# 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. (Civil & Mechanical Engineering) |
| **Class, Semester** | First Year B. Tech., Sem I/ II |
| **Course Code** | 7CH101 |
| **Course Name** | Engineering Chemistry ( Civil / Mechanical ) |
| **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, water parameters, Types of corrosion, Mechanism of Corrosion, setting and hardening of Portland cement and water's industrial applications. | II | Understanding |
| CO2 | Draw schematic of water softeners, Thermo grams, Thermo equipment's, Glass electrode, GLC setup, | II | Understanding |
| CO3 | Classify types of chemical analysis, hard water, Engineering materials, types of alloy and carbon steel. Chromatography. | 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** 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** Gravimetry and its requirements, applications and Numerical problems. 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. Advantages and Disadvantages of instrumental and non-instrumental methods. | 6 |

(Dr. Dodla S. Rao) (A. A. Powar) (C.K.V. Madhale) (Mrs. V.B. Giryaonkar)

| | | |
|---|---|---|
| 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. Thermal Analysis**<br>Thermal analysis and its types, Thermal events, Thermal analysis methods Thermo gravimetric Analysis (TGA), Differential Thermal Analysis (DTA)and Differential Scanning Calorimetry (DSC) w.r.t. Principle, instrumentation, and applications, Interpretation of Thermogram. % weight loss TGA numericals | 6 |
| VI | **Module 6: Ceramic and Metallic materials**<br>Engineering materials and its classification, Ceramics – definition, classification, properties, Portland cement – Chemical and compound composition, Mechanism of setting and hardening. Account of rapid setting, high alumina and high early strength cement by modifying compound composition. Alloy and purposes of alloying, Carbon Steel it's types Low, Medium, High, Brass it's general properties, Properties and uses of Cartridge, Admiralty, Muntz Metal , Leaded Duralumin, Bronzes general properties, Properties and uses of Phosphor Bronze, Aluminium Bronze, Gun Metal, Silicon Bronze . | 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 | Askeland and Phule , "The Science and Engineering of Materials" Thomson Publication 4th Edition ,2003 |
| 5 | 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<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, 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)

A. A. Powar

(K. V. Mashale)

(Prof. V. B. Girgaonkar)

**Walchand College of Engineering, Sangli**
*(Government Aided Autonomous Institute)*

**AY 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Robotics and Automation) |
| **Class, Semester** | First Year B. Tech. I & II |
| **Course Code** | 7ME107 |
| **Course Name** | Engineering Graphics |
| **Desired Requisites:** | Basic Knowledge of Different Types of Curves |

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

**Course Objectives**

| | |
|---|---|
| **1** | Introduce students to the conventions, concepts and basic principles of Engineering Drawing. |
| **2** | Draw projections of geometrical objects and real life components. |
| **3** | Demonstrate graphics skill for communication of concepts, ideas and design of engineering products |

**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** | Demonstrating Principles of Engineering, Computer Graphics through drafting software | I | Demonstrating |
| **CO2** | Understanding Principles of Engineering Graphics | II | Understanding |
| **CO3** | Outline projection of engineering objects | III | Applying |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Introduction to Engineering Drawing / Curves**<br>Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales; | 4 |
| II | **Projection of Lines**<br>Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes, Skew Lines, Parallel Lines, Perpendicular Lines using auxiliary methods; | 5 |
| III | **Projection of Planes**<br>Principles of Orthographic Projections-Conventions - Projections of planes inclined Planes - Auxiliary Planes; | 4 |
| IV | **Projections of Regular Solids Sections and Sectional Views of Right Angular Solids**<br>Inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.<br>Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; | 5 |
| V | **Orthographic Projections**<br>Principles of Orthographic Projections-Conventions - Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only) | 4 |

| | | |
|---|---|---|
| VI | **Isometric Projections**<br>Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions; | 4 |

**Module wise Measurable Students Learning Outcomes :**

**After the completion of the course the student should be able to:**

The student will learn :

- Introduction to engineering drawing and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics projection of standard solid primitives
- Exposure to visualization of 3-D solid modeling
- Exposure to computer-aided geometric drafting
- Exposure to creating working drawings

| **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 Mechanical Engineering Department**

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

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

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. (Mechanical, Civil, CSE,IT) |
| **Class, Semester** | First Year B. Tech. Sem. I/II |
| **Course Code** | 7EE106 |
| **Course Name** | Electrical & Electronics Engineering |
| **Desired Requisites:** | 12th Physics |

| **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** | To **explain** the difference between analog and digital electronic circuits. |
| **4** | To **explain** the working of diode circuits, transistorized and op-amp based amplifiers. |

