# Semester I

# Professional Core (Theory)

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

| **Course Information** | |
|---|---|
| **Programme** | B.Tech. (All Branches) |
| **Class, Semester** | First Year B. Tech., Sem I |
| **Course Code** | 7MA101 |
| **Course Name** | Engineering Mathematics- I |
| **Desired Requisites:** | Mathematics course at Higher Secondary Junior College |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 1 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 04** | | | |

| **Course Objectives** | |
|---|---|
| **1** | Introduce the basic concepts required to understand, construct, solve and interpret various types of differential equation. |
| **2** | Improve the Mathematical skill for enhancing logical thinking power of students |
| **3** | Acquire knowledge with a sound foundation in Mathematics and prepare them for graduate. |
| **4** | |

| **Course Outcomes (CO) with Bloom's Taxonomy Level** | | |
|---|---|---|
| At the end of the course, the students will be able to, | | |
| **CO1** | Explain mathematical concepts in engineering field. | Understanding |
| **CO2** | Solve engineering and scientific problems. | Applying |
| **CO3** | Applying the Mathematical concept in Engineering field | Applying |
| **CO4** | | |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Matrices**<br>Rank of matrix, Homogeneous and non-homogeneous linear equations, Eigen values, Eigen vectors, Cayley Hamilton theorem, Diagonalizations of matrices. | **6** |
| II | **Partial Differentiation and its application**<br>Partial derivative, chain rule for partial differentiation, Euler's theorem for homogeneous and non-homogeneous function, Jacobian, Error and approximation, maxima and minima of function of two variables | **8** |
| III | **Complex Number**Polar form of complex number, Argand's diagram, De Moiver's theorem, roots of complex number, Hyperbolic function, relation between circular and hyperbolic function. | **7** |

| | | |
|---|---|---|
| IV | **First order ordinary differential equation and its application**<br>Exact, Linear, Bernoulli's equations, Euler's equations, Orthogonal trajectory, applications to simple electric circuit. | **7** |
| V | **Numerical Solution of Ordinary Differential Equations of first order and first degree:**<br>Numerical Solution by (i) Taylor's series method (ii) Euler's method (iii) Modified Euler's method (iv) Runge- Kutta fourth order method | **6** |
| VI | **Calculus**<br>Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorem with remainders | **5** |

| **Textbooks** | |
|---|---|
| 1 | P. N. and J. N. Wartikar "A Text Book of Applied Mathematics, Vol I and II, Vidyarthi Griha Prakashan, Pune, 2006. |
| 2 | B .S. Grewal "Higher Engineering Mathematics", , Khanna Publication, 44th Edition, 2017. |
| 3 | |
| 4 | |

| **References** | |
|---|---|
| 1 | Erwin Kreyszig , "Advanced Engineering Mathematics", , Wiley Eastern Limited Publication, 10th Edition, 2015. |
| 2 | Wylie C.R *"Advanced Engineering Mathematics",*., Tata McGraw Hill Publication, 8th Edition 1999. |
| 3 | H. K. Dass, "*Advanced Engineering Mathematics",* S. Chand & Company Ltd., 1st Edition, 2014. |
| 4 | B.V.Ramana, "Higher Engineering Mathematics ", The McGraw Hill companies, 2006. |

| **Useful Links** | |
|---|---|
| 1 | https://nptel.ac.in/courses/111105121 |
| 2 | |
| 3 | |
| 4 | |

| **CO-PO Mapping** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Programme Outcomes (PO)** | | | | | | | | | | | | **PSO** | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 2 | | | 1 | | | | | | | | | | |
| **CO2** | 2 | | | 1 | | | | | | | | | | |
| **CO3** | 2 | | | 1 | | | | | | | | | | |
| **CO4** | | | | | | | | | | | | | | |

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

| **Assessment** |
|---|

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

| **Course Information** | |
|---|---|
| **Programme** | B.Tech. (Elect / ELN) |
| **Class, Semester** | First Year B.Tech., Sem I / II |
| **Course Code** | 7PH102 |
| **Course Name** | Engineering Physics (Elect / ELN) |
| **Desired Requisites:** | Students are expected to know the basic concept in Physics. |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| Lecture | 03Hrs/week | MSE | ISE | ESE | Total |
| Tutorial | 0 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 3** | | | |

| **Course Objectives** | |
|---|---|
| 1 | To provide basic concepts to solve many engineering and technical issues. |
| 2 | To give deep insights into the understanding of engineering courses. |
| 3 | To encourage them to understand engineering and technical development. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Descriptor** |
|---|---|---|---|
| **CO1** | Exhibit memory of previously learned information by recalling facts, terms, basic concepts in Wave Optics, Modern Physics and Quantum Mechanics, Ultrasonic, Semiconductors, Instrumentation and Transducer, Microchip Design. | 1 | Remembering |
| **CO2** | Demonstrate understanding of facts and ideas by recalling, comparing, interpreting for all terms in these modules. | 2 | Understanding |
| **CO3** | Solve problems to new situations by applying acquired knowledge, facts, techniques and rules for various concepts in a different way. | 3 | Applying |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Wave optics:** Introduction, interference of light, Newton's rings, Fresnel's diffraction: Fresnel's half-period zones, zone plate and diffraction at a straight edge. Fraunhofer's diffraction: Diffraction due to single slit, Diffraction due to double slits, Plane diffraction grating. | 6 |
| II | **Modern Physics and Quantum mechanics:** Introduction, black body radiation, Planck's quantum theory, Wien's displacement law and Rayleigh – Jeans law, phase velocity, group velocity and particle velocity, de-Broglie's hypothesis, Photoelectric effect, Compton effect, Heisenberg's uncertainty principle and applications, wave function and physical significance, Schrödinger's wave equation: time dependent and time independent, Eigen value and Eigen function. | 8 |
| III | **Ultrasonic:** Introduction, generation of ultrasonic waves (Magnetostriction and Piezoelectric method), detection of ultrasonic waves by Kundt's tube, thermal detection and sensitive flame method, velocity of ultrasonic waves in liquid, applications of ultrasonic waves in scientific and engineering field. | 6 |

| | | |
|---|---|---|
| IV | **Semiconductors:** Introduction, formation of energy bands, classification of solid on basis of band theory, number levels in a band, density of states, Fermi-Dirac statistics, Fermi level, variation of Fermi level with temperature, electrical conductivity of metal and semiconductor, Hall effect, basic concept of p-n junction. | 7 |
| V | **Instrumentation and Transducers:** Introduction, instrumentations, measurement system, control system, Transducer and Sensor: transducers, sensors, classification of transducers, characteristics of transducers, selection criterion for transducers, temperature transducers, strain gauge, pressure transducers, force transducers, optical transducers and actuators. | 6 |
| VI | **Microchip Design:** Introduction, Crystal growth, Epitaxial diffusion process, types of integrated circuit, Development of integrated components (diode, transistor, resistor and capacitor), Implementation in integrated circuit. | 6 |

| **Textbooks** | |
|---|---|
| 1 | M. N. Avadhanulu and P. G. Kshirsagar, "A Text book of Engineering Physics", S.Chand Pub. |
| 2 | R. K. Gaur and S. L. Gupta "Engineering Physics", Dhanpat Rai Publications, 2011 |

| **References** | |
|---|---|
| 1 | Halliday, Resnic and Walker, "Fundamentals of Physics", John Wiley, 9th edition 2011. |
| 2 | A. Beiser, "Concepts of Modern Physics", McGraw Hill International, 5th edition, 2003. |
| 3 | Ajoy Ghatak, "Optics", Tata McGraw Hill 5th edition, 2012. |
| 4 | Halit Eren, John G. Webster "Measurement, Instrumentation, and Sensors Handbook" CRC Press 2018 |
| 5 | Yaguang Lian "Semiconductor Microchips and Fabrication: A Practical Guide to Theory and Manufacturing" Wiley 2022 |

| **Useful Links** | |
|---|---|
| 1 | For optics https://nptel.ac.in/courses/122/107/122107035/ |
| 2 | For Quantum Physics https://nptel.ac.in/courses/122/106/122106034/ |
| 3 | For Ultrasonic https://freevideolectures.com/course/3531/engineering-physics-i/8 |
| 4 | For Solid State Physics https://nptel.ac.in/courses/115/105/115105099/ |
| 5 | For Instrumentation and Transducers https://youtu.be/1uPTyjxZzyo |
| 6 | For Microchip Design https://youtu.be/HdcLRMv3D3g |

**CO-PO Mapping**

| | **Programme Outcomes (PO)** | | | | | | | | | | | | **PSO** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 2 | | | | | | | | | | | | | |
| **CO2** | 2 | | | | | | | | | | | | | |
| **CO3** | 2 | | | | | | | | | | | | | |

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

**Assessment**

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be Tests, assignments, oral, seminar etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 30 - 40% weightage on modules 1 to 3 and 60 - 70% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (CSE, IT, Electrical , Electronics) |
| **Class, Semester** | First Year B. Tech., Sem I/II |
| **Course Code** | 7AM102 |
| **Course Name** | Engineering Mechanics |
| **Desired Requisites:** | Physics |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 2 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | --- | 30 | 20 | 50 | 100 |
| | | **Credits: 2** | | | |

**Course Objectives**

| | |
|---|---|
| 1 | To impart knowledge on fundamentals of mechanics |
| 2 | To provide knowledge of basic concepts and system of forces in statics and dynamics |
| 3 | To illustrate the principles of mechanics in engineering applications |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| CO | Course Outcome Statement/s | Bloom's Taxonomy Level | Bloom's Taxonomy Description |
|---|---|---|---|
| CO1 | Explain fundamental concepts in statics and dynamics | II | Understanding |
| CO2 | Apply fundamental concepts of mechanics to solve problems on static systems | III | Applying |
| CO3 | Use Newton's laws of motion, D'Alemberts and work energy principles to solve problems related to dynamic systems | III | Applying |

| Module | Module Contents | Hours |
|---|---|---|
| I | **Force System:** Fundamentals, Systems, Composition and Resolution, Resultant of planar force systems. Free Body Diagram, Laws of Forces, Varignon's Theorem, Lami's Theorem | 5 |
| II | **Equilibrium:** Concepts of determinacy and indeterminacy, Equilibrium of beams, Supports, Loads, Equilibrium, Reactions Principle of Virtual Work and its applications to statically determinate beams | 4 |
| III | **Centroid and Moment of Inertia** Centre of gravity and Centroid, Moment of Inertia of Plane figure, Composite Sections, Radius of gyration, Mass-Moment of Inertia. | 5 |
| IV | **Kinematics of Particles** Rectilinear motion of particle, Equations of motion, Motion under gravity, Relative Motion, Relation between linear and angular motion, Motion of a Projectile. | 5 |
| V | **Kinetics of Particles** Friction: Laws of friction, application of laws of friction, wedge friction, Newton's laws of motion, D'Alemberts principle, Applications to rough inclined plane, lift, and connected bodies, Circular motion, Rotation of rigid bodies | 4 |

| | | |
|---|---|---|
| VI | **Work Energy and Impact**<br>Work energy Principle, Potential and Kinetic Energy, Law of Conservation of Energy, Impulse Momentum Method<br>Collisions: Impact, Collision of bodies, Coefficient of Restitution, Loss of Kinetic Energy due to Impact | 5 |

**Textbooks**

| | |
|---|---|
| 1 | Ramamrutham., S. "Textbook of Applied Mechanics", Dhanpat Rai Publishing Company Limited, 2008. |
| 2 | Bhavikatti., S. S. and Rajashekarappa., K. G. "Engineering Mechanics", New Age International Publishers, 2015, 5th Edition. |
| 3 | Beer, F. P. and Johnston, E. R. "Vector Mechanics for Engineers Vol. I and II", McGraw Hill Company Publication, 2011, 9th Edition. |

