltage Measurements: Shunts, Potential Dividers, Instrument Transformers. | **(06)** |
| **Unit 2** | Measurements of R, L and C: Types of AC and DC bridges. Measurement of low, medium and high resistance.Measurement of power and energy in single phase and poly-phase circuits. Calibration of energy meter. | **(06)** |
| **Unit 3** | Measurement using digital instruments: Digital meters: Ammeter, Voltmeter, and multimeter, wattmeter, and Energy meter. Basic circuitry of electronic counter, frequency measurement using electronic counter. | **(06)** |
| **Unit 4** | Sensors and Transducers for physical parameters:Sensors & transducers for common engineering measurements liketemperature, pressure, torque, level, displacement,flow, Speedand Position Sensors.Opto-electronics-Shaft encoders, CD Sensors, Vision System etc. | **(06)** |
| **Unit 5** | Recent developments in Instrumentation and Measurements: Introduction to PLC, Wave Analyzers and Harmonic Distortion, Power Analyzer,Fiber Optic Transducers, Micro sensors, Smart Sensors, Virtual Instrumentation. Hall effect transducers, Strain gauge. | **(06)** |
| **Unit 6** | Instrumentation & Sensor TechnologiesforEngineering Applications:Measurement and Instrumentation for Industrial Automation. | **(06)** |

Text Books


| | |
|---|---|
| **1.** | Instrumentation: Measurement and Analysis, Nakra and Chaudhari, Tata McGraw Hill, New Delhi |
| **2.** | Alan S. Morris, Reza Langari, "Measurement and Instrumentation: Theory and application", Academic Press, 2012. |
| **3.** | Ernest O.Doebelin, "Measurement Systems Application and Design, International Student Edition", McGraw Hill Book Company, 1998. |


Reference Books


| | |
|---|---|
| **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, DhanpatRai and Sons. |
| **3.** | Mikell P. Groover, Automation, Production Systems, and Computer-integrated Manufacturing, prentice Hall. |
| **4.** | Control in Robotics and Automation, Ghosh, Allied Publishers. |
| **5.** | Modern Machining Process, Pandey and Shan, TMH. |


**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 |
| **3.** | https://nptel.ac.in/courses/108/105/108105063/ |

**EE2405**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering |
| EE 2405 : Electrical Measurements and instrumentation |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Apply physical laws used in different measuring instruments. |
| **2.** | Analyze the dynamic response and the calibration of instruments. |
| **3.** | Recognise need of using advanced and contemporary instruments. |
| **4.** | Understand proper sensor technologies for specific applications |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 1 | | | | | | | | | | | 1 | 1 |
| CO 2 | 1 | | | | | | | | | | | | 1 |
| CO 3 | 1 | 1 | 1 | | | | | | | | | 1 | |
| CO 4 | 1 | | 1 | 1 | 1 | | | | | | | 1 | |

## Assessment Pattern (with revised Bloom's Taxonomy)

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | 3 | 3 | 2 | 12 |
| Understand | 3 | 3 | 2 | 12 |
| Apply | 2 | 2 | 2 | 12 |
| Analyse | 2 | 2 | 1 | 11 |
| Evaluate | 2 | 2 | 1 | 13 |
| Create | 3 | 3 | 2 | 13 |
| TOTAL | 15 | 15 | 10 | 60 |

| Government College of Engineering, Karad | | | | |
|---|---|---|---|---|
| Second Year (Sem. – IV) B. Tech. Electrical Engineering | | | | |
| EE408: Digital Electronics Lab | | | | |
| **Teaching Scheme** | | | **Examination Scheme** | |
| Lectures | --- | | CT – 1 | - |
| Tutorials | --- | | CT – 2 | - |
| Practicals | 02 Hrs/week | | CA | 25 |
| Total Credits | 01 | | ESE | 25 |
| | | | Duration of ESE | 3hrs |

| **Course Outcomes (CO)** | |
|---|---|
| Student will be able to: | |
| **1.** | Implement and Demonstrate various Logic gates. |
| **2.** | Construct basic combinational circuits and verify their functionalities. |
| **3.** | Implement basic sequential circuits. |
| **4.** | Implment counters and Shift registers. |