**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** principles, construction and working of electrical machines. | II | Understanding |
| **CO2** | **Solve** electrical and magnetic circuits. | III | Applying |
| **CO3** | **Explain** the fundamentals of digital electronics. | I | Understanding |
| **CO4** | **Solve** the examples on digital circuits, diodes and transistors and Op-amp based circuits. | III | Applying |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Module 1: DC Circuits**<br>Review of R-L-C- Electrical circuit elements, KCL and KVL. Star- delta conversion, voltage and current sources. Thevenin, Norton and Superposition, Maximum powers transfer Theorems | 6 |
| II | **Module 2: AC Circuits**<br>Representation of sinusoidal waveforms, peak, RMS values, phasor representation 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. | 6 |
| III | **Module 3: 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, torque- speed characteristics<br>Magnetic circuits, Construction, working principle of single-phase transformer, and types. | 6 |

| | | |
|---|---|---|
| IV | **Module 4: Fundamentals of Digital Electronics**<br>Boolean algebra, SOP and POS terms, K-map reduction technique, converting AOI to NAND/NOR logic. Combinational Circuits: half adder and subtractor, 1-bit full adder and subtractor, 1-bit and 2-bit comparator, Sequential Circuits: flip-flop, counters. | 6 |
| V | **Module 5: Diodes and Transistors**<br>P-N junction diode, diode characteristics, half-wave and full-wave rectifier, clippers and clampers; Zener diode, LED, Photodiode and Solar Cell. Introduction to sensors: Light and Temperature Sensors.<br>Transistor structure, types (BJT, FET and MOSFET), biasing methods, transistor as a switch. | |
| VI | **Module 6: Operational Amplifier**<br>Basic op-amp configuration, op-amp powering, feedback in op-amp circuits, ideal op-amp circuits analysis, inverting, non-inverting amplifier, summing amplifier, difference amplifier, unity gain buffer; IC555 timer. | 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 | R. P. Jain, "Modern Digital Electronics", 4th edition, Tata McGraw Hill, 2009. |
| 5 | Robert Boylestad, Louis Nashelsky, 11th edition, "Electronic Devices and Circuits, Pearson, 2015. |
| 6 | Ramakant Gaikwad, "Op-amp and Linear Integrated Circuits", 4th edition, Pearson, 2015. |
| | |
| **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. |
| 4 | Morris Mano, "Digital Design", Pearson, 4th edition, 2011 |
| 5 | Donald A. Neamen, "Electronic Circuit Analysis and Design", 3rd edition, Tata McGraw Hill, 2011 |
| 6 | Robert F. Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", 6th edition, PHI, 2009 |
| | |
| **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" |
| 4 | https://nptel.ac.in/courses/108101091 |
| 5 | 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** | 3 | | | | | | | | | | | | | |
| **CO2** | | 3 | | | | | | | | | | | | |
| **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.<br>MSE shall be typically on Three modules. (One and half modules from Electrical syllabus and one and half modules from Electronics syllabus)<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 up to MSE and 60% weightage on modules after MSE.<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 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Robotics and Automation) |
| **Class, Semester** | First Year B.Tech., Sem - I |
| **Course Code** | 7RA101 |
| **Course Name** | Elements of Robotics and Automation |
| **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 impart the knowledge of the fundamentals in robotics and automation. |
| **2** | To understand the components of robot end effectors, material handling and automation. |
| **3** | To choose gripper type, product design considerations for automated assembly and solve gripper force. |
| **4** | To suggest appropriate components of robotics and automation like -joint, sensor, end effector, type of automation, automated assembly 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** | Define the fundamental components in robotics and automation. | I | Remembering |
| **CO2** | Explain the components of robot end effectors, material handling, automated assembly. | II | Understanding |
| **CO3** | Choose appropriate gripper, explain product design considerations for automated assembly and determine gripper force. | III | Applying |
| **CO4** | Select appropriate components of robotics and automation like -joint, sensor, end effector, type of automation, automated assembly system | IV | Analyzing |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | Robot-Definition, Basic concepts, Need, Law, History, Robot Anatomy, Robot configurations- Cartesian, cylinder, polar and articulate. Work Volume, Precision of Movement. | 7 |
| II | Robot End Effectors<br>Types of End Effectors, Mechanical Grippers, Other Types of Grippers, Tools as End Effectors, Considerations in Gripper Selection and Design, Gripper force when gravity is directed parallel to the contacting surfaces. | 7 |
| III | Robot Sensors and kinematics<br>Introduction to Sensors in robot - Touch sensors, Proximity and range sensors, Force sensors.<br>Robot joints and links-Types, Introduction to Robot kinematics – direct and inverse kinematics. | 6 |
| IV | Automation<br>Definition, reasons for automating. Types of production and types of automation, levels of automation, Basic elements of automated systems- power, program and control. | 7 |