**References**

| | |
|---|---|
| 1 | Singer, F. L. "Engineering Mechanics Statics & Dynamics", B. S. Publications, 2011. |
| 2 | Timoshenko, S. and Young, D. H. "Engineering Mechanics", McGraw Hill Companies, 2008, 4th Edition. |
| 3 | Meriam, L. and L.G. Kraige, "Engineering Mechanics – Dynamics", John Wiley & Sons, 2002, 6th Edition. |

**Useful Links**

| | |
|---|---|
| 1 | https://nptel.ac.in/courses/112106286 |
| 2 | https://www.youtube.com/watch?v=9Yt3I4bP-90 |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO1 | 3 | | | | | | | | | | | | | |
| CO2 | 3 | 1 | | | | | | | | | | | | |
| CO3 | 3 | 1 | | | | | | | | | | | | |

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

**Assessment**

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

B.B. Sawant

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Electrical, Electronics, CSE and IT) |
| **Class, Semester** | F.Y.B.Tech |
| **Course Code** | 7CM106 |
| **Course Name** | Civil and Mechanical Engineering |
| **Desired Requisites:** | |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | - | 30 | 20 | 50 | 100 |
| | | **Credits: 3** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To provide a solid grounding in the fundamental principles and concepts of mechanical engineering, including mechanics, thermodynamics, materials science, and fluid mechanics. |
| **2** | To introduce students to the field of mechanical engineering, its history, scope, and its importance in various industries. |
| **3** | Familiarize students with different building systems, their components, and the principles of building bye-laws, promoting a comprehensive understanding of safe and compliant construction practices. |
| **4** | Provide students with an in-depth understanding of the significance of infrastructure development in urban areas, with a specific focus on transportation, water supply, and waste management. |
| **5** | Enable students to comprehend the properties and applications of various construction materials, including concrete, steel, wood, and masonry, enhancing their ability to design and analyze structures effectively. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy** | |
|---|---|---|---|
| | | **Level** | **Description** |
| **CO1** | Identify suitable materials for engineering applications, understand basic manufacturing processes, and understand mechanical engineering applications in various industries and be aware of current industry practices and standards. | II | Understanding |
| **CO2** | Apply problem-solving techniques to analyze and solve basic engineering problems related to mechanical systems and components | III | Applying |
| **CO3** | Explain the various building systems, their components, and the principles of building bye-laws to ensure safe and compliant construction practices.. | II | Understanding |
| **CO4** | Summarize the significance of infrastructure development in urban areas and analyze its impact on transportation, water supply, and waste management.. | II | Understanding |
| **CO5** | Analyze the properties and applications of various construction materials, such as concrete, steel, wood, and masonry, to make informed decisions in structural design. | III | Analysis |

| **Module** | **Module Contents [Mechanical]** | **Hours** |
|---|---|---|

| | | |
|---|---|---|
| I | Introduction Engineering Materials, Properties of engineering materials (metals, polymers, ceramics) Material selection considerations for computer hardware and robotics applications Material testing and characterization techniques, Overview of manufacturing techniques (casting, machining, molding, etc.) Rapid prototyping methods (3D printing, laser cutting, etc.) for computer hardware prototypes. | 6 |
| II | Thermodynamics and Heat Management, Basic concepts of thermodynamics and heat transfer Heat dissipation and thermal management in computer hardware, Electronic Packaging and Cooling Packaging considerations for computer components and devices Cooling strategies for high-performance computer hardware | 7 |
| III | Introduction to Robotics, Basics of robotics and its integration with computer engineering, Overview of robotic mechanisms and control system, Gears, pulleys, belts, and other power transmission elements Bearings and lubrication Linkages and mechanical movements relevant to computer engineering | 6 |
| **Module** | **Module Contents [Civil]** | **Hours** |
| IV | **Introduction to Civil Engineering**<br>Scope of civil engineering, Disciplines of civil engineering<br>Role of Civil Engineers in infrastructure development<br>Building Systems: Conceptualization, Need for buildings, Defining Sustainability for Building systems, Structural systems; Load bearing, Framed, Prefabricated, Pre Engineered Construction, Loads on Building, Components in Buildings and their functions, building bye laws, Principle of building planning | 7 |
| V | **Construction Materials**<br>Construction materials and classification<br>Properties and uses of stone, brick, tile, timber, cement, sand, lime, mortar, concrete, bitumen and steel. | 6 |
| VI | **Urban Infrastructure**<br>Urban Planning and Infrastructure, Transport systems, Water supply and drainage, Waste management facilities, Concept of smart city | 7 |
| | | |
| **Text Books[Mechanical]** | | |
| 1 | Materials Science and Engineering: An Introduction" by William D. Callister Jr. and David G. Rethwisch, 10th ed. 2018 edition, Wiley. | |
| 2 | Thermodynamics: An Engineering Approach" by Yunus A. Çengel and Michael A. Boles, 8th edition.2017, McGra hill | |
| **Text Books[Civil]** | | |
| 1 | Bhavikatti S.S “Basic Civil Engineering”, I.K. International Publishing House Pvt. Ltd. | |
| 2 | Hirasakar G. K., “Basic Civil Engineering”, DhanpatRai publications, 1st Edition,2007 | |
| 3 | Gole L.G., “Introduction to Civil Engineering”, Mahu Publisher House, 4th Edition, 2005 | |
| | | |
| **References[Mechanical]** | | |
| 1 | Manufacturing Engineering and Technology (SI Edition), Serope Kalpakjian , Steven R. Schmid, SI edition, 2018, Pearson | |
| **References[Civil]** | | |
| 1 | Bindra S.P., Arora S.P. , “Building Construction”, Dhanpat Rai publication, 5th edition, 2012 | |
| 2 | Smart Cities Mission Statement & Guidelines, Ministry of Urban Development Government of India | |
| | | |
| **Useful Links[Mechanical]** | | |
| 1 | https://ocw.mit.edu/courses/mechanical-engineering/ | |
| 2 | https://www.coursera.org/browse/engineering/mechanical-engineering | |

| | |
|---|---|
| 3 | https://www.edx.org/learn/mechanical-engineering |

| CO-PO Mapping | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | 2 | | | | 1 | | | | | 1 | | 1 | | | |
| **CO2** | | | 1 | | | | | | | | | | | | |
| **CO3** | | | | | 2 | | | | | 1 | | | | | |
| The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High | | | | | | | | | | | | | | | |

| Assessment |
|---|
| The assessment is based on MSE, ISE and ESE.<br>MSE shall be typically on modules 1 to 3.<br>ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.<br>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.<br>For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing) |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

## Course Information

| | |
|---|---|
| **Programme** | First Year B. Tech. Electrical |
| **Class, Semester** | First Year B. Tech., Sem. I |
| **Course Code** | 7EL101 |
| **Course Name** | Fundamentals of Electrical Engineering |
| **Desired Requisites:** | NIL |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | - | 30 | 20 | 50 | 100 |
| | | **Credits: 3** | | | |

## Course Objectives

| | |
|---|---|
| **1** | This course intends to summarize and solve electrical and magnetic circuits. |
| **2** | It imparts skill to identifying principles, construction and working of electrical machines. |
| **3** | It develops skill to describe the wiring system, lamps and low voltage installation components. |

## Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | **Describe** basic concepts in Electrical Engineering. | II | Understanding |
| **CO2** | **Explain** principles, construction and working of electrical machine. | II | Understanding |
| **CO3** | **Solve** electrical and magnetic circuits. | III | Applying |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Module 1: Basic Concepts**<br>Concept of power generation, transmission and distribution. Single line diagram of electrical power system. Concept of Resistance, Ohm's Law, Series and Parallel Circuit, Equivalent Resistance, Open Circuits, Short Circuits, Ideal Voltage and current Source, practical Voltage and current Source, Source Conversion. Kirchhoff's Laws, Sign Convention, Illustration of Kirchhoff's Laws | 6 |
| II | **Module 2: D. C. Network Theorems**<br>Review of R-L-C- Electrical circuit elements, Star- delta conversion, Maxwell's Mesh Current Method, Nodal Analysis, Superposition Theorem, Thevenin's Theorem, Thevenin Equivalent Circuit, Norton's Theorem, Norton Equivalent Circuit, Maximum Power Transfer Theorem | 8 |
| III | **Module 3: AC Circuits**<br>Representation of sinusoidal waveforms, peak, RMS values, phasor representation of voltage and current, real, reactive and apparent power. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC (series and parallel) circuits and three-phase balanced circuits. Voltage and current relations in star and delta configurations. | 6 |
| IV | **Module 4: Electrical Machines**<br>Construction, working principle and types of DC generator and Motor. Speed-Torque characteristics.<br>Construction and working principle of single and three- phase induction motor. Types, Speed-Torque characteristics and applications of induction motor. | 7 |

| | | |
|---|---|---|
| V | **Module 5: Transformer**<br>Review of DC & AC Magnetic circuits, Construction, working principle and types of single-phase transformer, Losses, efficiency, all-day efficiency and voltage regulation. Autotransformer. | 6 |
| VI | **Module 6: Wiring, Electrical Installations and Components of LT Switchgear**<br>Switch fuse unit, MCB, ELCB, MCCB. Types of wire and cables. Staircase, Godown and Domestic wiring, CFL, LED, Fluorescent tube. Lighting schemes, Earthing, types of batteries, characteristics of batteries. | 6 |

| | |
|---|---|
| | |
| **Textbooks** | |
| 1 | D. C. Kulshreshtha, "Basic Electrical Engineering", 1st revised edition McGraw Hill, 2012. |
| 2 | D. P. Kothari and I. J. Nagrath, "*Basic Electrical Engineering",* Tata McGraw Hill, 2010. |
| 3 | B. L. Theraja "A Textbook of Electrical Technology", S Chand Publication, 2013. |
| 4 | |
| **References** | |
| 1 | V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989. |
| 2 | E. Hughes, "Electrical and Electronics Technology", Pearson, 2010. |
| 3 | V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering", 2nd edition, Tata McGraw Hill. |
| | |
| **Useful Links** | |
| 1 | Basic Electrical Technology, IISc Bangalore, by Prof. L. Umanand, "https://nptel.ac.in/courses/108108076" |
| 2 | Basic Electrical Technology, IIT Kharagpur, by Prof. N. K. De, Prof. G. D. Roy, Prof. T. K. Bhattacharya, "https://nptel.ac.in/courses/108105053" |
| 3 | Fundamentals of Electrical Engineering, IIT Kharagpur, by Prof. Debapriya Das , "https://nptel.ac.in/courses/108105112" |

**CO-PO Mapping**

| | **Programme Outcomes (PO)** | | | | | | | | | | | | **PSO** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | | | | | | | | | | | | | |
| **CO2** | 3 | | | | | | | | | | | | | |
| **CO3** | | 3 | | | | | | | | | | | | |