| | Experiments: The list given here is illustrative list and course coordinator is encouraged to design new experiments. | |
|---|---|---|
| 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 Subtractor and Full Subtractor. | |
| Experiment 5 | To Study and Verify operation of Multiplexer and Demultiplexer. | |
| Experiment 6 | To Study and Verify operation of Binary to Gray and Gray to Binary Converter. | |
| Experiment 7 | To Study and Verify operation of S-R, J-K, T, D type Flip Flop. | |
| Experiment 8 | Study of Counters using IC's: Up down, Decade, Synchronous, Binary, BCD counter. | |
| Experiment 9 | Study of Ring Counter, Johnson Counter etc. | |
| Experiment 10 | 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 11 | Design of Decoder driver to drive 7 segment LED display. | |

**EE2406**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering |
| EE2406: Digital Electronics Lab |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Implement and Demonstrate various Logic gates. |
| **2.** | Construct basic combinational circuits and verify their functionalities. |
| **3.** | Implement basic sequential circuits. |
| **4.** | Implment counters and Shift registers. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 2 | | | 3 | | 1 | | | 2 | | | 1 | 1 |
| CO 2 | 3 | | 3 | 3 | | 2 | 2 | | | 2 | | | |
| CO 3 | 3 | 2 | 3 | 3 | 1 | | 2 | | 2 | 2 | | | |
| CO 4 | 2 | 2 | 3 | 3 | 2 | | | | | | | | |

## Assessment Pattern

1. Assessment for laboratory work will be based on skills acquired by students during the course.
2. Continuous Assessment Sheet (CAS) will be maintained for each student.

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | |
| Understand | | | | |
| Apply | | | | |
| Analyse | | | | |
| Evaluate | | | | |
| Create | | | | |
| TOTAL | | | | |

| Government College of Engineering, Karad | | | | |
|---|---|---|---|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering | | | | |
| EE2407: Electrical Machines-1 Lab | | | | |
| **Teaching Scheme** | | | **Examination Scheme** | |
| Practicals | 02Hrs/week | | TA | 25 |
| Total Credits | 01 | | ESE | 25 |
| | | | Duration of ESE | 03 Hrs |

| **Course Outcomes (CO)** | |
|---|---|
| Student will be able to: | |
| **1.** | Apply appropriate experimental setup for performance evaluation of machines. |
| **2.** | Apply engineering mathematics for validation of experimental results. |
| **3.** | Understand various tests on DC machines & Transformer. |
| **4.** | Interpret obtained results to reach appropriate conclusion. |

| | **Course Contents** |
|---|---|
| Experiments: The list given here is illustrative list and course coordinator is encouraged to design new experiments. | |
| **Experiment1** | O.C.C. on Separately Excited DC generator |
| **Experiment2** | Load test on DC Shunt Motor |
| **Experiment3** | Load test on DC Series Motor |
| **Experiment4** | Speed Control of DC Shunt Motor(Armature and Field Control) |
| **Experiment5** | Swinburne's Test |
| **Experiment6** | Hopkinson's Test |
| **Experiment7** | To Find equivalent circuit parameters from O.C and S.C Test on single phaseTransformer |
| **Experiment8** | Sumpner's Test on single phase transformer |
| **Experiment9** | Load test on single phase transformer |
| **Experiment10** | Scott connection |
| **Experiment11** | Parallel operation of single phase transformer |

**EE2407**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering |
| EE2407: Electrical Machines-I Lab |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Apply appropriate experimental setup for performance evaluation of machines. |
| **2.** | Apply engineering mathematics for validation of experimental results. |
| **3.** | Understand various tests on DC machines & Transformer. |
| **4.** | Interpret obtained results to reach appropriate conclusion. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 1 | 1 | | | | 1 | 2 | | | | | 1 | 3 |
| CO 2 | 1 | | 1 | | 1 | 1 | 1 | | | | | 2 | 3 |
| CO 3 | 1 | | 1 | 1 | 1 | 1 | | | | | | 1 | 3 |
| CO 4 | 1 | 2 | | 2 | 1 | | 1 | | | | | | 3 |

## Assessment Pattern

1. Assessment for laboratory work will be based on skills acquired by students during the course.
2. Continuous Assessment Sheet (CAS) will be maintained for each student.

