# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Mechanical Engineering) |
| **Class, Semester** | Second Year B. Tech., Sem IV |
| **Course Code** | 7ME221 |
| **Course Name** | Fluid Mechanics and Fluid Machines |
| **Desired Requisites:** | |

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

**Course Objectives**

| | |
|---|---|
| **1** | To learn about the application of mass and momentum conservation laws for fluid flows |
| **2** | To understand the importance of dimensional analysis |
| **3** | To obtain the velocity and pressure variations in various types of simple flows |

**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 | Recall knowledge of mathematics, science, and engineering for the needs in fluid mechanics. | I | Remembering |
| CO2 | Explain the basics of fluid properties, pressure measurement, fluid statics, kinematics, dynamics, and dimensional analysis. | II | Understanding |
| CO3 | Summaries the basic expressions and theory related to: fluid statics, kinematics, dynamics, dimensional analysis, boundary layer theory and its applications. | III | Applying |
| CO4 | Explain analyze rotodynamic machines for their performance | IV | Analyzing |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **INTRODUCTION AND BASIC CONCEPTS:**<br>Introduction, No-Slip Condition, Classification of Fluid Flows,<br>**PROPERTIES OF FLUIDS:**<br>Density and Specific Gravity, Vapor Pressure and Cavitation, Coefficient of Compressibility, Viscosity, Surface Tension and Capillary Effect<br>**PRESSURE AND FLUID STATICS:**<br>Hydrostatic Forces on Submerged Plane Surfaces, Hydrostatic Forces on Submerged Curved Surfaces, Buoyancy and Stability, Fluids in Rigid-Body Motion | 7 |

| | | |
|---|---|---|
| | **FLUID KINEMATICS:**<br>Lagrangian and Eulerian Descriptions, Flow Visualization, Plots of Fluid Flow Data, Reynolds Transport Theorem | |
| II | **MASS, BERNOULLI, AND ENERGY EQUATIONS:**<br>Introduction, Conservation of Mass, Mechanical Energy and Efficiency, The Bernoulli Equation and its applications, General Energy Equation, Energy Analysis of Steady Flows | 6 |
| III | **MOMENTUM ANALYSIS OF FLOW SYSTEMS:**<br>Newton's Laws and Conservation of Momentum, Choosing a Control Volume, Forces Acting on a Control Volume, The Linear Momentum Equation, Rotational Motion and Angular Momentum, Angular Momentum Equation | 7 |
| IV | **DIMENSIONAL ANALYSIS AND MODELING:**<br>Dimensional Homogeneity, Dimensional Analysis and Similarity, The Method of Repeating Variables and the Buckingham Pi Theorem,<br>**FLOW IN PIPES:**<br>Laminar and Turbulent Flows, The Entrance Region, Laminar and Turbulent Flows in pipes, Minor Losses, Flow Rate and Velocity Measurement<br>**DIFFERENTIAL ANALYSIS OF FLUID FLOW:**<br>The Stream Function, Cauchy's Equation, The Navier–Stokes Equation<br>**FLOW OVER BODIES: DRAG AND LIFT:**<br>Boundary Layer Approximation, Drag and Lift, Friction and Pressure Drag | 7 |
| V | **FUNDAMENTALS OF TURBOMACHINERY :**<br>Euler's equation – theory of Rotodynamic machines – various efficiencies – velocity components at entry and exit of the rotor, velocity triangles – Centrifugal pumps, working principle, work done by the impeller, performance curves – Cavitation in pumps Reciprocating pump – working principle | 7 |
| VI | **TYPES OF TURBOMACHINERY:**<br>Classification of water turbines, heads and efficiencies, velocity triangles- Axial, radial and mixed flow turbines- Pelton wheel, Francis turbine and Kaplan turbines, working principles – draft tube- Specific speed, unit quantities, performance curves for turbines – governing of turbines | 5 |

| **Text Books** | |
|---|---|
| 1 | S K Som, Gautam Biswas, Suman Chakraborty, "*Introduction to Fluid Mechanics and Fluid Machines*" Tata McGraw – Hill Publication. 3rd Edition 2012. |
| 2 | Cengel Yunus A. And Cimbala John M. "*Fluid Mechanics and Fundamental and applications*", Tata Mcgraw-Hill New Delhi. 4th Edition 2017 |
| 3 | Dr. R. K . Bansal, " Fluid mechanics and Hydraulic machines" Laxmi Publication, 9th Edition 2010 |

| **References** | |
|---|---|
| 1 | Streeter, Wylie and Bedford, "*Fluid Mechanics*", Tata McGraw – Hill Publication. 9th Edition 2000. |
| 2 | Franke and White, "*Fluid Mechanics*", Tata Mcgraw-Hill New Delhi. 5th Edition 2003 |

| | |
|---|---|
| 3 | M. Potter, D.Wiggert *"Fluid Mechanics"* Schaum's Outline Series Mcgraw-Hill New York 2008.. |
| | |

| **Useful Links** | |
|---|---|
| 1 | https://archive.nptel.ac.in/courses/112/105/112105269/ |