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

**Assessment**

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

# Professional Core (Lab)

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

| **Course Information** | | | | | |
|---|---|---|---|---|---|
| **Programme** | | B.Tech. | | | |
| **Class, Semester** | | First Year B.Tech., Sem I &II | | | |
| **Course Code** | | 7PH155 | | | |
| **Course Name** | | Engineering Physics Lab. | | | |
| **Desired Requisites:** | | Students are expected to know the basic practical knowledge up to HSC | | | |
| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
| **Lecture** | - | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Tutorial** | - | 30 | 30 | 40 | 100 |
| **Practical** | 2 Hrs/week | | | | |
| **Interaction** | - | **Credits: 1** | | | |

| **Course Objectives** | | |
|---|---|---|
| **1** | To gain practical knowledge by applying the experimental methods to correlate with the physics theory. | |
| **2** | To learn the usage of electrical and optical systems for various measurements. | |
| **3** | To Apply the analytical techniques and graphical analysis to the experimental data. | |
| **Course Outcomes (CO) with Bloom's Taxonomy Level** | | |
| **CO1** | Calculate the diameter of the thin wire, Planck's constant, Refractive index of liquid / radius of curvature of Plano convex lens , Specific rotation of optical active substances, I-V characteristics of Semiconductor diode, Velocity of sound in air, Calculate R.T for specific hall/auditorium, Verify the expression for the resolving power of a telescope | Applying |
| **CO2** | Demonstrate Hartley and Colpitt's oscillator and simulation , Wavelength of light by Plane diffraction grating, Wavelength of light by He-Ne LASER | Applying |
| **List of Experiments / Lab Activities.** | | |
| **List of Experiments/ Lab Activities- Any Eight Experiments** | | |
| 1 | Find the diameter of the thin wire by diffraction of the light | |
| 2 | Determination of wavelength of light by plane diffraction grating. | |
| 3 | Determine the Specific rotation of sugar solution | |
| 4 | Find the wavelength of He-Ne Laser using Plane diffraction grating. | |
| 5 | Verify the expression for the resolving power of a telescope. | |
| 6 | Measure the wavelength of ultrasonic waves by Kundt's tube method. | |
| 7 | Design and simulate Colpitt's & Hartley Oscillator. | |
| 8 | Determine the Planck's constant. | |
| 9 | Study the I-V characteristic of semiconductor diode. | |
| 10 | Newton's ring: Determination of wavelength of light and refractive index of liquid /radius of curvature of Plano convex lens | |
| 11 | To calculate the reverberation time of specific hall. | |
| 12 | Determination of Fermi energy of copper using a Wheatstone bridge. | |
| **Text Books** | | |
| 1 | C. L. Arora *"Practical Physics"* S. Chand & Co Edition 2009. | |
| 2 | P.R. Sasi Kumar *"Practical Physics"*, PHI Learning Pvt. Ltd 1st edition 2011. | |
| **References** | | |
| 1 | Halliday, Resnic and Walker, *"Fundamentals of Physics"*, John Wiley, 9th edition 2011. | |
| 2 | A. Beiser, *"Concepts of Modern Physics"*, McGraw Hill International, 5th edition, 2003. | |
| 3 | Ajoy Ghatak, *"Optics"*, Tata McGraw Hill 5th edition, 2012. | |
| **Useful Links** | | |
| 1 | https://nptel.ac.in/courses/115/105/115105121/ | |
| 2 | https://www.iitg.ac.in/cet/nptel.html | |
| 3 | https://youtu.be/imHvRBOMg84 | |

| CO-PO Mapping For All B.Tech. Programs | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| **CO1** | 1 | 1 | | | | | | | | | | | | | |
| **CO2** | 2 | | | | | | | | | | | | | | |
| The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High | | | | | | | | | | | | | | | |

**Assessment (for Lab. Course)**

**There are three components of lab assessment, LA1, LA2 and Lab ESE.**
**IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.**

| Assessment | Based on | Conducted by | Typical Schedule (for 26-week Sem) | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

**Assessment Plan based on Bloom's Taxonomy Level**

| Bloom's Taxonomy Level | LA1 | LA2 | Lab ESE | Total |
|---|---|---|---|---|
| Remember | 10 | 10 | 15 | **35** |
| Understand | 10 | 10 | 10 | **30** |
| Apply | 10 | 10 | 15 | **35** |
| Analyze | 0 | 0 | 0 | **0** |
| Evaluate | 0 | 0 | 0 | **0** |
| Create | 0 | 0 | 0 | **0** |
| **Total** | **30** | **30** | **40** | **100** |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-2024**

**Course Information**

| | |
|---|---|
| **Programme** | First Year B. Tech |
| **Class, Semester** | Sem I and Sem II |
| **Course Code** | 7HS101 |
| **Course Name** | Communication & Generic skills |
| **Desired Requisites:** | 10+2 level English |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | | |
|---|---|---|---|---|---|---|
| **Lecture** | --- | **LA1** | **LA2** | | **ESE** | **Total** |
| **Tutorial** | --- | 30 | 30 | | 40 | 100 |
| **Practical** | 2Hrs/week | | | | | |
| **Interaction** | 1Hr/week | **Credits: 2** | | | | |

**Course Objectives**

| | |
|---|---|
| 1 | Enable the students to communicate with clarity and precision. |
| 2 | Prepare the students to acquire structure of Oral and written expression required for their profession and enable them to acquire proper behavioural skills |
| 3 | Provide relevant knowledge about generic skills, its importance and enable them to understand personal attributes like commitment, loyalty, ethical values, team building, and ensure exposure to personal growth. |
| 4 | Infuse the ability to positively consider other's views and to work effectively in teams and teach them self-management skills, problem solving skills and technological skills. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

| | | |
|---|---|---|
| CO1 | Communicate clearly, precisely and competently in different scenario | Apply |
| CO2 | Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills. | Understand |
| CO3 | Practice Lifelong Learning (LLL) with positive attitude. loyalty, commitment, reliability, self-development and manage himself/herself physically, intellectually and psychologically. | Apply |
| CO4 | Work ethically and effectively as a team member, manage tasks effectively and apply knowledge to solve problems. | Apply |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Module 1: Introduction to communicative English**<br>1.Fundamentals<br>2. Elements<br>3.Process<br>4.Types<br>5.Barriers<br>6.Need to develop good interpersonal and intrapersonal skills<br>7.Developing effective Listening Skills (types, Barriers, listening and note making) | 02 |
| II | **Module2: Communicative Grammar & Developing advanced.**<br>**Vocabulary.**<br>1.Modal verbs, non-modal verbs ,semi-modal verbs<br>2.Question tags<br>3.Misplaced Modifiers<br>4.Passives<br>5.Phrasal verbs<br>**Vocabulary:**<br>1. Connectives,<br>2. Prefixes and suffixes,<br>3.Synonyms and Antonyms<br>4.one-word substitutions ,<br>5.Re-arranging Jumbled sentences<br>6.redundancies | 05 |

| | | |
|---|---|---|
| III | **Module 3 : Formal Communication Skills**<br>**a. Oral skills:** Developing non-verbal skills.<br>1.Extempore /Public Speaking Skills ( speeches)<br>2.Group Presentation<br>3.Individual Presentations<br>**b. Written Skills**:<br>1.Paragraph Writing<br>2.Comprehension passage<br>3.Inter-office communication – Memorandums ,Circulars<br>4.Report Writing | 05 |
| IV | **Module 4: Introduction to Generic Skills**<br>a. Importance of Generic Skill Development (GSD)<br>b. Global and Local Scenario of GSD<br>c. Lifelong Learning (LLL) and associated importance of GSD. | 01 |
| V | **Module 5: Self-management skills**<br>**1. Knowing Self for Self-Development. (01 hrs)**<br>a. Self-concept.<br>b. Attitude,<br>c. Self-esteem.<br>d. Self-confidence.<br>e. Self-motivation.<br>**2 Personal Attributes (02 hrs)**<br>a. Loyalty.<br>b. Commitment.<br>c. Honesty and integrity.<br>d. Reliability.<br>e. Enthusiasm.<br>f. Balanced attitude while studying, working and home life.<br>**3. Managing Self – Physical (02 hrs)**<br>a. Personal grooming.<br>b. Health, Hygiene.<br>c. Time Management.<br>**4. Managing Self – Psychological (02 hrs)**<br>a. Stress, Emotions, Anxiety- concepts and significance.<br>b. Exercises related to stress management.<br>c. Techniques to manage the above. | 07 |
| VI | **Module 6: Teamwork Skills**<br>**1. Team Building (01 hrs.)**<br>Definition, hierarchy, team dynamics.<br>**2. Team related skills. (02 hrs)**<br>a. Sympathy, empathy.<br>b. co-operation, concern, lead and negotiate.<br>c. work well with people from culturally diverse background.<br>**3. Technological Skills. (02 hrs.)**<br>a. Task Initiation, Task Planning, Task execution, Task close out<br>b. Exercises/case studies on task planning towards development of skills for task management.<br>**4. Problem Solving skills. (02 hrs.)**<br>a. Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving.<br>b. Different approaches for problem solving.<br>c. Steps followed in problem solving.<br>d. Exercises/case studies on problem solving. | 07 |

| | |
|---|---|
| | |
| **Text Books** | |
| 1 | Textbook: Sanjay Kumar, Pushpalata, Communication Skills, Oxford University Press, First edition ,2012 |
| | |
| **References** | |
| 1 | Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hills publishing Company 2006 |
| 2 | William Sanborn Pfeiffer, T.V.S. Padmaja, Technical Communication: A Practical Approach, Pearson, Sixth Edition 2012 |
| 3 | Exercises in Spoken English, Parts 1 and II CIEFL, Hyderabad, Oxford University Press |
| | |
| **Useful Links** | |
| 1 | www.oupinheonline.com |
| 2 | www.scitechpublications.com |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| **CO1** | | | | | | | | | | 1 | | | | | |
| **CO2** | | | | | | | | | | 1 | | | | | |
| **CO3** | | | | | | | | | 2 | | | 2 | | | |
| **CO4** | | | | | | | | 2 | 3 | | | | | | |

The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

**Assessment**

The assessment is based on two In-semester evaluations (LA) of 30 marks each, one End-semester examination (ESE) of 40 marks.
LA1 and LA2 are based on the modules taught (typically Module 1-3) and ESE is based on all modules with 30-40% weightage on modules before LA1 and 60-70% weightage on modules LA2.

**Assessment Plan based on Bloom's Taxonomy Level**

| Bloom's Taxonomy Level | LA1 | LA2 | ESE | Total |
|---|---|---|---|---|
| Remember | | | | |
| Understand | 10 | 10 | 10 | **30** |
| Apply | 20 | 20 | 30 | **60** |
| Analyse | | | | |
| Evaluate | | | | |
| Create | | | | |
| **Total** | **30** | **30** | **40** | **100** |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (All Branches) |
| **Class, Semester** | First Year B. Tech., Sem I/II |
| **Course Code** | 7AM155 |
| **Course Name** | Engineering Mechanics Lab |
| **Desired Requisites:** | Engineering Mechanics |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2 Hrs/ Week | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Interaction** | --- | 30 | 30 | 40 | 100 |
| | | **Credits: 1** | | | |

**Course Objectives**

| | |
|---|---|
| 1 | To provide hands on practice for the conduct of experiments to verify the principles of mechanics |
| 2 | To demonstrate the graphical methods to verify the analytical solutions |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| CO | Course Outcome Statement/s | Bloom's Taxonomy Level | Bloom's Taxonomy Description |
|---|---|---|---|
| CO1 | Demonstrate verification of laws and basic principles of mechanics through experiments. | III | Applying |
| CO2 | Apply graphical method to solve problems on force system, beams, and frames. | III | Applying |

**List of Experiments / Lab Activities/Topics**

**List of Experiments :**

1. Verification of law of triangle of forces
2. Verification of law of polygon of forces
3. Determination of support reactions for Simply Supported Beam
4. Verification of the principle of moments using Bell crank lever apparatus
5. Determination of the coefficient of friction for motion on horizontal plane
6. Determination of the coefficient of friction for motion on inclined plane
7. Analysis of concurrent and non-concurrent coplanar force system by graphical method
8. Analysis of statically determinate beams by graphical method
9. Analysis of pin jointed perfect plane frames by graphical method

**Textbooks**

| | |
|---|---|
| 1 | Lab Manual Link - https://atifmohd077.files.wordpress.com/2019/03/em-lab-manual-1.pdf |
| 2 | Lab Manual Links - https://jecassam.ac.in/wp-content/uploads/2018/10/1_Engineering-Mechanics-Laboratory-2nd-SEM-DU-Old-Course.pdf |
| 3 | Bhavikatti., S. S. and Rajashekarappa., K. G. "Engineering Mechanics", New Age International Publishers, 2015, 5th Edition. |