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | |
| Understand | | | | |
| Apply | | | | |
| Analyse | | | | |
| Evaluate | | | | |
| Create | | | | |
| TOTAL | | | | |

# Government College of Engineering, Karad

## Second Year (Sem – IV) B. Tech. Electrical Engineering

## EE 2408: Power System-I Lab

| Teaching Scheme | | Examination Scheme | |
|---|---|---|---|
| Lectures | 02Hrs/week | CT – 1 | - |
| Tutorials | - | CT – 2 | - |
| Total Credits | 01 | TA/CA | 25 |
| | | ESE | - |

### Course Outcomes (CO)

Student will be able to

| | |
|---|---|
| **1.** | Determine the parameters of AC circuits |
| **2.** | Determine the parameters of Transmission line |
| **3.** | Calculate various economic factors of power generation |
| **4.** | Understand various aspects of substation. |

| | | |
|---|---|---|
| | Experiments: The list given here is illustrative list and course coordinator is encouraged to design new experiments. | |
| | Experiments using available software 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 | |

### Reference Books


| | |
|---|---|
| **1.** | Hadi Sadat, Power System Analysis, McGraw Hill International, fifth edition |


### Useful Links

| | |
|---|---|
| **1.** | https://nptel.ac.in/courses/103106118/ |

EE2408

| Government College of Engineering, Karad |
|---|
| Second Year (Sem. – IV) B. Tech. Electrical Engineering |
| EE 2408: Power System-I Lab |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Determine the parameters of AC circuits |
| **2.** | Determine the parameters of Transmission line |
| **3.** | Calculate various economic factors of power generation |
| **4.** | Understand various aspects of substation. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 2 | 2 | 2 | 2 | 2 | 1 | | | | | | 3 | |
| CO 2 | 2 | 2 | 2 | 3 | 2 | 1 | | | | | | 3 | |
| CO 3 | 2 | 1 | 1 | 2 | 1 | 2 | | | | | | 3 | |
| CO 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 3 | |

## Assessment Pattern

1. Assessment for laboratory work will be based on skills acquired by students during the course.
2. Continuous Assessment Sheet (CAS) will be maintained for each student.

| Knowledge Level | CT 1 | CT 2 | TA/CA | ESE |
|---|---|---|---|---|
| Remember | - | - | - | - |
| Understand | - | - | - | - |
| Apply | - | - | 10 | - |
| Analyse | - | - | 10 | - |
| Evaluate | - | - | 05 | - |
| Create | | | | |
| TOTAL | | | 25 | |

| Government College of Engineering, Karad | | | | | |
|---|---|---|---|---|---|
| Second Year (Sem. – IV) B. Tech. Electrical Engineering | | | | | |
| EE 2409: Electrical Measurements and Instrumentation Lab | | | | | |
| **Teaching Scheme** | | | **Examination Scheme** | | |
| Lectures | --- | | CT – 1 | - | |
| Tutorials | --- | | CT – 2 | - | |
| Practicals | 02 Hrs/week | | CA | 25 | |
| Total Credits | 01 | | ESE | 25 | |
| | | | Duration of ESE | 03 Hrs | |
| **Course Outcomes (CO)** | | | | | |
| Student should acquire the skill to, | | | | | |
| **1.** | Learn about various measurement devices, their characteristics, their operation and their limitations. | | | | |
| **2.** | Design and validate DC and AC bridges. | | | | |
| **3.** | Understand the principles of operation and characteristics of instrumentation and integratedsensor systems. | | | | |
| **4.** | Apply proper method, sensors and transducers for specific applications and measurement. | | | | |
| | Experiments: The list given here is illustrative list and course coordinator is encouraged to design new experiments. | | | | |
| 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 energy meter at different power factors. | | | | |
| Experiment 4 | Measurement of Reactive Power by one wattmeter with all possible connections of current coil and pressure coil. | | | | |
| Experiment 5 | Measurement of resistance using appropriate bridge as well as LCR meter. | | | | |
| Experiment 6 | Measurement of Inductance using appropriate bridge as well as LCR meter. | | | | |
| Experiment 7 | Measurement of Capacitance using appropriate bridge as well as LCR meter. | | | | |
| Experiment 8 | Usage of DSO for steady state periodic waveforms produced by a function generator. Selection of trigger source and trigger level, selection of time-scale and voltage scale. Bandwidth of measurement and sampling rate. | | | | |
| Experiment 9 | Download of one-cycle data of a periodic waveform from a DSO and use values to compute the RMS values using a C program. | | | | |
| Experiment 10 | Usage of DSO to capture transients like a step change in R-L-C circuit. | | | | |
| Experiment 11 | Study of Bosch sensor applications. | | | | |
| | *Design proper sensor technology for specific application. | | | | |
| | (*with batch of four students) | | | | |
| | | | | | |