| | | |
|---|---|---|
| V | Material Handling Systems<br>Material handling introduction, Unit Load, Palletizing, Material Transport Equipments- automated guided vehicles (AGV), Rail-Guided Vehicles(RGV), Conveyors- Types of Conveyors, Pick and Place Robots. | 6 |
| VI | Automated Assembly Systems<br>Types of automated assembly systems- in-line, dial-type, carousel, single station; Parts delivery at workstations, Product design considerations for automated assembly. | 6 |

| | |
|---|---|
| | |
| **Textbooks** | |
| 1 | Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata –McGraw Hill Pub. Co., 2008. |
| 2 | Groover, M. P., Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice Hall, 2001 |
| | |
| **References** | |
| 1 | Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010. |
| 2 | Klafter.R.D, Chmielewski.T.A, and Noggin's., "Robot Engineering: An Integrated Approach"', Prentice Hall of India Pvt. Ltd., 1994 |
| 3 | Fu.K.S, Gonzalez.R.C&Lee.C.S.G, "Robotics control, sensing, vision and intelligence", Tata-McGraw Hill Pub. Co., 2008 |
| 4 | Akande, Olushola. "Industrial Automation from Scratch: A Hands-on Guide to Using Sensors, Actuators, PLCs, HMIs, and SCADA to Automate Industrial Processes", United Kingdom, Packt Publishing, 2023. |
| | |
| **Useful Links** | |
| 1 | https://nptel.ac.in/courses/107106090 |
| 2 | https://nptel.ac.in/courses/112101098 |

**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** | 2 | | | | | | | | | | | | 1 | | |
| **CO3** | | | 1 | | | | | | | | | | 1 | | |
| **CO4** | | | | 1 | | | | | | | | | 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.
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. |
| **Class \| Semester** | First Year B. Tech (Mechanical Engineering) \| Semester I |
| **Course Code** | 7CS106 |
| **Course Name** | Computer Programming (Python Programming) |
| **Desired Requisites:** | |

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

## Course Objectives

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

## 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** | Inculcate the various skills in Problem Solving. | II | Understand |
| **CO2** | Demonstrate significant experience with the Python Programming. | III | Applying |
| **CO3** | To test and execute the Python 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:** General Problem Solving Concepts, Types of Problems, Problem Solving Strategies. **Program Design Tools:** Algorithms, Flowcharts and Pseudo-Codes.

**Module II: Python Programming:** Writing and Executing Python Program, Variables, Keywords, Identifiers, Constants, Operators & Expressions, Operators, Data Types.

**Module III: 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.

**Module IV: Functions:** Need, Definition, Call, Variable Scope, Return Statement, Lambda or Anonymous Function. **Modules:** Definition, Introduction to packages in Python, Introduction to standard library modules.

**Module V: Strings and Operations:** Concatenation, Appending, Multiplication and Slicing. Strings are Immutable, Strings Formatting Operator.

**Module VI: File Handling:** Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files.

**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,
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.
11. Program to accepts a string from user and perform following string operations, a) Calculate length of string, b) String reversal, c) Check palindrome,
12. Program to demonstrate different file handling functions.
13. Program to copy contents of one file to other.

| **Textbooks** | |
|---|---|
| 1 | Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6. |
| 2 | R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN10: 938605230X, ISBN-13: 978-9386052308 ASIN: B07BFSR3LL. |
| | |
| **References** | |
| 1 | Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645. |
| 2 | Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712. |
| 3 | Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943. |
| 4 | Jeeva Jose, P. Sojan Lal, "Introduction to Computing & Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810 |
| | |
| **Useful Links** | |
| 1 | https://www.w3schools.com/python/ |
| 2 | https://www.geeksforgeeks.org/python-programming-language/ |

| **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<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, 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. |
| **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. Doellas-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 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Robotics and Automation) |
| **Class, Semester** | First Year B. Tech., Sem I &II |
| **Course Code** | 7ME157 |
| **Course Name** | Engineering Graphics Lab |
| **Desired Requisites:** | Basic Knowledge of Computer |

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

**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 projection 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 (use of CAD software)**

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 Mechanical Engineering Department | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | 3 | | | | 2 | | | | | 1 | | 1 | 2 | | |
| **CO2** | | | 2 | | | | | | | | | | | | |
| **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 Civil Engineering Department | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | 3 | | 3 | | 3 | | | | | 1 | | 1 | | | |
| **CO2** | | | 2 | | | | | | | | | | | | |
| **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.<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 2023-24**

## Course Information

| | |
|---|---|
| **Programme** | First Year B. Tech. ( Mech, Civil, CSE, IT) |
| **Class, Semester** | First Year B. Tech., Sem I/II |
| **Course Code** | 7EE156 |
| **Course Name** | Electrical and Electronics Engineering Lab |
| **Desired Requisites:** | 12th Physics |