**References**

| | |
|---|---|
| 1 | Ramamrutham., S. "Textbook of Applied Mechanics", Dhanpat Rai Publishing Company Limited, 2008. |
| 2 | Beer, F. P. and Johnston, E. R. "Vector Mechanics for Engineers Vol. I and II", McGraw Hill Company Publication, 2011, 9th Edition. |
| 3 | R. K. Bansal "Engineering Mechanics" Laxmi Publications ltd. |

| Useful Links | |
|---|---|
| 1 | https://nptel.ac.in/courses/112106286 |
| 2 | https://www.youtube.com/watch?v=9Yt3I4bP-90 |
| 3 | https://www.vlab.co.in/broad-area-civil-engineering |
| 4 | Virtual Lab link by IIT Mumbai - http://vlabs.iitb.ac.in/vlab/labsme.html |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| CO1 | | | | 1 | | | | | | | | | | |
| CO2 | | 1 | | | | | | | | | | | | |

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

| Assessment | Based on | Conducted by | Typical Schedule | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 8 Marks Submission at the end of Week 8 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 9 to Week 16 Marks Submission at the end of Week 16 | 30 |
| Lab ESE | Lab activities, journal/ performance | Lab Course Faculty and External Examiner as applicable | During Week 18 to Week 19 Marks Submission at the end of Week 19 | 40 |

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

B. B Sawant

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Electrical, Electronics, CSE, IT) |
| **Class, Semester** | First Year B. Tech. SEM-I & II |
| **Course Code** | 7CM156 |
| **Course Name** | Civil and Mechanical Engineering Lab |
| **Desired Requisites:** | |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2 Hrs/Week | **LA1** | **LA2** | **ESE** | **Total** |
| **Interaction** | - | 30 | 30 | 40 | 100 |
| | | **Credits: 1** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To provide a solid grounding in the fundamental principles and concepts of mechanical engineering, including mechanics, thermodynamics, materials science, and fluid mechanics |
| **2** | To introduce students to the field of mechanical engineering, its history, scope, and its importance in various industries. |
| **3** | To introduce students to fundamental civil engineering experiments and procedures. |
| **4** | To develop practical skills in handling civil engineering equipment and instruments. |
| **5** | To promote teamwork, problem-solving, and analytical skills while conducting experiments and interpreting results. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy** | |
|---|---|---|---|
| | | **Level** | **Description** |
| **CO1** | To understand mechanical testing and inspections, such as hardness testing, non-destructive testing (e.g., ultrasonic testing), and dimensional measurements. | II | Understand |
| **CO2** | To demonstrate experiments related to thermodynamics and heat transfer, such as measuring heat conduction through different materials or studying heat dissipation from electronic components. | II | Apply |
| **CO3** | Demonstrate identification and reading ability of elements in building drawing. | II | Understand |
| **CO4** | Examine the material properties and comment on their quality. | III | Applying |
| **CO5** | Use surveying equipment to measure distance and area. | III | Applying |

**List of Experiments / Lab Activities**

**Mechanical:**

1. Ultrasonic thickness measurements and flaw detection.
2. Liquid and magnetic particle testing for discontinuity examination.
3. Hardness measurements by using Rockwell, Brinell hardness testers.
4. Tensile test of metallic materials and study of Stress vs Strain curve.
5. Eddy current and acoustic emission flaw measurement techniques.
6. Use of machine learning and AI in mechanical testing. Only Demonstration.

**Civil:**

1. Study and identify basic elements in
   i) Site plan,
   ii) Plan, elevation and section of a residential building
2. Study water supply and sanitation plan of a residential building
3. Field tests on brick
4. Field tests on Cement

| | |
|---|---|
| 5. Measurement of distance and area<br>6. Demonstration of Total station | |
| **Text Books [Mechanical]** | |
| 1 | Raghuwanshi B. S., "A Course in Workshop Technology I", Dhanpat Rai Publications, 10th Ed., 2009 |
| 2 | S. K. Hajra Choudhury and A. K. HajraChoudhary,"Workshop Technology" – Vol I [Manufacturing Processes]", Media Promoters and Publishers Pvt. Ltd., 10th edition, reprint 2001 |
| 3 | Bawa H S. "Workshop Practice," McGraw Hill Education, Noida, 2nd edition, 2009<br>ISBN-13: 978-0070671195 |
| 4 | Gupta, J. K.; Khurmi, "A Textbook of Manufacturing Process" (Workshop Tech.) R S S Chand and Co., New Delhi, 2020, ISBN:81-219-3092-8 |
| 5 | Singh Rajender, "Introduction to Basic Manufacturing Process and Workshop Technology", New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7 |
| **References [Mechanical]** | |
| 1 | W.A.J. Chapman, "Workshop Technology Volume I", CBS Publishing & Distributors, Delhi. [ISBN-13:9788123904016] 2001 |
| 2 | Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House,2017 |
| 3 | Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008 |
| **Text Books [Civil]** | |
| 1 | Hiraskar G. K., "Basic Civil Engineering", DhanpatRai publications, 1st Edition,2007 |
| 2 | Gole L.G., "Introduction to Civil Engineering", Mahu Publisher House, 4th Edition, 2005 |
| 3 | Bhavikatti S.S., "Basic Civil Engineering", New Age Publications, 2010 |
| **References [Civil]** | |
| 1 | Duggal S. K., "Surveying (Vol-I)", Tata McGraw Hill, 4th edition 2013 |
| 2 | Bindra S. P., Arora S. P., "Building Construction", DhanpatRai publication, 5th edition, 2012 |
| | |
| **Useful Links** | |
| 1 | https://www.vlab.co.in/broad-area-mechanical-engineering |

| **CO-PO Mapping** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Programme Outcomes (PO)** | | | | | | | | | | | | **PSO** | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | 3 | | 1 | | | | | | | 1 | | 1 | | | |
| **CO2** | 3 | | 1 | | | | | | | | | | | | |
| **CO3** | | | | | | 2 | | | | 1 | | | | | |
| The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High | | | | | | | | | | | | | | | |

| **Assessment** | | | | |
|---|---|---|---|---|
| There are three components of lab assessment, LA1, LA2 and Lab ESE.<br>IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation. | | | | |
| **Assessment** | **Based on** | **Conducted by** | **Typical Schedule (for 26-week Sem)** | **Marks** |
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |
| Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab | | | | |

activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

## Course Information

| | |
|---|---|
| **Programme** | First Year B. Tech. Electrical |
| **Class, Semester** | First Year B. Tech., Sem I |
| **Course Code** | 7EL151 |
| **Course Name** | Fundamentals of Electrical Engineering Lab |
| **Desired Requisites:** | NIL |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2 Hrs/ Week | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Interaction** | - | 30 | 30 | 40 | 100 |
| | | **Credits: 1** | | | |

## Course Objectives

| | |
|---|---|
| **1** | This course intends to demonstrate basic knowledge of Electrical engineering. |
| **2** | It intends to develop skills to recognize working principle, construction and types of electrical Machines. |

## Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | **Describe** basic concepts of electrical circuits and various theorems. | II | Understanding |
| **CO2** | **Demonstrate** the use of transformers and AC/DC machines. | III | Applying |

## List of Experiments / Lab Activities/Topics

**List of Topics (Applicable for Interaction mode ):**

1. To study AC and DC machines parts and their functions.
2. Study of AC/DC motor starters.
3. To study servo motor/ steeper motor with application.
4. Study of installation techniques using fuse, MCB and MCCB.

**List of Lab Activities:**

1. Electrical Safety Measures.
2. To study series-parallel RL, RC and RLC circuits
3. To verify KVL and KCL theorems.
4. To study speed control techniques of dc motor.
5. To study speed control techniques of induction motor.
6. To perform load test on transformer.
7. Find out equivalent resistance in series and parallel connection.
8. Measure voltage, current and power in single phase A.C., R-C series circuit.
9. Measure Voltage, current and power factor of single phase A.C., R-L series circuit.

## Textbooks

| | |
|---|---|
| 1 | D. C. Kulshreshtha, "Basic Electrical Engineering", 1st revised edition McGraw Hill, 2012. |
| 2 | D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010. |

## References

| | |
|---|---|
| 1 | V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering", 2nd edition, Tata McGraw Hill. |

## Useful Links

| | |
|---|---|
| 1 | Virtual Labs, An Initiative of Ministry of Education Under the National Mission on Education through ICT,<br>1. https://www.vlab.co.in/broad-area-electrical-engineering<br>2. http://vlabs.iitkgp.ac.in/asnm/# |

| **CO-PO Mapping** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Programme Outcomes (PO)** | | | | | | | | | | | | **PSO** | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | | | | | | | | | | | | | |
| **CO2** | 3 | | | | | | | | 2 | | | | | |
| The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High<br>Each CO of the course must map to at least one PO, and preferably to only one PO. | | | | | | | | | | | | | | |

| **Assessment** | | | | |
|---|---|---|---|---|
| There are three components of lab assessment, LA1, LA2 and Lab ESE.<br>IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40% | | | | |
| **Assessment** | **Based on** | **Conducted by** | **Typical Schedule** | **Marks** |
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 8<br>Marks Submission at the end of Week 8 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 9 to Week 16<br>Marks Submission at the end of Week 16 | 30 |
| Lab ESE | Lab activities, journal/ performance | Lab Course Faculty and External Examiner as applicable | During Week 18 to Week 19<br>Marks Submission at the end of Week 19 | 40 |
| Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any. | | | | |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2022-23**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. All Branches |
| **Class, Semester** | First Year B. Tech. SEM-I & II |
| **Course Code** | 7VS151 |
| **Course Name** | Engineering Skills-I |
| **Desired Requisites:** | |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | - | **LA1** | **LA2** | **ESE** | **Total** |
| **Tutorial** | - | 30 | 30 | 40 | 100 |
| **Practical** | 2Hrs/Week | - | | | |
| **Interaction** | - | **Credits: 1** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To train the students to use different tools and equipment involved in the manufacturing processes |
| **2** | To develop the skills to handle the basic cutting tools and devices required for various manufacturing processes, interpret the given job drawing, select relevant fitting tools |
| **3** | To prepare the students to carry out the various operations to make a finished product |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy** | |
|---|---|---|---|
| | | **Level** | **Description** |
| **CO1** | Describe the basic methods, operations and processes of manufacturing | I | Understand |
| **CO2** | Illustrate the simple mechanical systems, machines, equipment, the basic working of cutting tools for manufacturing. | II | Apply |
| **CO3** | Use of Fitting tools, job holding devices, measuring tools | III | Apply |
| **CO4** | Check verticality and level difference. | III | Apply |
| **CO5** | Estimate the material requirement in constructed structure. | III | Apply |
| **CO6** | Sketch building plan. | III | Apply |

**List of Experiments / Lab Activities**

**List of Mechanical Engineering Skills:**

1. Introduction to **wood working**, the hand tools required and machines:
   Perform Planning operation, cutting by chisel to prepare small **mobile phone stand** [Square joint type] (**4 Hrs)**
2. Introduction to **fitting shop** tools, equipment/machines:
   Job consisting of **male and female parts** viz.one with groove, another with matching projection, holes on both and their assembly, as per given job drawing.
   operations to be performed: Marking, Punching, Saw cutting, Drilling, Edge filing operations **(4 Hrs.)**
3. Introduction to **sheet metal work**: Job of small **sheet metal tray** as per given job drawing with following operations: Marking, Cutting, bending/folding **(4 Hrs.)**