**EE2409**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering |
| EE 2409 : Electrical Measurements and Instrumentation Lab |

## Mapping of COs and Pos

| Course Outcomes (CO) | |
|---|---|
| Student will be able to: | |
| **1.** | Learn about various measurement devices, their characteristics, their operation and their limitations. |
| **2.** | Design and validate DC and AC bridges. |
| **3.** | Understand the principles of operation and characteristics of instrumentation and integratedsensor systems. |
| **4.** | Apply proper method, sensors and transducers for specific applications and measurement. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 1 | | | | | | | | | | | 1 | 1 |
| CO 2 | 1 | | | | | | | | | | | | 1 |
| CO 3 | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 | 1 | 1 | |
| CO 4 | 1 | | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | |

## Assessment Pattern

1. Assessment for laboratory work will be based on skills acquired by students during the course.
2. Continuous Assessment Sheet (CAS) will be maintained for each student.

| Knowledge Level | TA | ESE |
|---|---|---|
| Remember | 2 | 12 |
| Understand | 2 | 12 |
| Apply | 2 | 12 |
| Analyse | 1 | 11 |
| Evaluate | 1 | 13 |
| Create | 2 | 13 |
| TOTAL | 10 | 60 |

## Government College of Engineering, Karad

## Second Year (Sem – IV) B. Tech. Electrical Engineering

## EE2410 : Environmental Science

| Teaching Scheme | | Examination Scheme | |
|---|---|---|---|
| Lectures | 02 Hrs/week | CT – 1 | --- |
| Tutorials | --- | CT – 2 | --- |
| Total Credits | 00(Audit) | TA | --- |
| | | ESE | --- |
| | | Duration of ESE | --- |

### Course Outcomes (CO)

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

| | Course Contents | Hours |
|---|---|---|
| **Unit 1** | **Natural Resources and Associated Problems:**<br>Definition, scope and importance. Multidisciplinary nature of environmental studies<br>Need for public awareness.<br>a) Environment resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people.<br>b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.<br>c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources.<br>d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems.<br>e) Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.<br>f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. | **(08)** |
| **Unit 2** | **Ecosystems:**<br>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,<br>structure and function of the following ecosystem :-<br>a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,<br>d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). | **(06)** |
| **Unit 3** | **Biodiversity and its conservation :**<br>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. | **(06)** |
| **Unit 4** | **Environmental Pollution:**<br>Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, | **(06)** |

| | | |
|---|---|---|
| | Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.<br>Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of a individual in prevention of pollution. | |
| **Unit 5** | **Social Issue and Environment:**<br>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.<br>Consumerism and waste products. | **(08)** |
| **Unit 6** | **Environmental Protection :**<br>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. | **(08)** |

| | |
|---|---|
| **Tutorials** | |
| | Visit to a local area to document environmental assets-river/Forest/Grassland/Hill/Mountain.<br>OR<br>Visit to a local polluted site -Urban / Rural / Industrial /Agricultural.<br>OR<br>Study of common plants, insects, birds. |
| **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) |
| **Reference Books** | |
| **1.** | Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner. (Edition 2011) |
| **2.** | BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahemdabad 380013 India (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.** | Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II, Environmental Medi |
| **Useful Links** | |
| **1.** | www.mpcb.gov.in |
| **2.** | www.cpcb.nic.in |
| **3.** | www.downtoearth.org.in |

**EE2410**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem – IV) B. Tech. Electrical Engineering |
| EE2410 : Environmental Science |