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

## 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. |
| **3** | This course intends to demonstrate basic knowledge of Electronics engineering. |
| **4** | 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** | **Describe** basic concepts of electrical circuits and various theorems. | II | Understanding |
| **CO2** | **Demonstrate** the use of transformers and AC/DC machines. | III | Applying |
| **CO3** | **Identify and explain** use of electronics components and instruments. | II | Understanding |
| **CO4** | **Construct** digital IC, diode, transistor and op-amp based circuits. | III | Applying |

## List of Experiments / Lab Activities/Topics

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

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.
5. Measure voltage, current and power in single phase R-C series circuit.
6. Measure Voltage, current and power factor of 1-phase A.C R-L series circuit.

**List of Lab Activities: Electrical**

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 ac and dc machines.
5. To perform load test on transformer.
6. Find out equivalent resistance in series and parallel connection.

**List of Lab Activities: Electronics**

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 half-wave and full-wave rectifier.
5. Study of diode-based clipper and clamper circuits
6. Study of transistor as a switch.
7. Study of inverting and non-inverting amplifier using op-amp.

| | |
|---|---|
| **Textbooks** | |
| 1 | D.C. Kulshreshtha, “Basic Electrical Engineering”, 1 st revised editionMcGraw Hill, 2012. |
| 2 | D.P Kothari and I.J Nagrath, “Basic Electrical Engineering”,Tata McGraw Hill, 2010. |
| 3. | R. P. Jain, “Modern Digital Electronics”, 4th edition, Tata McGraw Hill, 2009. |
| 4. | Robert Boylestad, Louis Nashelsky, 11th edition, “Electronic Devices and Circuits, Pearson, 2015. |
| 5. | Ramakant Gaikwad, “Op-amp and Linear Integrated Circuits”, 4th edition, Pearson, 2015. |
| | |
| **References** | |
| 1 | V. N. Mittle and Arvind Mittal, “Basic Electrical Engineering”, 2 nd edition, Tata McGraw Hill. |
| 2 | Morris Mano, “Digital Design”, Pearson, 4th edition, 2011 |
| 3 | Donald A. Neamen, “Electronic Circuit Analysis and Design”, 3rd edition, Tata McGraw Hill, 2011 |
| 4 | Robert F. Coughlin and Frederick F. Driscoll, “Operational Amplifiers and Linear Integrated Circuits”, 6th edition, PHI, 2009 |
| | |
| **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/# |
| 2 | Virtual Labs, An Initiative of Ministry of Education Under the National Mission on Education through ICT:Basic Electronics |
| 3 | https://nptel.ac.in/courses/122106025 |

| **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 | | | | | |
| **CO3** | 3 | | | | | | | | | | | | | |
| **CO4** | 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 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B. Tech. (Robotics and Automation) |
| **Class, Semester** | First Year B.Tech., Sem I |
| **Course Code** | 7RA151 |
| **Course Name** | Elements of Robotics and Automation Lab |
| **Desired Requisites:** | NA |

| **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 robotics and automation. |
| **2** | To develop experience of basic elements in robotics and automation. |
| **3** | To gain knowledge about automated systems. |

**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** | Show the basic components of robot. | I | Remembering |
| **CO2** | Explain various robot grippers, elements of automated systems | II | Understanding |
| **CO3** | Demonstrate the basic robot operations, simple robot programming. | III | Applying |
| **CO4** | Analyse automated systems | IV | Analyzing |

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

Demonstrations of following Elements of Robotics and Automation

1. Robot axes and joints
2. Pick and place robot
3. Object sorting by robot.
4. Robot grippers
5. Robot programming by teach method.
6. One experiment using Virtual Lab
7. Sensors (proximity, force) for Robots.
8. Coin counting.
9. Case study on Robotics
10. Case study on Automation

**Textbooks**

| | |
|---|---|
| 1 | Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata –McGraw Hill Pub. Co., 2008. |
| 2 | Groover, M. P., Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice Hall, 2001 |

**References**

| | |
|---|---|
| 1 | Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010. |
| 2 | Klafter.R.D, Chmielewski.T.A, and Noggin's., "Robot Engineering: An Integrated Approach"', Prentice Hall of India Pvt. Ltd., 1994 |
| 3 | Fu.K.S, Gonzalez.R.C&Lee.C.S.G, "Robotics control, sensing, vision and intelligence", Tata-McGraw Hill Pub. Co., 2008 |
| 4 | Akande, Olushola. "Industrial Automation from Scratch: A Hands-on Guide to Using Sensors, Actuators, PLCs, HMIs, and SCADA to Automate Industrial Processes", United Kingdom, Packt Publishing, 2023. |
| | |
| **Useful Links** | |
| 1 | Mechanisms & Robotics Lab http://vlabs.iitkgp.ernet.in/mr/ |
| 2 | Robotics Application Lab https://vlab.amrita.edu/?sub=3&brch=271&sim=1642&cnt=3525 |
| 3 | Bio Inspired Robotics Virtual Lab https://vlab.amrita.edu/?sub=3&brch=257 |