**List of Civil Engineering Skills:**

1. Establishing verticality, right angle corner, and level difference in masonry construction (2 Hrs)
2. Line out of building plan on site (2 Hrs)
3. Estimate the quantities/ material requirement for (4Hrs)
   a) Brickwork
   b) Concrete components/elements
   c) Flooring

| | |
|---|---|
| 4. | Sketching of building plan and calculation of FSI (2Hrs) |
| **Text Books [Mechanical]** | |
| 1 | Raghuwanshi B. S., "A Course in Workshop Technology I", Dhanpat Rai Publications,10th Ed., 2009 |
| 2 | S. K. Hajra Choudhury and A. K. HajraChoudhary, "Workshop Technology" – Vol-I [Manufacturing Processes]", Media Promoters and Publishers Pvt. Ltd., 10th edition, reprint 2001 |
| 3 | Bawa H S. "Workshop Practice," McGraw Hill Education, Noida, 2nd edition ,2009 ISBN-13: 978-0070671195 |
| 4 | Gupta, J. K., Khurmi, "A Textbook of Manufacturing Process" (Workshop Tech.) R S S Chand and Co., New Delhi,2020, ISBN:81-219-3092-8 |
| 5 | Singh Rajender, "Introduction to Basic Manufacturing Process and Workshop Technology", New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7 |
| **References [Mechanical]** | |
| 1 | W.A.J. Chapman, "Workshop Technology Volume I", CBS Publishing & Distributors, Delhi. [ISBN-13:9788123904016] 2001 |
| 2 | Rao P. N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House,2017 |
| 3 | Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008 |
| **Text Books [Civil]** | |
| 1. | Gole L. G., "Introduction to Civil Engineering", Mahu Publisher House, 4th Edition, 2005 |
| 2. | Bhavikatti S. S., "Basic Civil Engineering", New Age Publications, 2010 |
| | |
| **References [Civil]** | |
| 1 | Bindra S. P., Arora S. P., "Building Construction", Dhanpat Rai publication, 5th edition, 2012 |
| | |
| **Useful Links** | |
| 1 | https://www.vlab.co.in/broad-area-mechanical-engineering |
| 2 | https://drive.google.com/file/d/1tp5yV2ghp_Slub58S7iKnvvJyoEwQVYq/view |
| 3 | https://www.youtube.com/@workshop.supdtjmdabir5653 |
| 4 | https://www.youtube.com/watch?v=gPaBULgRRuM |
| 5 | https://www.youtube.com/watch?v=-f7tTNRH_04 |
| 6 | https://www.youtube.com/watch?v=UD3q5R0N8U4 |
| 7 | https://www.youtube.com/watch?v=uapzeNwKq4U |
| 8 | https://www.youtube.com/watch?v=jbRgJbIGAwc |
| 9 | https://www.youtube.com/watch?v=TeErxz59Sss |
| 10 | https://www.youtube.com/watch?v=F4SwbJ1euB8 |
| 11 | https://www.youtube.com/watch?v=cuv-tP6JHEI |
| 12 | https://www.youtube.com/watch?v=vUIY_BiLyFI |
| 13 | https://www.youtube.com/watch?v=xMQOR6Jg3o4 |
| 14 | https://www.youtube.com/watch?v=OdrBpPNJMaI |
| 15 | https://www.youtube.com/watch?v=uAIXHqOm0AM |
| 16 | https://www.youtube.com/watch?v=DzCBASUKpF4 |
| 17 | https://www.youtube.com/watch?v=TQ_NeHenT9Y |
| 18 | https://www.youtube.com/watch?v=rkp2Uvpop-g |
| 19 | https://www.youtube.com/watch?v=iDJ_sMvXsYs |
| 20 | https://www.youtube.com/watch?v=xZgtyNdGHvs |

| **CO-PO Mapping** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Programme Outcomes (PO) Mechanical** | | | | | | | | | | | | **PSO** | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| **CO1** | | | | 1 | | | | | | | | | | | |
| **CO2** | | | | 1 | | | | | | | | | | | |
| **CO3** | | | | | 1 | | | | | | | | | | |
| The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High | | | | | | | | | | | | | | | |

| **Assessment** |
|---|

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

| Assessment | Based on | Conducted by | Typical Schedule (for 26-week Sem) | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 6<br>Marks Submission at the end of Week 6 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 7 to Week 12<br>Marks Submission at the end of Week 12 | 30 |
| Lab ESE | Lab activities, attendance, journal | Lab Course Faculty | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 40 |

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

# Semester II

# Professional Core (Theory)

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

| **Course Information** | |
|---|---|
| **Programme** | B.Tech (Electrical/Electronics) |
| **Class, Semester** | First Year B. Tech., Sem II |
| **Course Code** | 7MA103 |
| **Course Name** | Engineering Mathematics- II (Elect/ELN) |
| **Desired Requisites:** | Mathematics course at Higher Secondary Junior College |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 1 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 04** | | | |

| **Course Objectives** | |
|---|---|
| **1** | Familiarize the students with techniques in multivariate integration and Differential equation. |
| **2** | Awareness about Mathematics fundamental necessary to solve and analyse the Engineering problem |
| **3** | |
| **4** | |

| **Course Outcomes (CO) with Bloom's Taxonomy Level** | | |
|---|---|---|
| At the end of the course, the students will be able to, | | |
| **CO1** | Understand the Mathematical Tools that are needed to solve Engineering problem | Understanding |
| **CO2** | Solve the problems in multivariable calculus, | Applying |
| **CO3** | Apply the statistical technique to interpret the data | Applying |
| **CO4** | | |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Beta-Gamma Functions:** Definition of Beta, Gamma functions and properties of Beta Gamma functions | **6** |
| II | **Curve tracing** Tracing of curves for Cartesian and polar coordinate | **6** |
| III | **Multivariable Calculus:** Multiple Integrals: Double integrals, change of order of integration, change of variables (Cartesian to polar) Evaluation of triple integrals, Application of Multiple integrals such as Area enclosed by plane curves, Mass of lamina, Volume of solid. | **8** |
| IV | **Linear Differential equations of nth order with constant coefficient:** Linear Differential equation with constant coefficient, Complementary function, Particular Integra**l** | **8** |
| V | **Applications of L.D.E with constant Coefficient:** Applications of L.D.E with constant Coefficient to Electrical Engineering | **4** |
| VI | **Statistics:** | |

| | | |
|---|---|---|
| | Correlation, Linear regression, Curve fitting (a) straight line (b) logarithmic curve, | **7** |
| | | |
| **Textbooks** | | |
| 1 | P. N. and J. N. Wartikar, "A Text Book of Applied Mathematics", Vol I and II", Vidyarthi Griha Prakashan, Pune, 2006 | |
| 2 | B .S. Grewal , "Higher Engineering Mathematics", Khanna Publication, 44th Edition , 2017. | |
| 3 | S.C. Gupta, "Fundamentals of Mathematical Statistics and probability", Sultan chand &Sons,2014. | |
| 4 | | |
| | | |
| **References** | | |
| 1 | Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Limited Publication, 2015, 10th Edition | |
| 2 | Wylie C.R, *"Advanced Engineering Mathematics",* Tata McGraw Hill Publication, 8th Edition, 1999 | |
| 3 | H. K. Dass *, "Higher Engineering Mathematics",* S. Chand & Company Ltd., 1st Edition 2014. | |
| 4 | S. S. Sastry, *"Engineering Mathematics (Volume-I)",* Prentice Hall Publication, 3rd Edition 2006 | |
| | | |
| **Useful Links** | | |
| 1 | https://www.youtube.com/watch?v=KgItZSst2sU | |
| 2 | https://nptel.ac.in/courses/111105121 | |
| 3 | | |
| 4 | | |

| **CO-PO Mapping** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Programme Outcomes (PO)** | | | | | | | | | | | | **PSO** | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 2 | | | 1 | | | | | | | | | | |
| **CO2** | 2 | | | 1 | | | | | | | | | | |
| **CO3** | 2 | | | 1 | | | | | | | | | | |
| **CO4** | | | | | | | | | | | | | | |
| The strength of mapping is to be written as 1: Low, 2: Medium, 3: High<br>Each CO of the course must map to at least one PO. | | | | | | | | | | | | | | |

| **Assessment** |
|---|
| The assessment is based on MSE, ISE and ESE.<br>MSE shall be typically on modules 1 to 3.<br>ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. |

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

## Course Information

| | |
|---|---|
| **Programme** | B. Tech. (Electrical Engineering) |
| **Class, Semester** | First Year B. Tech., Sem.- I |
| **Course Code** | 7EN106 |
| **Course Name** | Basic Electronics Engineering |
| **Desired Requisites:** | Physics course at Secondary and Higher secondary level |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | - | 30 | 20 | 50 | 100 |
| | | **Credits: 3** | | | |

## Course Objectives

| | |
|---|---|
| **1** | To explain the difference between analog and digital electronic circuits. |
| **2** | To explain the realization of a logic using combinational and sequential circuits. |
| **3** | To explain the working of diode circuits, transistorized and op-amp based amplifiers. |
| **4** | To build and test simple electronic circuits. |

## Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

| CO | Course Outcome Statement/s | Bloom's Taxonomy Level | Bloom's Taxonomy Description |
|---|---|---|---|
| **CO1** | Explain the fundamentals of digital electronics. | I | Understand |
| **CO2** | Explain the working of amplifiers and oscillators. | I | Understand |
| **CO3** | Explain the working of amplifiers and oscillators. | III | Apply |
| **CO4** | Implement small application circuit using op-amp and IC 555. | III | Apply |

| Module | Module Contents | Hours |
|---|---|---|
| I | **Fundamentals of Digital Electronics** Boolean algebra, SOP and POS terms, K-map reduction technique, converting AOI to NAND/NOR logic. Combinational Circuits: half adder and subtract 1-bit full adder and subtractor, 1-bit and 2-bit comparator, Sequential Circuit flip-flop, counters. | 7 |
| II | **Diodes and its Applications** P-N junction diode, diode characteristics, half-wave and full-wave rectifier clippers and clampers; Zener diode, LED, Photodiode and Solar Cell. | 4 |
| III | **Basics of Transistor** Transistor structure, types (BJT, FET and MOSFET), transistor configuration biasing methods, transistor as a switch, Introduction to CMOS circuit. | 4 |
| IV | **Amplifiers and Oscillators** Amplifier fundamentals, small signal amplifiers: common emitter amplifier common collector amplifier; JFET/MOSFET common source/ common drain amplifier, Oscillators: classification, RC phase shift oscillator. | 5 |
| V | **Operational Amplifier** Basic op-amp configuration, op-amp powering, feedback in op-amp circuit ideal op-amp circuits analysis, inverting, non-inverting amplifier, summing amplifier, difference amplifier, unity gain buffer; IC555 timer. | 5 |
| VI | **Regulated DC Power Supply** Block diagram of regulated dc power supply, Zener diode voltage regulator series and shunt regulator, op-amp based voltage regulator. | 3 |

## Textbooks

| | |
|---|---|
| 1 | R. P. Jain, "Modern Digital Electronics," 4th edition, Tata McGraw Hill, 2009. |
| 2 | Anand Kumar, "Fundamentals of Digital Circuits," 4th edition, PHI Learning Private Limited, 2016. |
| 3 | Robert L. Boylestad, "Electronic Devices and Circuit Theory," Pearson, 2015. |
| 4 | Ramakant Gaikwad, “Op-amp and Linear Integrated Circuits”, 4th edition, Pearson, 2015. |
| | |
| **References** | |
| 1 | M. Morris Mano, "Digital Design," Pearson Education, 2011. |
| 2 | Donald A. Neamen, "Electronic Circuit Analysis and Design," McGraw-Hill Education, 2011. |
| 3 | Robert F. Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits," Pearson Education, 2009. |
| | |
| **Useful Links** | |
| 1 | https://nptel.ac.in/courses/108101091 |
| 2 | https://nptel.ac.in/courses/108105113 |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 2 | 2 | | | | | | | | | | | | |
| **CO2** | 2 | 2 | | | | | | | | | | | | |
| **CO3** | 2 | 2 | | | | | | | | | | | | |
| **CO4** | 2 | 2 | | | | | | | | | | | | |

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

**Assessment**

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher’s assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