**Mapping of COs and Pos**

| Course Outcomes (CO) |
|---|
| Explain key concepts from Economic, and Social analysis as they pertain to design and evaluation of environmental policies and institutions. |
| Appreciate concepts and methods from ecological and physical sciences and their applications in environmental problem solving. |
| Appreciate the ethical, cross cultural and historical context of environmental issues and the links between human and natural systems. |
| Reflect critically about their roles and identities as citizens, consumers, environmental actors in a complex and interconnected world. |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 1 | | 1 | | 1 | 2 | 3 | | | | 1 | 1 | 1 |
| CO 2 | 1 | | 1 | | 1 | 2 | 3 | | | | | 1 | 1 |
| CO 3 | 1 | | 1 | | 1 | 2 | 3 | | | | 1 | 2 | 1 |
| CO 4 | 1 | | 1 | | 1 | 2 | 3 | | | | | 1 | 2 |

**Assessment Pattern (with revised Bloom's Taxonomy)**

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | | | | |
| Understand | | | | |
| Apply | | | | |
| Analyse | | | | |
| Evaluate | | | | |
| Create | | | | |
| TOTAL | | | | |

## Government College of Engineering, Karad

## Second Year (Sem. – IV) B. Tech. Electrical Engineering

## EE 2411 :Technical Presentation

| Teaching Scheme | | Examination Scheme | |
|---|---|---|---|
| Lectures | - | CT – 1 | --- |
| Tutorials | 01 Hr./week | CT – 2 | --- |
| Total Credits | 01 | TA | 25 |
| | | ESE | 25 |
| | | Duration of ESE | |

**Course Outcomes (CO)**

Student will be able to

| | |
|---|---|
| **1.** | Understand the importance of presentations and their inherent problems and Identify the audience, purpose, organization, flow, style, and delivery of presentations. |
| **2.** | Cite and reference presentation resources and data and use advanced presentation software packages. |
| **3.** | Control nerves and deliver a presentation with confidence and authority. |
| **4.** | Understand how to deal with questions from the audience |

| | Course Contents | Hours |
|---|---|---|
| Technical Presentation | In this course, students will develop the oral presentation skills needed to present technical research findings in any electrical field. Students are expected to design and give a five to fifteen-minute presentation related to their field of interests in electrical engineering.<br>This presentation will be in English. Students will focus on the language needed during each part of the presentation (opening, outline, background, materials/methods, results, discussion, summary, and Q&A). By analyzing the language used in a model presentation given at a real-world engineering conference, students will learn many of the common features of presentation language and develop confidence to deliver their own presentations in English. Students will also practice the target language through a series of short pair and group activities, and work toward a final presentation related to their field of interests. It will accurately reflect the type of presentation that students will need to give at an academic conference. | |
| **Tutorials** | | |
| | | |

**Text Books**

| | |
|---|---|
| **1.** | Garr Reynolds; Presentation Zen, Simple Ideas on Presentation Design and Delivery; New Riders publication, 2nd Edition |
| **2.** | Edward R. Tufte; The Visual Display of Quantitative Information, Graphic Press, 2nd Edition |

**Reference Books**

| | |
|---|---|
| **1.** | Brian Tracy; How to Present With Power in Any Situation, McGraw-Hill publication |
| **2.** | Scott Berkun; Confessions of a Public Speaker; Oreilly Publication |

**Useful Links**

| | |
|---|---|
| **1.** | https://www.google.com/search |
| **2.** | http://buildingpublicunderstanding.org/assets/files/presentationzen.pdf |
| **3.** | https://www.semanticscholar.org/paper/The-visual-display-of-quantitative-information-Tufte |

**EE2411**

| Government College of Engineering, Karad |
|---|
| Second Year (Sem. – IV) B. Tech. Electrical Engineering |
| EE 2411 :Technical Presentation |

**Mapping of COs and Pos**

| Course Outcomes (CO) | |
|---|---|
| Students will | |
| **1.** | Understand the importance of presentations and their inherent problems and Identify the audience, purpose, organization, flow, style, and delivery of presentations. |
| **2.** | Cite and reference presentation resources and data and use advanced presentation software packages. |
| **3.** | Control nerves and deliver a presentation with confidence and authority. |
| **4.** | Understand how to deal with questions from the audience |

| PO → CO ↓ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | 1 | | | 3 | 1 | 2 | | 3 | 3 | 2 | 2 | 1 |
| CO 2 | | | | | | 1 | | 1 | 2 | 3 | 1 | 3 | |
| CO 3 | 3 | | | | 2 | | | 1 | 2 | 1 | | 3 | 2 |
| CO 4 | 1 | 1 | | | | | | 1 | 2 | 3 | | 3 | |