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

| **Assessment** |
|---|
| The assessment is based on MSE, ISE and ESE.<br>MSE shall be typically on modules 1 to 3.<br>ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.<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 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Mechanical Engineering) |
| **Class, Semester** | Second Year B. Tech., Sem IV |
| **Course Code** | 7ME222 |
| **Course Name** | Kinematics and Theory of Machines |
| **Desired Requisites:** | |

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

**Course Objectives**

| | |
|---|---|
| **1** | To make the students understand the kinematics and rigid- body dynamics of kinematically driven machine components |
| **2** | To make the students understand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigid link |
| **3** | To enable the students to design linkage mechanisms and cam systems to generate specified output motion |
| **4** | To make the students understand the kinematics of gear trains |

**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** |
|---|---|---|---|
| CO 1 | Remember facts, terms, basic concepts, and methods related to theories of machines. | I | Remember |
| CO 2 | Identify mechanism that should be used according to application and find degrees of freedom of different mechanisms. | II | Understand |
| CO 3 | Analyse various linkage mechanisms for optimal functioning | IV | Analyze |
| CO 4 | Develop various linkage mechanism for different applications | V | Evaluate |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | Classification of mechanisms- Basic kinematic concepts and definitions- Degree of freedom, mobility- Grashof's law, Kinematic inversions of four bar chain and slider crank chains- Limit positions- Mechanical advantage- Transmission angle- Description of some common mechanisms- Quick return mechanism, straight line generators- Universal Joint- Rocker mechanisms | 7 |
| II | Displacement, velocity and acceleration analysis of simple mechanisms, graphical velocity acceleration analysis, instantaneous centers, velocity and acceleration analysis using loop closure equations, Coincident points- Coriolis component of acceleration | 8 |
| III | Introduction to linkage synthesis three position graphical synthesis for motion and path generation kinematic analysis of simple mechanisms slider crank mechanism dynamics | 7 |

| | | |
|---|---|---|
| IV | Classification of cams and followers- Terminology and definitions- Displacement diagrams- Uniform velocity, parabolic, simple harmonic and cycloidal motions- derivatives of follower motions- specified contour cams- circular and tangent cams- pressure angle and undercutting, sizing of cams, graphical and analytical disc cam profile synthesis for roller and flat face followers | 7 |
| V | Involute and cycloidal gear profiles, gear parameters, fundamental law of gearing and conjugate action, spur gear contact ratio and interference/undercutting- helical, bevel, worm, rack & pinion gears, epicyclic | 6 |
| | and regular gear train kinematics | |
| VI | Surface contacts- sliding and rolling friction- friction drives, belt and rope drives bearings and lubrication, friction clutches and brakes | 5 |

| Text Books | |
|---|---|
| 1 | Ratan S.S, "Theory of Machines", Tata McGraw Hill, New Delhi, 3rd Edition, 2011. |
| 2 | Sadhu Singh,"Theory of Machines", Pearson Education, 2nd Edition, 2009 |
| 3 | H. G. Phakatkar,"Theory of Machines I", Nirali Publication, 5th Edition 2009. |

| References | |
|---|---|
| 1 | Thomas Bevan, "Theory of Machines", CBS Publishers, New Delhi, 1st Edition, 2010. |
| 2 | J. E. Shigley,"Theory of Machines and Mechanism", , McGraw Hill, New York. 4th Edition, 2011 |
| 3 | G.S. Rao and R.V. Dukipatti, "Theory of Machines and Mechanism", New Age International Publications Ltd. New Delhi. 2011 |

| Useful Links | |
|---|---|
| 1 | Kinematics of Mechanisms and Machines - YouTube |
| 2 | Module 1 Lecture 1 Kinematics Of Machines - YouTube |
| 3 | Lecture 01 \| Introduction to Kinematics of Machines \| KOM - YouTube |
| 4 | https://onlinecourses.nptel.ac.in/noc22_me25/preview |