**Course Information**

| | |
|---|---|
| **Programme** | First Year B. Tech. Electrical |
| **Class, Semester** | First Year B. Tech., Sem II |
| **Course Code** | 7EL102 |
| **Course Name** | Electrical Measurement and Instrumentation |
| **Desired Requisites:** | Fundamentals of Electrical Engineering |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | -- | 30 | 20 | 50 | 100 |
| | | **Credits: 3** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | This course intends to provide basic concepts of errors in measurements and basic fundamentals of Measuring systems, formal representation, computational methods, notation, and vocabulary of linear models. |
| **2** | It is aimed to impart skills to classify bridges, measuring instruments and equipment's and also demonstrates digital instruments, advance instruments. |
| **3** | To impart basic knowledge of transducer. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | Describe fundamental concepts of measurement and identify errors in measurement and its statistics. | I | Remembering |
| **CO2** | Explain working principle and mechanism of measuring instrument. | II | Understanding |
| **CO3** | Implement a proper measuring instrument and modern techniques for measurement of electrical and physical parameters for given application. | III | Applying |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Introduction**<br>Units, Dimensions and Standards, Structure of Measurement Systems, Instrument Types-Active, Passive, Static Characteristics & Dynamic Characteristics of Instruments, Measurement Errors, Sensors and Transducers - Overview, Definition, Classification, Selection Criteria. | 6 |
| II | **Measuring Instruments**<br>Indicating, Integrating, Recording Instruments, Analog & Digital Instruments. Essentials of Indicating Instruments Deflecting, Controlling And Damping Systems. Construction, Working Principle, Torque Equation, Advantages & Disadvantages of Moving Iron (MI) (Attraction And Repulsion), Permanent Magnet Moving Coil (PMMC) & Dynamometer Type Instruments, Range Extension of MI Instruments. | 7 |

| | | |
|---|---|---|
| III | **Measurement of Power and Energy**<br>Active And Reactive Power Measurement In Three Phase System for Balanced and Unbalanced Load Using Two Wattmeter Method & One Wattmeter Method. Construction, Working Principle, Torque Equation of Single Phase Conventional (Induction Type) Energy Meter, Calibration of Energy Meter, Digital Energy Meter | 6 |
| IV | **Measurement of Electrical Quantities**<br>Measurement of Low, Medium and High Resistance, Wheatstone Bridge, Kelvin's Double Bridge, Ammeter-Voltmeter Method, Megger, Earth Tester for Earth Resistance Measurement, Maxwell's Bridge, Hay's Bridge, Anderson's Bridge, Schering Bridge and Wien's Bridge. | 6 |
| V | **Measurement of Non-electrical Quantities**<br>Force Measurement Using Strain Gauges, Displacement Measurements Using LVDT, Temperature Measurement Using RTD, Thermistor, Thermocouple, Bellows and Diaphragm. Flow Measurement Using Rotameter, Electromagnetic Flow Meter. Speed Measurement Using Magnetic Pick-Up And Photoelectric Pick-Up. | 8 |
| VI | **Recent Developments**<br>DSO, Power Analyzer, Wave Analyzer, Harmonic Distortion Analyzer, Instrument Transformers, Digital Ammeter & Voltmeter | 6 |

| **Textbooks** | |
|---|---|
| 1 | Alan Morris "Principles of measurement and instrumentation", Prentice Hall- India, 2004 ISBN: 0134897099. |
| 2 | A. K. Sawhney, "A Course in Electrical and Electronics Measurement and Instrumentation", Dhanapat Rai & Company, New Delhi, reprint, 17th Edition, 2005. |
| 3 | Rangan, Mani and Sharma, "Instrumentation Devices and Systems", Tata McGraw Hill, New Delhi, 2nd Edition. |
| 4 | Helfrick and Cooper, "Modern Electronic Instrumentation and Measurement Techniques" Pearson, 2007 |
| 5 | C. D. Johnson, "Process Control Instrumentation Technology", Pearson Education. |

| **References** | |
|---|---|
| 1 | M. A. Baldwin, "Fundamentals of Electrical Measurements", Publication – Lyall Book Depot, Ludhiyana. |
| 2 | Albert D. Helfric, "Modern Electronics measurement & instruments", PHI Ltd, 2003. |
| 3 | Doebelin E. O., "Measurement Systems", McGraw Hill Book Co. |
| 4 | Patranabis D, "Sensors and Transducers", Wheeler Publishing Co., Ltd. New Delhi. |
| 5 | Murthy D. V. S., "Transducers and Instrumentation", Prentice Hall of India Pvt. Ltd., New Delhi. |

| **Useful Links** | |
|---|---|
| 1 | https://nptel.ac.in/courses/108/105/108105153 |
| 2 | https://nptel.ac.in/courses/108/105/108105064 |
| 3 | elearning.vtu.ac.in/, nptel.iitg.ernet.in/ |

| **CO-PO Mapping** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Programme Outcomes (PO)** | | | | | | | | | | | | **PSO** | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | | | | | | | | | | | | | |
| **CO2** | 2 | 1 | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO3** | | 2 | 1 | | | | | | | | | | | |

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

| **Assessment** |
|---|
| The assessment is based on MSE, ISE and ESE.<br>MSE shall be typically on modules 1 to 3.<br>ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.<br>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.<br>For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing) |

# Professional Core (Lab)

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. |
| **Class, Semester** | First Year B. Tech. Sem I/II |
| **Course Code** | 7CH155 |
| **Course Name** | Engineering Chemistry Lab |
| **Desired Requisites:** | Chemistry course at secondary and higher secondary level |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2Hrs/ Week | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Interaction** | 0Hrs/ Week | 30 | 30 | 40 | 100 |
| | | **Credits: 1** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To make the student familiar with analytical techniques. |
| **2** | To provide hands on practice of Instrumental and titrimetric analysis. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | Apply principles of Volumetry/gravimetry to quantitative analysis for water quality parameter, metal and alloys. | III | Applying |
| **CO2** | Demonstrate use of instrument for quantitative analysis. | III | Applying |
| **CO3** | Experiment physical/Chemical characteristics of material. Execute preparation of product. | III | Applying |

**List of Experiments (Minimum 8 experiments from the following list)**

| **Sr. No** | **List of Experiments** | **Hours** |
|---|---|---|
| 1 | Estimation of hardness of water by EDTA method (Complexometric Titration). | 2 Hrs. each Expt. |
| 2 | Estimation of alkalinity of water (Neutralization Titration). | |
| 3 | Estimation of Dissolved Oxygen in water (Iodometric Titration). | |
| 4 | Estimation of Chloride content in water (Argentometry). | |
| 5 | Demonstration of pH meter & pH metric titration. | |
| 6 | Determination of strength of acid/base by conductometrically. | |
| 7 | Colorimetric estimation of Copper. | |
| 8 | Estimation of copper from Bronze. (Iodometric Titration). | |
| 9 | Estimation of Zn from Brass (Displacement Titration). | |
| 10 | Determination of purity of Iron (Redox Titration). | |
| 11 | Determination of viscosity of given liquid. by Ostwald viscometer. | |
| 12 | Determination of corrosion rate by weight loss method | |
| 13 | Gravimetric estimation of Ba from $BaSO_4$ as BaO. | |
| 14 | Preparation of Resin | |
| **List of Topics(Applicable mode ):** | | |
| | Verification of Calcium content from Cement/ Limestone/Eggs shells/Calcium tablet. | |

Dr. Doddas Rao  A. A. Powar

| Textbooks | |
|---|---|
| 1 | College Practical Chemistry, V K Ahaluwaliya. Sunita Dhingra, Adarsha Gulati , Universities Press. |
| 2 | Laboratory Manual on Engineering Chemistry by Sudha Rani And S.K. Bashin, Dhanpat Rai& Co. |

| References | |
|---|---|
| 1 | Engineering Chemistry Laboratory Manual, Department of Chemistry WCE, Sangli. |
| 2 | J Mendham, R.C. Denney, J.D. Barnes, M.J.K Thomas, "Quantitative Chemical analysis", Vogels, Pearson Education, 2008, 6th Edition. |

| Useful Links | |
|---|---|
| 1 | https://www.lccc.edu/academics/science-and-engineering/science-in-motion/labs-equipment/chemistry-lab-experiments |
| 2 | https://edu.rsc.org/resources/collections/classic-chemistry-experiments |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | | | | | | | | | | | | | |
| **CO2** | 3 | | | | | | | | | | | | | |
| **CO3** | 3 | | | | | | | | | | | | | |

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %),LA1+LA2 should be min 40%

| Assessment | Based on | Conducted by | Typical Schedule | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 8<br>Marks Submission at the end of Week 8 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 9 to Week 16<br>Marks Submission at the end of Week 16 | 30 |
| Lab ESE | Lab activities, journal/ performance | Lab Course Faculty | During Week 18 to Week 19<br>Marks Submission at the end of Week 19 | 40 |

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

## Course Information

| | |
|---|---|
| **Programme** | B.Tech. (Electrical, Electronics, CSE, IT) |
| **Class, Semester** | First Year B. Tech., Sem I &II |
| **Course Code** | 7ME108 |
| **Course Name** | Engineering Graphics Lab |
| **Desired Requisites:** | Basic Knowledge of Computer |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2Hrs/Week | **LA1** | **LA2** | **ESE** | **Total** |
| **Interaction** | 1 Hrs/Week | 30 | 30 | 40 | 100 |
| | | **Credits: 2** | | | |

## Course Objectives

| | |
|---|---|
| **1** | To impart the techniques of engineering graphics. |
| **2** | To prepare the students for applying knowledge of engineering graphics in real life drawings. |
| **3** | To develop the skills of students for evaluating CAD software for its applications |

## Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | Understand the basic principle of Engineering graphics. | II | Understanding |
| **CO2** | Draw different views of components using the first angle projections method. | III | Applying |
| **CO3** | Apply the knowledge of engineering graphics in real life applications. | III | Applying |

## List of Experiments / Lab Activities

**List of Experiments:**

**Submission of drawing on following topics (Any two sheets on CAD)**

1: Plane Curves and Conic Sections (Min. 5 Problems)
2: Projections of Points and Lines (Min. 5 Problems)
3: Projections of Planes and Solids (Min. 6 Problems)
4: Development of Lateral Surfaces (Min. 3 Problems)
5: Orthographic Projections (Min. 2 Problems)
6: Isometric Projections (Min. 2 Problems)

## Text Books

| | |
|---|---|
| 1 | Bhatt N.D., Panchal V.M. and Ingle P.R., Engineering Drawing, Charotar Publishing House, 2014 |
| 2 | Shah, M.B. and Rana B.C., Engineering Drawing and Computer Graphics, Pearson Education, 2008. |
| 3 | Agrawal B. and Agrawal C. M., Engineering Graphics, TMH Publication, 2012. |

## References

| | |
|---|---|
| 1 | Narayana, K.L. and P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, 2008. |
| 2 | Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi, 2010 |
| 3 | Fredderock E. Giesecke, Alva Mitchell others, Principles of Engineering Graphics, Maxwell McMillan Publishing, 2010 |

## Useful Links

| | |
|---|---|
| 1 | https://nptel.ac.in/courses/112/103/112103019/ |
| 2 | https://nptel.ac.in/courses/105/104/105104148/ |
| 3 | https://www.youtube.com/watch?v=xXdpkQXDuMw&list=PL9RcWoqXmzaJT-fliqTSwUjWU4zCX_H2A |

| CO-PO Mapping For Electrical Engineering Department | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | 2 | | | | 1 | | | | | 1 | | 1 | | | |
| **CO2** | | | 1 | | | | | | | | | | | | |
| **CO3** | | | | | 2 | | | | | 1 | | | | | |
| The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High | | | | | | | | | | | | | | | |

| CO-PO Mapping Electronics Engineering Department | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | 1 | | | | 1 | | | | | 1 | | | | | |
| **CO2** | | | 1 | | | | | | | | | | | | |
| **CO3** | | | | | 2 | | | | | 1 | | | | | |
| The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High | | | | | | | | | | | | | | | |

| CO-PO Mapping Computer Science and Engineering Department | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | | | | | 3 | | | | | 1 | | 1 | | | |
| **CO2** | | | 1 | | | | | | | | | | | | |
| **CO3** | | | | | 3 | | | | | 1 | | | | | |
| The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High | | | | | | | | | | | | | | | |

| CO-PO Mapping For Information Technology Department | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | | | | | 3 | | | | | 1 | | 1 | | | |
| **CO2** | | | 1 | | | | | | | | | | | | |
| **CO3** | | | | | 3 | | | | | 1 | | | | | |
| The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High | | | | | | | | | | | | | | | |