**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** | 2 | | | | | | | | | | | | 1 | | |
| **CO3** | | | 1 | | | | | | | | | | 1 | | |
| **CO4** | | 1 | | | | | | | | | | | 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 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, journal/ performance | Lab Course Faculty and External Examiner as applicable | During Week 15 to Week 18<br>Marks Submission at the end of Week 18 | 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 |
| **Course Code** | 7VS152 |
| **Course Name** | Engineering Skills Laboratory |
| **Desired Requisites:** | - |

| **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 by Earl Boysen and Nancy Muir, Published by Wiley Publishing, Inc., 2006 |
| 3 | D.C. Kulshreshtha, “Basic Electrical Engineering”, 1 st revised editionMcGraw 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”, 2 nd edition, Tata McGraw Hill. |
| 4 | |
| | |
| **Useful Links** | |
| 1 | |
| 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** | | | 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<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 2023-24**

| **Course Information** | |
|---|---|
| **Programme** | B.Tech. (Civil/ Mechanical) |
| **Class, Semester** | First Year B. Tech., Sem- II |
| **Course Code** | 7MA102 |
| **Course Name** | Engineering Mathematics –II (Civil/Mech) |
| **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:**<br>Definition of Beta, Gamma functions and properties of Beta Gamma functions | **6** |
| II | **Curve tracing**<br>Tracing of curves for Cartesian and polar coordinate | **5** |
| III | **Multivariable Calculus:**<br>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:**<br>Linear Differential equation with constant coefficient, Complementary function, Particular Integral, Homogeneous Linear Differential equation | **8** |

| | | |
|---|---|---|
| V | **Applications of L.D.E with constant coefficient:**<br>Applications of L.D.E with constant coefficient to Civil and Mechanical Engineering | **5** |
| VI | **Statistics:**<br>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
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) |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2023-24**

| **Course Information** | |
|---|---|
| **Programme** | B.Tech. (Civil /Mech) |
| **Class, Semester** | First Year B.Tech., Sem I / II |
| **Course Code** | 7PH101 |
| **Course Name** | Engineering Physics (Civil /Mech) |
| **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 recal ling facts, terms, basic concepts in Wave Optics, Modern Physics and Quantum Mechanics, Ultrasonic, Semiconductors, Nanoscience and Nanotechnology, Acoustics. | 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 | **Nanoscience and Nanotechnology**<br>Introduction to nano-science and nanotechnology, Surface to volume ratio, Two main approaches in nanotechnology -Bottom up technique and top down technique. Nano materials: Methods to synthesize nanomaterials (Ball milling, Sputtering, Vapour deposition, sol gel), properties and applications of nanomaterials. Applications of nanomaterials, Introduction to Carbon Nanotubes and its applications. | 6 |
| VI | **Acoustics**: Introduction, Types of Acoustics, reverberation and reverberation time, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula, measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its Measurements, Sound Insulation and its measurements. Impact of Noise in Multi-storied buildings. | 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 | Charles P.Poole and Frank J. Owner, "*Introduction to Nanotechnology*", Wiley India. |
| 5 | G. Cao *"Nanostructures and Nanomaterials: Synthesis, Properties and Applications"* Imperial College Press, 2004. |

| **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 Introduction to Nanotechnology https://youtu.be/ebO38bbq0_4 |
| 6 | For acoustics https://youtu.be/fHBPvMDFyO8 |

**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. (Civil and Mechanical Engineering ) |
| **Class, Semester** | First Year B. Tech., Sem I/II |
| **Course Code** | 7AM101 |
| **Course Name** | Engineering Mechanics |
| **Desired Requisites:** | Physics, Mathematics |