**CO-PO Mapping**

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

**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**
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**AY 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B. Tech. (Mechanical Engineering) |
| **Class, Semester** | Second Year B. Tech. SEM-II |
| **Course Code** | 7ME223 |
| **Course Name** | Manufacturing Processes - II |
| **Desired Requisites:** | NA |

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

**Course Objectives**

| | |
|---|---|
| **1** | To familiarize students in various metal cutting, joining and finishing processes |
| **2** | To introduce students with various plastic processing, additive manufacturing and various nonconventional machining processes |
| **3** | To train the students to identify various process and response variables in cutting, joining and finishing processes. |
| **4** | To familiarize students about CNC, VMC and various micromachining processes. |
| **5** | To make aware of various non-conventional machining processes. |

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

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

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | To summarize and compare various cutting, joining, finishing, plastic working and additive manufacturing, non-conventional machining processes. | II | Understanding |
| **CO2** | To illustrate/practice various cutting, joining, finishing, plastic processing and additive manufacturing, non-conventional machining processes | III | Applying |
| **CO3** | Differentiate and investigate various cutting, joining, finishing, plastic working and additive manufacturing, non-conventional machining processes | IV | Analysing |
| **CO4** | To estimate the effect of various process parameters in cutting, joining, finishing, plastic working and additive manufacturing, non-conventional machining processes | V | Evaluating |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Metal Cutting:** Single and multi-point cutting, Machinability, cutting tool materials, cutting fluids,Tool geometry, Orthogonal / oblique cutting, various force components, tool wear and tool life and its economics, Surface finish and integrity machining. Major operations performed on Lathe, Milling, shaping machines. | 7 |
| II | **Joining Processes:** Overview and classification of joining processes: Soldering, brazing, oxifuel gas welding such as oxyacetylene and pressure gas welding, arc welding such as shielded metal arc welding, gas metal arc welding, submerged arc welding, plasma arc welding, Electrodes and Electrode Coatings, resistance welding such as spot, seam and projection welding, Solid-State Welding, Friction Stir Welding, HAZ. | 6 |
| III | **Plastic Processing and Additive Manufacturing Processes:** Classification of Plastics and its properties,Thermosetting and thermoplastic materials, comparison with other materials, their properties and | 7 |

| | | |
|---|---|---|
| | applications. blow moulding, compression moulding, injection moulding, thermoforming, rotational moulding and calendaring Introduction to Additive manufacturing: Rapid prototyping(3D Printing) Types of 3D printing, advantages, applications. | |
| IV | **Finishing Processes:**<br>Overview and classification of finishing processes, Grinding process-abrasive materials, grinding wheel specification and types, grinding machine classification and grinding operations. Lapping, Honing, Buffing, Barrel Tumbling, Burnishing. | 7 |
| V | **Non-conventional Machining Processes – I:**<br>Importance and scope of various non-conventional machining processes like Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining,Ultrasonic Machining, micro machining, their working Principle, Process Parameters, comparison and application of these processes | 6 |
| VI | **Non-conventional Machining Processes – II:**<br>Electrical Discharge Machining, wire EDM, Electro-chemical machining (ECM),Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining (EBM), their working Principles, Process Parameters, comparison and application of these processes | 6 |

| **Text Books** | |
|---|---|
| 1 | P.C. Sharma, "A Textbook of Production Technology (Manufacturing processes)", S. Chand & co.,8th revised edition 2014. ISBN:8121911141. |
| 2 | P.N. Rao, "Manufacturing Technology- Foundry, Forming and Welding", Vol. I Tata McGraw-Hill, 4th edition, 2013, ISBN: 9781259062575. |
| 3 | George E. Dieter, "Mechanical Metallurgy", Tata McGraw Hill Publication, Si Metric Edition, 3rd Revised edition, 2013, ISBN : 9780070168930. |
| 4 | Jagadeesha T, "Unconventional Machining Processes", Dreamtech Press, Edition 2020, ISBN No:978-93-89976-05-2 |

| **References** | |
|---|---|
| 1 | E. Paul DeGarmo, J.T. Black, Ronald A. Kosher, "Materials and Processes in Manufacturing", John Wiley and Sons Ltd, 9th revised edition, 2004.ISBN:,9780471656777 |
| 2 | Jagadeesha T, "Non-traditional Machining Processes", Dreamtech Press, Edition 2020, ISBN No:978-93-85920-72-9 |
| 3 | Serope Kalpakjian, Steven R. Schmid, Manufacturing Engineering and Technology', Pearson (Prentice Hall), Fifth Edition, 2005 |
| 4 | V. K. Jain, Introduction to Micromachining, Alpha Science, 2010, ISBN 1842654853, 9781842654859 |