**Assessment Pattern(with revised Bloom's Taxonomy)**

| Knowledge Level | CT 1 | CT 2 | TA | ESE |
|---|---|---|---|---|
| Remember | - | - | 8 | 8 |
| Understand | - | - | 8 | 8 |
| Apply | - | - | 3 | 0 |
| Analyse | - | - | 2 | 6 |
| Evaluate | - | - | 2 | 2 |
| Create | - | - | 2 | 0 |
| TOTAL | | | 25 | 25 |

# Semester III

| Sr. No. | | Course code Course title | Course Outcomes<br>Student Will be able to: |
|---|---|---|---|
| 1 | EE2301 | Innovations | 1. Discover the creative / innovative side within her/him. |
| | | | 2. Hone entrepreneurial and leadership skills within his/her personality. |
| | | | 3. Develop new ways of thinking and Learn the entire innovation cycle from Ideation to Go-To-Market. |
| | | | 4. Study frameworks, strategies, techniques and business models for conceived ideas. |
| | | | 5. Develop skills for evaluating, articulating, refining, and pitching a new product orservice |
| 2 | EE2302 | Engineering Mathematics | 1. Obtain solution of Electrical Engineering systems using Laplace and z Transforms |
| | | | 2. Formulate and solve problems involving random variables using probability and statistics. |
| | | | 3. Apply statistical methods for analysing experimental data. |
| 3 | EE2303 | Fundamentals of Electrical and Electronics Engineering | 1. Comprehend the basics of Electrical and Electronics Engineering and practical implementation of the fundamentals. |
| | | | 2. Solve the basic DC/AC/ magnetic circuits and develop numerical solutions to fundamental electrical and electronics engineering problems. |
| | | | 3. Demonstrate the skills for electric wiring, selection of protective systems and PLC programming. |
| | | | 4. Compare and contrast the characteristics of various power devices. |
| 4 | EE2304 | Electrical Engineering Materials | 1. Understand and select the insulating materials, magnetic materials, conducting materials & semi-conducting materials for cables, transmission lines, transformers and machines |
| | | | 2. Update him/herself with advancement in nanomaterial technology |
| | | | 3. Test the conducting, insulating and magnetic materials. |
| 5 | EE2305 | Electric Circuit Analysis | 1. Apply network theorems for the analysis of electrical circuits |
| | | | 2. Obtain the transient and steady-state response of electrical circuits |
| | | | 3. Analyse circuits in the sinusoidal steady-state (single-phase and three-phase). |
| | | | 4. Analyse two port circuit behaviour |
| 6 | EE2306 | Fundamentals of Electrical and Electronics Engineering Lab | 1. Impliment and Demonstrate the various functions, purpose and operations of PLC. |
| | | | 2. Comprehend the basics of Electrical Engineering and practical implementation of Electrical fundamentals. |
| | | | 3. Solve the basic DC/AC/ magnetic circuits and develop numerical solutions to fundamental electrical engineering problems |
| | | | 4. Develop/Create a PLC project using PLC software and demonstrate the fundamentals of power devices. |
| 7 | EE2307 | Electrical Circuit Analysis Lab | 1. Apply network theorems for the analysis of electrical circuits |
| | | | 2. Obtain the transient and steady-state response of electrical circuits |
| | | | 3. Analyse circuits in the sinusoidal steady-state (single-phase and three-phase). |
| | | | 4. Analyse two port circuit behavior. |
| 8 | EE 2308 | Software Lab-1 | 1. Develop programs and codes and become self-sufficient in loading datasets. |
| | | | 2. Analyse the given data and think in algorithms |
| | | | 3. Apply statistics, process data and visualise results. |

| | | | |
|---|---|---|---|
| | | | 4. Demonstrate proficiency in developing effective code |
| 9 | EE 2309 | Technical Training and Presentation in Vernacular | 1. Understand the importance of presentations and their inherent problems and Identify the audience, purpose, organization, flow, style, and delivery of presentations. |
| | | | 2. Use natural sounding linking phrases and expressions when navigating and explaining presentation content. |
| | | | 3. Deliver a presentation from notes with comprehensible pronunciation |
| | | | 4. Control nerves and deliver a presentation with confidence and authority |