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

| **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 concept & principles of forces with respect to engineering applications | II | Understanding |
| **CO2** | Apply the concepts of force, stresses and strains for analysis of trusses and solid bodies | III | Applying |
| **CO3** | Apply the concepts of Newton's laws of motion, D'Alemberts principles to solve problems related to dynamic system | III | Applying |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Forces**<br>Fundamentals, Systems, Composition and Resolution, Resultant of planar force systems. Free Body Diagram, Laws of Forces, Varignon's Theorem, Lami's Theorem | 8 |
| II | **Equilibrium**<br>Equilibrium conditions, Concept of determinacy and indeterminacy<br>Beams: Types of Supports, Loads and Reactions<br>Principle of Virtual Work and its applications to statically determinate beams | 7 |
| III | **Centroid and Moment of Inertia**<br>Centre of gravity and Centroid, Moment of Inertia of Plane figure, Composite Sections, Radius of gyration, Mass-Moment of Inertia | 5 |
| IV | **Plane Trusses**<br>Pin-jointed statically determinate plane trusses: Assumptions, imperfect, perfect and redundant trusses, Analysis by Method of joints, method of sections | 5 |
| V | **Concept of Stress and Strain:**<br>Normal and shear stress and strain, State of stress at a point, Stress strain curve, Hook's law, Modulus of elasticity, Poisson's ratio, Modulus of rigidity, Bulk modulus | 8 |

| | | |
|---|---|---|
| VI | **Dynamics of Particles:**<br>Rectilinear Motion, Motion of Projectile, Kinetics – Newton's laws of motion, D'Alemberts principle, Applications to rough inclined plane, lift, and connected bodies, Collisions: Impact, Collision of bodies, Coefficient of Restitution, Loss of Kinetic Energy due to Impact | 7 |

| | |
|---|---|
| | |
| **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. |
| 4 | F. P. Beer and E. R. Johnston, Mechanics of materials, McGraw-Hill International |
| | |
| **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 | | | | | | | | | | | | |
| **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 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B. Tech. (Robotics and Automation) |
| **Class, Semester** | First Year B. Tech. Sem. II |
| **Course Code** | 7CV106 |
| **Course Name** | Basic Civil Engineering. |
| **Desired Requisites:** | Nil |

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

**Course Objectives**

| | |
|---|---|
| **1** | To, familiarize with Building Systems and Sustainable Construction: Students will gain knowledge about building systems, including structural systems and their various components and functions. |
| **2** | To introduce students to different types of construction equipment used on construction sites, enhancing their understanding of efficient project execution and management. |
| **3** | To, acquire Proficiency in Surveying, Construction Materials, and Equipment: Through this course, students will develop practical skills in surveying techniques and measurement methods. They will also gain insights into various construction materials, their properties, and applications in civil engineering projects. |

**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 different types of building systems, their components, and functions. | II | Knowledge |
| **CO2** | Describe the importance of smart cities in modern urban development and its challenges. | II | Understanding |
| **CO3** | Select appropriate construction equipment based on project requirements and constraints. | III | Apply |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Introduction to Civil Engineering**<br>Scope of civil engineering, Disciplines of civil engineering, Role of Civil Engineers in infrastructure development, 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 | 5 |
| II | **Surveying and Construction Materials**<br>Principles of surveying, Distance measurement, Levelling,<br>Construction materials and classification, Properties and uses of stone, brick, tile, timber, cement, sand, lime, mortar, concrete, bitumen and steel | 5 |
| III | **Construction Equipment**<br>Necessity of Construction Equipment and types, Earth moving equipment: Excavator, bulldozer, and loader, Material handling equipment: Cranes, hoists, and conveyors. Concrete equipment: Concrete pumps, mixers, and vibrators, Asphalt equipment: Asphalt pavers and compactors. | 4 |
| IV | **Transportation Engineering**<br>Modes of surface transport, Functional Classification of Highway Systems, Typical Cross section of a Highway.<br>Introduction to Railways, Airport, Docks and Harbours, functions, types, layouts | 4 |

| | | |
|---|---|---|
| V | **Hydraulic Structures**<br>Sources of water,<br>Hydraulic structures: Dam, Reservoir, Barrage, Weirs, Canal, Hydropower plant, Irrigation systems | 4 |
| VI | **Smart Cities**<br>The Challenge of Urbanization, Sustainable environment<br>Smart city: Infrastructure elements, Features, Strategic components of development, The Process of Selection, Smart Cities in India, A typical smart city in India | 4 |

| **Textbooks** | |
|---|---|
| 1 | Bhavikatti S.S "Basic Civil Engineering", I.K. International Publishing House Pvt. Ltd. |
| 2 | B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain "Surveying Vol. I and II" |
| 3 | S.K. Garg Water Supply Engineering, Khanna Publishers, 15th edition |
| 4 | Hirasakar G. K., "Basic Civil Engineering", DhanpatRai publications, 1st Edition,2007 |

| **References** | |
|---|---|
| 1 | Robert Peurifoy, Clifford J. Schexnayder, Aviad Shapira, Construction Planning, Equipment and Methods, McGraw Hill Education, 7th edition, 2010 |
| 2 | Smart Cities Mission Statement & Guidelines, Ministry of Urban Development Government of India |