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

| Assessment | Based on | Conducted by | Typical Schedule | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 8<br>Marks Submission at the end of Week 8 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 9 to Week 16<br>Marks Submission at the end of Week 16 | 30 |
| Lab ESE | Lab activities, journal/ performance | Lab Course Faculty and External Examiner as | During Week 18 to Week 19<br>Marks Submission at the end of Week 19 | 40 |

| | | | | |
|---|---|---|---|---|
| | | applicable | | |
| Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any. | | | | |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

| **Course Information** | |
|---|---|
| **Programme** | B.Tech. (Electronics Engineering) |
| **Class \| Semester** | First Year B. Tech \| Semester-I |
| **Course Code** | 7CS107 |
| **Course Name** | Computer Programming (C Programming) |
| **Desired Requisites:** | - |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2 Hrs/ Week | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Interaction** | 2 Hrs/ Week | 30 | 30 | 40 | 100 |
| | | **Credits: 3** | | | |

| **Course Objectives** | |
|---|---|
| **1** | To understand problem solving and problem solving aspects. |
| **2** | To learn basics, features and future of C programming. |
| **3** | To acquaint with data types, input output statements, decision making, looping, functions, array, string, pointer, structure and union in C. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | To understand the basics of problem solving and C programming. | II | Understand |
| **CO2** | To translate the algorithms to programs (in C language). | III | Applying |
| **CO3** | To test and execute the C programs and correct syntax and logical errors. | IV | Analyse |

**List of Experiments / Lab Activities/Topics**

**List of Topics (Applicable for Interaction Mode):**

**Module I: Basics of Problem Solving & C Programming:** General Problem Solving Concepts, Types of Problems, Problem Solving Strategies. **Program Design Tools:** Algorithms, Flowcharts and Pseudo-Codes. **C Programming:** Types of programming languages, Features of C, Basic Concepts, Structure of a C Program, Declarations, Constants, Variables, Data Types, Operators and Expressions, Input and Output Functions.

**Module II: Decision Control Statements:** Conditional Statements: If, If-else, Nested If, If-elseif Statements. **Iterative Statements:** While Loop, For Loop, Do While Loop, Break, Continue, Pass, else Statement used with Loops.

**Module III: Functions:** Need for functions, Definition, Function Call, Block Structure, Variable Scope, Return Type, Passing Arguments to a Function: Call by Reference, Call by Value, Recursive Functions.

**Module IV: Array**: Declaration, Initialization, Two-Dimensional Arrays, Multi-Dimensional Array. **String**: Declaration and Initialization of Strings, Array of Strings, String functions.

**Module V: Pointers:** Introduction, Definition and Declaration of Pointers, Address Operator, Pointer Variables. **Structures and Unions:** Declaration, Initialization, Accessing members of a Structure, Initializing a Union, Accessing the Members of a Union.

**Module VI: File handling:** Concept of a File, Types of File, File Operation, File functions, File opening modes in C, Reading, Write and Closing a File.

**List of Experiments:**

1. Program to simulate simple calculator that performs basic tasks such as addition, subtraction, multiplication and division.
2. Program to demonstrate different operators and their order precedence.
3. Program to accept the number and Compute a) square root of number, b) Square of number, c) Cube of number d) check for prime, d) factorial of number e) prime factors.
4. Program to accept a number from user and print digits of number in a reverse order.
5. Program to accept two numbers from user and compute smallest divisor and Greatest Common Divisor of these two numbers.
6. Program to find whether the number is positive / negative / zero using conditional statement.
7. Programs to show different types of iteration / loop.
8. Program to accept N numbers from user and compute and display maximum in list, minimum in list, sum and average of numbers.
9. Program to print the Fibonacci Series (with & without recursion).
10. Program to swap two number using function (Call by value & reference).
11. Program to demonstrate structure to array.
12. Program to demonstrate structure and union.
13. Program to demonstrate file handling.

| **Textbooks** | |
|---|---|
| 1 | E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill. |
| 2 | Yashavant Kanetkar, "Lets Us C", BPB Publication, 5th Edition, 20216. |
| | |
| **References** | |
| 1 | Maureen Spankle, “Problem Solving and Programming Concepts”, Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645. |
| 2 | Herbert Schidt, C: The complete reference, 4th edition, McGraw Hill publication. |

| | |
|---|---|
| 3 | Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India |
| | |

| Useful Links | |
|---|---|
| 1 | https://www.programiz.com/c-programming |
| 2 | https://www.w3schools.com/c/c_intro.php |
| 3 | https://www.javatpoint.com/c-programming-language-tutorial |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | 2 | | | | | | | | | | | | |
| **CO2** | 1 | | 2 | | 2 | | | | | | | | | |
| **CO3** | | 2 | 1 | 2 | | | | | | | | | | |

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

| Assessment | Based on | Conducted by | Typical Schedule | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, Submission | Lab Course Faculty | During Week 1 to Week 8 Marks Submission at the end of Week 8 | 30 |
| LA2 | Lab activities, attendance, Submission | Lab Course Faculty | During Week 9 to Week 16 Marks Submission at the end of Week 16 | 30 |
| Lab ESE | Lab activities/ submission/ performance | Lab Course Faculty and External Examiner as applicable | During Week 18 to Week 19 Marks Submission at the end of Week 19 | 40 |

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

## Course Information

| | |
|---|---|
| **Programme** | B. Tech. (Electrical Engineering) |
| **Class, Semester** | First Year B. Tech., Sem.- I |
| **Course Code** | 7EN156 |
| **Course Name** | Basic Electronics Engineering Lab |
| **Desired Requisites:** | Physics course at Secondary and Higher secondary level |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2 Hrs/ Week | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Interaction** | - | 30 | 30 | 40 | 100 |
| | | **Credits: 1** | | | |

## Course Objectives

| | |
|---|---|
| **1** | To **provide** knowledge of electronic components and circuits to first year engineering students, so that they can understand, design and implement simple analog / digital electronic circuits. |

## Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

| CO | Course Outcome Statement/s | Bloom's Taxonomy Level | Bloom's Taxonomy Description |
|---|---|---|---|
| **CO1** | **Identify and explain** use of electronics components and instruments. | II | Understand |
| **CO2** | **Explain** the working of diode circuits, transistorized and op-amp based amplifiers. | II | Understand |
| **CO3** | **Construct** digital IC, diode, transistor and op-amp based circuits. | III | Apply |
| **CO4** | **Build and Test** simple electronic circuits using op-amp and IC555. | III | Apply |

## List of Experiments / Lab Activities/Topics

**List of Topics (Applicable for Interaction mode): List of Lab Activities: (minimum 08 experiments)**

1. Identification of components and instruments required in lab to perform experiments in basic electronics engineering.
2. Realization of logic gates using basic building block (NAND/NOR).
3. Implementation of combinational and sequential logic circuit.
4. Study of p-n junction diode characteristics.
5. Study of half-wave and full-wave rectifier.
6. Study of diode-based clipper and clamper circuits
7. Study of transistor as a switch and amplifier (BJT and JFET).
8. Study of common emitter/common source amplifier.
9. Study of inverting and non-inverting amplifier using op-amp.
10. Implementation of op-amp based applications (adder / subtractor).
11. Build and test multivibrator/ timer circuits using IC 555.

Study of regulated dc power supply (Zener diode voltage regulator/ op-amp based linear voltage regulator).

## Textbooks


| | |
|---|---|
| 1 | R. P. Jain, "Modern Digital Electronics," 4th edition, Tata McGraw Hill, 2009. |
| 2 | Anand Kumar, "Fundamentals of Digital Circuits," 4th edition, PHI Learning Private Limited, 2016. |
| 3 | Robert L. Boylestad, "Electronic Devices and Circuit Theory," Pearson, 2015. |
| 4 | Ramakant Gaikwad, "Op-amp and Linear Integrated Circuits", 4th edition, Pearson, 2015. |


## References


| | |
|---|---|
| 1 | M. Morris Mano, "Digital Design," Pearson Education, 2011. |
| 2 | Donald A. Neamen, "Electronic Circuit Analysis and Design," McGraw-Hill Education, 2011. |

| | |
|---|---|
| 3 | Robert F. Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits," Pearson Education, 2009. |
| | |

| Useful Links | |
|---|---|
| 1 | https://nptel.ac.in/courses/122106025 |
| 2 | https://nptel.ac.in/courses/108101091 |
| 3 | https://nptel.ac.in/courses/108105113 |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 2 | | | | | | | | | | | | | |
| **CO2** | 2 | | | | | | | | | | | | | |
| **CO3** | | | | 2 | | | | | 1 | | | | | 1 |
| **CO4** | | | | 2 | | | | | 1 | | | | | 2 |

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

| Assessment | Based on | Conducted by | Typical Schedule | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 8<br>Marks Submission at the end of Week 8 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 9 to Week 16<br>Marks Submission at the end of Week 16 | 30 |
| Lab ESE | Lab activities, journal/ performance | Lab Course Faculty and External Examiner as applicable | During Week 18 to Week 19<br>Marks Submission at the end of Week 19 | 40 |

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

**Course Information**

| | |
|---|---|
| **Programme** | First Year B. Tech. Electrical |
| **Class, Semester** | First Year B. Tech., Sem II |
| **Course Code** | 7EL152 |
| **Course Name** | Electrical Measurement and Instrumentation Lab |
| **Desired Requisites:** | Fundamentals of Electrical Engineering |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2 Hrs/ Week | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Interaction** | - | 30 | 30 | 40 | 100 |
| | | **Credits: 1** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | This course explain and physically identify the parts like moving coil, control system, damping systems, pointer, shunts, multipliers etc. of different types of deflection systems. |
| **2** | It aims to recognize various transducers and use them in the measurement of various electrical and non-electrical quantities. |
| **3** | It intends to develop skills for measurement and instrumentation system. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | Identify the principles and operation of various measurement devices, their characteristics, limitations. | I | Remembering |
| **CO2** | Describe proper method, sensors and transducers for specific applications. | II | Understanding |
| **CO3** | Execute measurement electrical and physical parameters. | III | Applying |

**List of Experiments / Lab Activities/Topics**

**List of Lab Activities:**

1. Study of Moving iron, PMMC and Dynamometer type instruments (Basic moving systems)
2. Measurement of power in three phase balanced and unbalanced circuits by conventional two wattmeter method.
3. Calibration of Single-phase energy meter for energy measurement
4. Measurement of R, L and C Using Different Bridges and confirmation with analytical calculations.
5. Measurement of temperature using RTD
6. Comparative study of temperature measurement using RTD and thermocouple
7. Study of strain gauge and measurement of force using it
8. Study of construction of LVDT and measurement of displacement, force and pressure by using it.
9. Measurement of Light intensity using Lux-meter and to realize the light intensity distribution with change in distance.
10. Speed measurement using photoelectric pick up, magnetic pick up and stroboscope.