# Semester IV

| Sr. No. | Course code Course title | Course Outcomes<br>Student Will be able to: |
|---|---|---|
| 1 | EE 2401 : Digital Electronics and Logic Design | 1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics. |
| | | 2. outline the formal procedures for the analysis and design of combinational circuits and sequential circuits |
| | | 3. Understand the process of Analog to Digital conversion and Digital to Analog conversion. |
| | | 4. Introduce the concept of memories, programmable logic devices and digital ICs |
| 2 | EE2402 : Signal Processing for Electrical Engineering | 1. Analyse CT and DT signals and LTI systems in frequency domain. |
| | | 2. Analyse and design the time domain and frequency domain behavior of higher order systems |
| | | 3. Analyse and characterize of LTI systems using Laplace and Z Transforms |
| | | 4. Transform given set of state variables into another form by using different transform methods |
| 3 | EE403: Electrical Machines-I | 1. Apply engineering concepts in construction & working of DC machines. |
| | | 2. Formulate mathematical equations to model DC machines for obtaining various parameters under different loading conditions. |
| | | 3. Apply engineering concepts in construction & working of Transformers. |
| | | 4. Make selection of appropriate machine for different applications. |
| 4 | EE 2404 : Power System-I | 1. Describe the structure of a power system. |
| | | 2. Represent the per phase impedance and reactancediagrams for a symmetrical three-phase system. |
| | | 3. Determine the different parameters of different type of transmission lines. |
| | | 4. Understand economic aspects of power generation. |
| 5 | EE 2405 : Electrical Measurements and instrumentation | 1. Apply physical laws used in different measuring instruments. |
| | | 2. Identify sources of errors and limitations of measuring instruments. |
| | | 3. Recognise need of using advanced and contemporary instruments. |
| | | 4. Extract measurement requirements relevant to electrical engineering standards such as IEEE, BIS etc. |
| 6 | EE2406: Digital Electronics Lab | 1. Learn the basics of gates. |
| | | 2. Construct basic combinational circuits and verify their functionalities. |
| | | 3. Apply the design procedures to design basic sequential circuits. |
| | | 4. Learn about counters and Shift registers. |
| 7 | EE2407: Electrical Machines-I Lab | 1. Apply appropriate experimental setup for performance evaluation of machines. |
| | | 2. Apply engineering mathematics for validation of experimental results. |
| | | 3. Understand various tests on DC machines & Transformer. |
| | | 4. Interpret obtained results to reach appropriate conclusion. |
| 8 | EE 2408: Power | 1. Determine the parameters of AC circuits |

| | | |
|---|---|---|
| | System-I Lab | 2. Determine the parameters of Transmission line |
| | | 3. Calculate various economic factors of power generation |
| | | 4. Understand various aspects of substation. |
| 9 | EE 2409 : Electrical Measurements and Instrumentation Lab | 1. Learn about various measurement devices, their characteristics, their operation and their limitations. |
| | | 2. Design and validate DC and AC bridges. |
| | | 3. Understand the principles of operation and characteristics of instrumentation and integrated sensor systems. |
| | | 4. Apply proper method, sensors and transducers for specific applications and measurement. |
| 10 | EE2410 : Environmental Science | 1. Explain key concepts from Economic, and Social analysis as they pertain to design and evaluation of environmental policies and institutions. |
| | | 2. Appreciate concepts and methods from ecological and physical sciences and their applications in environmental problem solving. |
| | | 3. Appreciate the ethical, cross cultural and historical context of environmental issues and the links between human and natural systems. |
| | | 4. Reflect critically about their roles and identities as citizens, consumers, environmental actors in a complex and interconnected world. |
| 11 | EE 2411 :Technical Presentation | 1. Understand the importance of presentations and their inherent problems and Identify the audience, purpose, organization, flow, style, and delivery of presentations. |
| | | 2. Cite and reference presentation resources and data and use advanced presentation software packages. |
| | | 3. Control nerves and deliver a presentation with confidence and authority. |
| | | 4. Understand how to deal with questions from the audience |