**Useful Links**

**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 | | | | | | | | 2 | | 2 | | |
| **CO3** | 2 | | 2 | | | | | | | 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 a teacher's assessment. The mode of assessment can be field visits, 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 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B. Tech (Robotics and Automation) |
| **Class, Semester** | First Year B. Tech., Sem II |
| **Course Code** | 7RA102 |
| **Course Name** | Measurement and Metrology |
| **Desired Requisites:** | NA |

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

**Course Objectives**

| | |
|---|---|
| 1 | Students should able to explain the basic principles and importance of measurement and metrology in engineering and science.. |
| 2 | Student will be aware importance of calibration and traceability in measurements. |
| 3 | Student will be acquire the confidence to understand the working principles of sensors and transducers used in measurement systems. |
| 4 | Students will able to identify different types of measurement errors |

**Course Outcomes (CO)**

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** | Recall and describe the fundamental principles and terminology used in measurement and metrology. | I | Remembering |
| **CO2** | Explain the importance of measurement accuracy and precision in engineering and scientific contexts. | II | Understanding |
| **CO3** | Demonstrate the use of various measurement instruments, such as micrometers, calipers, and gauges, to obtain precise measurements. | III | Applying |
| **CO4** | Identify and classify different types of measurement errors (systematic, random, and gross errors). | IV | Analyzing |

| Module | Module Contents | Hours |
|---|---|---|
| I | **Introduction to Measurement**<br>Definition and significance of measurement and metrology, Types of measurement systems, Units and standards of measurement, Calibration and traceability, measurement errors and sources of errors, Metrological Standards**,** characteristics of measuring instruments. | 06 |
| II | **Measurement of Force, Pressure, and Strain**<br>**Force Measurement :**<br>Basic principles**,** Types of force transducers, Applications and calibration<br>**Pressure Measurement:**<br>Principles and types of pressure measurement**,** Pressure transducers and their applications<br>**Strain Measurement:** | 07 |

| | | |
|---|---|---|
| | Strain and stress relationship**,** Types of strain gauges and their working principles**,** Wheatstone bridge and strain gauge circuits**,** Applications and calibration of strain gauges | |
| III | **Flow and Temperature Measurement**<br>**Flow Measurement:**<br>Flow characteristics, Pressure differential meters, volume flow meters, Measurement of fluid velocities, Anemometers.<br>**Temperature Measurement:**<br>Temperature standard and temperature scale, Non-Electrical and Electrical method of temperature measurement, Calibration | 06 |
| IV | **Linear and Angular Measurements**<br>**Linear Measurement:**<br>Types of standards, Vernier calipers, micrometres, and height gauges, Slip gauges and their applications,<br>**Angular Measurement:**<br>Sine bars, angle gauges, and bevel protractors, Optical instruments: autocollimators, angle dekkers, Applications of angular measurement instruments | 07 |
| V | **Inframetrology and Comparators**<br>**Inframetrology:**<br>Introduction to inframetrology, Optical flat, Flatness testing, Interferometers, NPL Flatness and Gauge interferometers<br>**Comparator:**<br>Types of comparators: mechanical, optical, electrical, pneumatic and fluid displacement, Working principles and applications | 07 |
| VI | **Metrology of Screw Threads and Gears**<br>**Screw Thread Measurement:**<br>Terminology and types of screw threads, Measurement of major diameter, minor diameter, effective diameter, pitch, and thread angle, Tools and instruments: screw thread micrometres and optical projectors<br>**Gear Measurement:**<br>Gear terminology and types of gears, Measurement of gear tooth thickness, pitch, and runout, Tools and instruments: gear tooth vernier caliper and profile projector. | 06 |
| | | |
| **Text Books** | | |
| 1 | Engineering Metrology and Measurements by N.V. Raghavendra and L. Krishnamurthy, 1st Edition, Oxford University Press, 2013 | |
| 2 | Mechanical Measurements by Thomas G. Beckwith, Roy D. Marangoni, and John H. Lienhard V, 6th Edition, Pearson, 2007 | |
| | | |
| **References** | | |
| 1 | Metrology for Engineers by John F. W. Galyer and Charles R. Shotbolt, 5th Edition, Cassell, 1990 | |
| 2 | Mechanical Measurements by S.P. Venkateshan and Prasanna Swaminathan, 1st Edition, John Wiley & Sons, 2015 | |
| 3 | Dimensional Metrology by Connie L. Dotson, 5th Edition, Delmar Cengage Learning, 2011 | |
| 4 | Principles of Measurement Systems" by John P. Bentley, 4th Edition, Pearson, 2004, | |
| | | |
| **Useful Links** | | |
| 1 | https://onlinecourses.nptel.ac.in/noc19_me70/preview | |
| 2 | https://onlinecourses.nptel.ac.in/noc24_me12/preview | |

| CO-PO Mapping | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | 3 | | | | | | | | | | | 2 | | 2 | |
| **CO2** | | | 2 | | | | | | 3 | | | | 2 | | |
| **CO3** | | | 2 | | | | | | 1 | | | | | 2 | |
| **CO4** | | 2 | | 2 | 3 | | | | | | | | 2 | | |
| 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 2023-2024**