**Textbooks**

| | |
|---|---|
| 1 | Alan Morris “Principles of measurement and instrumentation”, Prentice Hall- India, 2004 ISBN: 0134897099. |
| 2 | A. K. Sawhney, “A Course in Electrical and Electronics Measurement and Instrumentation”, Dhanapat Rai & Company, New Delhi, reprint, 17th Edition, 2005. |
| 3 | Rangan, Mani and Sharma, “Instrumentation Devices and Systems”, Tata McGraw Hill, New Delhi, 2nd Edition. |
| 4 | C. D. Johnson, “Process Control Instrumentation Technology”, Pearson Education. |
| | |
| **References** | |
| 1 | Albert D. Helfric, “Modern Electronics measurement & instruments”, PHI Ltd, 2003. |
| 2 | Doebelin, E. O., “Measurement Systems”, McGraw Hill Book Co. |
| 3 | Patranabis, D,” Sensors and Transducers”, Wheeler Publishing Co., Ltd. New Delhi. |
| 4 | Murthy, D. V. S., “Transducers and Instrumentation”, Prentice Hall of India Pvt. Ltd., New Delhi. |
| | |
| **Useful Links** | |
| 1 | https://nptel.ac.in/courses/108/105/108105153 |
| 2 | https://nptel.ac.in/courses/108/105/108105064 |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | | | | | | | | | | | | | |
| **CO2** | 1 | | | | 3 | | | | | | | | | |
| **CO3** | 1 | | | | 3 | | | | | | | | | |

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

| Assessment | Based on | Conducted by | Typical Schedule | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 8<br>Marks Submission at the end of Week 8 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 9 to Week 16<br>Marks Submission at the end of Week 16 | 30 |
| Lab ESE | Lab activities, journal/ performance | Lab Course Faculty and External Examiner as applicable | During Week 18 to Week 19<br>Marks Submission at the end of Week 19 | 40 |

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

## Course Information

| | |
|---|---|
| **Programme** | B. Tech. (All Branches) |
| **Class, Semester** | First Year B. Tech., Sem.-I/II |
| **Course Code** | 7VS152 |
| **Course Name** | Engineering Skills (E/EN) |
| **Desired Requisites:** | Nil |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Practical** | 2 Hrs/ Week | **LA1** | **LA2** | **Lab ESE** | **Total** |
| **Interaction** | - | 30 | 30 | 40 | 100 |
| | | **Credits: 1** | | | |

## Course Objectives

| | |
|---|---|
| **1** | To **provide** basic knowledge of handling electrical equipment and safety. |
| **2** | To **impart** skills to plan and implement simple electrical wiring. |
| **3** | To **provide** exposure to the students with hands on experience on various basic engineering practices in Electrical and Electronics Engineering. |
| **4** | To **explain** the working of small electronic gadget like electronic bell, emergency lamp etc. |

## Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | **Identify** the instruments for measurement of electrical parameters. | I | Remembering |
| **CO2** | **Illustrate** working of switchgear for electrical safety and protections. | III | Applying |
| **CO3** | **Identify and explain** the use of electronic instruments. | II | Understanding |
| **CO4** | **Build and Test** simple electronic gadget. | III | Applying |

## List of Experiments / Lab Activities/Topics

**List of Lab Activities: (minimum 08 experiments)**

**Engineering Skills (Electrical)**

**Module 1:**

**i.** Measurement of Electrical Parameters in DC Circuits.

**ii.** Measurement of Electrical Parameters in Single Phase AC Circuits.

**Module 2:**

i. Study of various types of wires and cables.

**ii.** Basic wiring schemes for residential and industrial applications.

**iii.** Demonstrate the operation of fuse, MCCB, ELCB

**Module 3:**

i. Preparation of Earthing Pit for Electrical Installation Safety.

ii. Dismantling, Assembly and Fault Finding of Ceiling Fans / Table Fans, Automatic Electric Iron, Plate Tube Water Heater, Use of Megger.

**Engineering Skills (Electronics)**

**Module 1:** Introduction to Lab Instruments like CRO, Power supply, Oscillator, Multi meter. Frequency measurement, AC-DC voltage measurement using CRO and multi meter

**Module 2:** Study of components (Resistance, capacitor, Diode, Transistor, Transformer, switches, relays, PCB etc.) testing and lead identification

**Module 3:** Electronics Gadget building & testing (Gadget must work)

## Textbooks

| | |
|---|---|
| 1 | Make: Electronics, by Charles Platt, Published by Maker Media, 2015 |

| | |
|---|---|
| 2 | Electronics Projects For Dummies, by Earl Boysen and Nancy Muir, Published by Wiley Publishing, Inc., 2006 |
| 3 | D. C. Kulshreshtha, "Basic Electrical Engineering", 1st revised edition McGraw Hill, 2012. |
| 4 | D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010. |
| | |
| **References** | |
| 1 | Paul Horowitz, Winfield Hill, "The Art of Electronics", Cambridge University Press, 1989 |
| 2 | E-learning material through Intranet/Internet |
| 3 | V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering", 2nd edition, Tata McGraw Hill. |
| | |
| **Useful Links** | |
| 1 | |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | | | 1 | | 2 | | | | 1 | | | | 1 | |
| **CO2** | | | 1 | | 2 | | | | 1 | | | | 1 | |
| **CO3** | | | | 2 | | | | | 1 | | | | | 1 |
| **CO4** | | | | 2 | | | | | 1 | | | | | 2 |

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

**Assessment**

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

| Assessment | Based on | Conducted by | Typical Schedule | Marks |
|---|---|---|---|---|
| LA1 | Lab activities, attendance, journal | Lab Course Faculty | During Week 1 to Week 8<br>Marks Submission at the end of Week 8 | 30 |
| LA2 | Lab activities, attendance, journal | Lab Course Faculty | During Week 9 to Week 16<br>Marks Submission at the end of Week 16 | 30 |
| Lab ESE | Lab activities, journal/ performance | Lab Course Faculty and External Examiner as applicable | During Week 18 to Week 19<br>Marks Submission at the end of Week 19 | 40 |

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Electrical & Electronics Engineering) |
| **Class, Semester** | First Year B. Tech., Sem I/ II |
| **Course Code** | 7CH102 |
| **Course Name** | Engineering Chemistry ( Electrical / Electronics) |
| **Desired Requisites:** | Chemistry course at Secondary and Higher secondary level |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 2 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 0 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 3** | | | |

**Course Objectives**

| | |
|---|---|
| 1 | To make student familiar with engineering properties associated with different materials to use them successfully in practice. |
| 2 | To provide knowledge and significance of characterization and chemical analysis for using materials in different engineering applications. |

**Course Outcomes (CO) with Bloom's Taxonomy Level**

At the end of the course, the students will be able to,

| CO | Course Outcome Statement/s | Bloom's Taxonomy Level | Bloom's Taxonomy Description |
|---|---|---|---|
| CO1 | Explain terms chemical analysis, thermal analysis/ Batteries, fuel cell , water parameters, phase rule. Types of corrosion, Mechanism of Corrosion, water's industrial applications | II | Understanding |
| CO2 | Draw schematic of water softeners, phase diagrams, Thermo grams/ Batteries, Fuel cell , Thermo equipment's, Glass electrode, GLC setup | II | Understanding |
| CO3 | Classify types of chemical analysis, hard water, Chromatography. Corrosion, Batteries | II | Understanding |
| CO4 | Calculate concentration of solutions, % of analyte gravimetrically, hardness of water, Calorific values, % weight loss TGA | III | Applying |

| Module | Module Contents | Hours |
|---|---|---|
| I | **Module 1. General principles of chemical Analysis Part A: Volumetry**<br>Chemical analysis, Its types/ classification, Different ways to express concentration of solution & Numerical problems. Standards and its types, Definition of terms associated with titrimetry. Classification of titrimetry with application of type analysis, Numerical problems. | 7 |
| II | **Module 2. General principles of chemical Analysis Part B: Gravimetry & Instrument**<br>Gravimetry and its requirements, applications and Numerical problems.<br>pH metry, potentiometry, Single beam spectrophotometry w.r.t. Principle, Instrumentation, Calibration, Application Chromatography and its types & Introduction to GLC, Introduction for SEM, TEM,AFM and its applications.<br>Advantages and Disadvantages of instrumental and non-instrumental methods. | 6 |

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| | | |
|---|---|---|
| III | **Modules 3. Water Chemistry** - Natural sources of water, Impurities in natural water. Water quality parameters Hardness- Definition, Causes, Types, Expressing hardness, units to measure hardness, Numerical problems on hardness calculation, ill effects of hard water in steam generation, Alkalinity, Chloride , Dissolved oxygen(DO), Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) its significance. Ion exchange method of water softening | 7 |
| IV | **Module 4 : Corrosion Science**<br>Definition of corrosion, Types of corrosion, Dry & wet corrosion, Electrochemical & Galvanic series & its importance, Mechanism of Hydrogen evolution and Oxygen absorption corrosion, Factors influencing rate of corrosion, Various methods for protection from corrosion viz. Surface coatings(Electroplating, Galvanizing, Tinning) Cathodic and Anodic protection, | 7 |
| V | **Module 5. Battery & Fuel cell:** Terms in battery and fuel cell: Anode, Cathode, Cell, Battery, Electrode Electrolyte, Types of batteries: Construction, working, uses and advantages of primary cells: Dry Cell: (Leclanche Cell) , Lithium cells: Lithium cells with solid cathode Lithium cells with liquid cathode, Secondary cell: Lead – Acid cell, Nickel – Cadmium Cell, Hydrogen oxygen fuel cell, Methyl Alcohol- Oxygen (Alkaline Fuel Cell) | 6 |
| VI | **Module 6- Phase Rule**: Gibbs phase rule, Explanation of the terms Phase, Component, Degree of freedom, Phase reactions, types of equilibrium, equilibrium conditions. One component system-Water system, Sulphur system, Two component system- Lead Silver system, Application of Eutectic system, Merit and Demerits of Phase rule. | 6 |

| | **Textbooks** |
|---|---|
| 1 | S.K. Singh, "Engineering Chemistry", New Age Publication, 3rd Edition , 2005. |
| 2 | Shasi Chawla, "Engineering Chemistry", Dhanpat Rai Publication, 3rd Edition , 2003. |
| 3 | Jain P.C. and Jain Monika, "Engineering Chemistry", Dhanpat Rai Publication, 16th Edition, 2013 |

| | **References** |
|---|---|
| 1 | O G Palanna, "Engineering Chemistry" Tata McGraw Hill 2009. |
| 2 | Mendham, R.C. Denney, J.D. Barnes, M.J.K Thomas, "Quantitative Chemical analysis", Vogel's Pearson Education, 6th Edition , 2008. |
| 3 | S.S Dara, "Engineering Chemistry" S. Chand and Company 2008. |
| 4 | B Viswanathan M. Aulice Scibioh" Fuel Cell: Principle and Applications" Universities Press 2009 |
| 5 | Askeland and Phule , "The Science and Engineering of Materials" Thomson Publication 4th Edition ,2003 |
| 6. | Douglas A. Skoog, E James Holler, Stanely R Crouch, " Principles of Instrumental Analysis", Thomson publication, 2007, 6th Edition |

| | **Useful Links** |
|---|---|
| 1 | https://edu.rsc.org/resources |
| 2 | A free resource for Chemistry teachers and students of all levels, including higher education, hosted by Royal Society of Chemistry. |
| 3 | https://www.digimat.in/nptel/courses/video/122106028/L01.html |
| 4 | https://onlinecourses.nptel.ac.in/noc21_cy49/preview |

| CO-PO Mapping | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | | | | | | | | | | | | | |
| **CO2** | 3 | | | | | | | | | | | | | |
| **CO3** | 3 | | | | | | | | | | | | | |
| **CO4** | 3 | | | | | | | | | | | | | |

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

| Assessment |
|---|
| The assessment is based on MSE, ISE and ESE.<br>MSE shall be typically on modules 1 to 3.<br>ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments, surprise or declared test etc.<br>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.<br>For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing) |

(Dr. Dodla S. Rao) Approved A. A. Powar (K. V. Mashale) (MB. V. B. Girgaonkar)