**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. |
| **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 2023-24**

## 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<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. (Mechanical) |
| **Class, Semester** | First Year B. Tech., Sem I |
| **Course Code** | 7CV156 |
| **Course Name** | Basic Civil Engineering Lab |
| **Desired Requisites:** | |

| **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 introduce students to fundamental civil engineering experiments and procedures. |
| **2** | To develop practical skills in handling civil engineering equipment and instruments. |
| **3** | 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 | Bloom's Taxonomy Description |
|---|---|---|---|
| **CO1** | Demonstrate identification and reading ability of elements in building drawing. | II | Understanding |
| **CO2** | Examine the material properties and comment on their quality. | III | Applying |
| **CO3** | Use surveying equipment to measure distance and area. | III | Applying |

## List of Experiments / Lab Activities/Topics

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

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 horizontal distances by using tape and pedometer
6. Measurement of horizontal angles by using prismatic compass
7. Area measurement by planimeter
8. Determination of levels by Dumpy Level/Auto level
9. Demonstration of total station
10. Study of any two construction equipment

## Textbooks

| | |
|---|---|
| 1 | Hirasakar 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

| | |
|---|---|
| 1 | Duggal S.K., "Surveying (Vol I)", Tata McGraw Hill, 4th edition 2013 |
| 2 | Bindra S.P., Arora S.P. , "Building Construction", Dhanpat Rai publication, 5th edition, 2012 |

## Useful Links

| CO-PO Mapping | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | | 1 | | | | | | | | | | | |
| **CO2** | 3 | | 1 | | | | | | | | | | | |
| **CO3** | | | | | | 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 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B. Tech (Robotics and Automation) |
| **Class, Semester** | First Year B. Tech., Sem I |
| **Course Code** | 7RA152 |
| **Course Name** | Measurement and Metrology Lab |
| **Desired Requisites:** | |

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

**Course Objectives**

| | |
|---|---|
| **1** | To demonstrate the ability to use various measurement tools and instruments accurately. |
| **2** | To conduct precise measurements of length, mass, time, temperature, and other physical quantities. |
| **3** | To perform measurements of dimensions, such as length, diameter, and thickness, using instruments like micrometers, calipers, and gauges. |
| **4** | To develop practical skills through hands-on laboratory exercises and experiments. |

**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 accurate use of various measurement tools and instruments. | I | Remembering |
| **CO2** | Perform calibration procedures for different types of measurement instruments. | II | Understanding |
| **CO3** | Demonstrate the use of various measurement instruments, such as micrometers, calipers, and gauges, to obtain precise measurements. | III | Applying |
| **CO4** | Identify and classify different types of measurements and errors. | IV | Analyzing |

**List of Experiments / Lab Activities**

**List of Experiments (Any 10):**

01. Speed measurement.
02. Strain measurement.
03. Displacement measurement.
04. Force measurement.
05. Calibration of thermocouple and temperature measurement.
06. Torque measurement.
07. Calibration of micrometer
08. Angular measurement

| |
|---|
| 09. Use of Optical flat for interferometry<br>10. Measurement of elements of screw threads<br>11. Gear Inspection<br>12. Use of Tool maker microscope and Profile projector |
| |

| Text Books | |
|---|---|
| 1 | Engineering Metrology and Measurements" by N.V. Raghavendra and L. Krishnamurthy, 1st Edition, Oxford University Press, 2013 |
| 2 | Mechanical Measurements" by Thomas G. Beckwith, Roy D. Marangoni, and John H. Lienhard V, 6th Edition, Pearson, 2007 |

| References | |
|---|---|
| 1 | Metrology for Engineers" by John F. W. Galyer and Charles R. Shotbolt, 5th Edition, Cassell, 1990 |
| 2 | Mechanical Measurements" by S.P. Venkateshan and Prasanna Swaminathan, 1st Edition, John Wiley & Sons, 2015 |

| Useful Links | |
|---|---|
| 1 | https://onlinecourses.nptel.ac.in/noc19_me70/preview |

**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** | | | | 1 | | | | | | | | | 1 | | |
| **CO4** | 2 | | 1 | | | | | | | | | | 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 (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, journal/ performance | Lab Course Faculty and External Examiner as applicable | During Week 15 to Week 18 Marks Submission at the end of Week 18 | 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 2024-25**

**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.<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. | | | | |