| **Useful Links** | |
|---|---|
| 1 | https://youtu.be/Qx-Kx4GapgI |
| 2 | https://youtu.be/ljveGnQw2G0?list=PLSGws_74K018JY-1RyIj0cm4yppa1h54r |
| 3 | https://youtu.be/ZLlwfXSXEVc?list=PLSGws_74K01_zyzpQkNtm-6ickGhCwi-4 |
| 4 | https://youtu.be/TlhGTSDfQxc |
| 5 | https://youtu.be/Vy4nlWoPPmo |
| 6 | https://youtu.be/mmKy5PbndQI?list=PLyqSpQzTE6M-KwjFQByBvRx464XpCgOEC |
| 7 | https://www.youtube.com/watch?v=sPhTjrvpGyE&t=1838s |
| 8 | https://www.youtube.com/watch?v=WJtF1wEOeAw |
| 9 | https://www.youtube.com/watch?v=ICjQ0UzE2Ao |
| 10 | https://www.youtube.com/playlist?list=PLzCSUZGIUJkaSyCzPiQMWynGyxmC8hrpl |
| 11 | https://www.youtube.com/watch?v=Hc6mfNWT8oQ&t=7s |
| 12 | https://www.youtube.com/watch?v=cxU1zUOpGLk&t=3016s |
| 13 | https://youtu.be/xf6TbK68hHY |
| 14 | https://www.youtube.com/watch?v=06QxjEAMrKc&list=PLwFw6Nkm8oWqFJUxiUuu5c0uHK076lz2K |

| **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

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**AY 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. (Mechanical Engineering) |
| **Class, Semester** | Second Year B. Tech., Sem IV |
| **Course Code** | 7ME271 |
| **Course Name** | Fluid Mechanics and Fluid Machines 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 introduce the students about basic principles and laws through conducting experiments in laboratory |
| **2** | To enable the students to analyze the fluid turbo machines |
| **3** | To develop skills in the evaluation of fluid turbo machines. |

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

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

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | Understand basic principles and laws and conduct the experiments for validation | II | Understanding |
| **CO2** | Investigate the performance parameters of fluid turbo machines | III | Applying |
| **CO3** | Interpret the performance of fluid turbo machines. | IV | Analyzing |
| **CO4** | Evaluate the performance of fluid turbo machines. | V | Evaluating |

**List of Experiments / Lab Activities**

**List of Experiments:**

**a) Study and demonstration.**

1. Study of similarity principles.

**b) Experiments and Trials (Any twelve)**

1. Experiment on Impact of Jet.
2. Experiment on Prandtl type pitot type apparatus.
3. Verification of Bernoulli's Equation.
4. Calibration of Venturi meter and Orifice meter.
5. Calibration of V-Notch
6. Calibration of Orifice and Mouthpiece apparatus.
7. Experiment on Reynolds apparatus.
8. Determination of Minor losses in pipe fittings.
9. Determination of loss in pipes (series/parallel/different material)
10. Trial on Pelton Turbine.
11. Trial on Kaplan Turbine.
12. Trial on Francis Turbine.

13. Trial on Centrifugal Pump.
14. Trial on Gear Pump.
15. Trail on Cavitation apparatus

| Text Books | |
|---|---|
| 1 | S K Som, Gautam Biswas, Suman Chakraborty, "*Introduction to Fluid Mechanics and Fluid Machines*" Tata McGraw – Hill Publication. 3rd Edition 2012. |
| 2 | Cengel Yunus A. And Cimbala John M. "*Fluid Mechanics and Fundamental and applications*", Tata Mcgraw-Hill New Delhi. 4th Edition 2017 |

| References | |
|---|---|
| 1 | Streeter, Wylie and Bedford, "*Fluid Mechanics*", Tata McGraw – Hill Publication. 9th Edition 2000. |
| 2 | Franke and White, "*Fluid Mechanics*", Tata Mcgraw-Hill New Delhi. 5th Edition 2003 |
| 3 | M. Potter, D.Wiggert *"Fluid Mechanics"* Schaum's Outline Series Mcgraw-Hill New York 2008.. |

| Useful Links | |
|---|---|
| 1 | https://archive.nptel.ac.in/courses/112/105/112105269/ |

**CO-PO Mapping**

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

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 (for 26-week Sem) | 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. (Mechanical Engineering) |
| **Class, Semester** | Second Year B. Tech., Sem IV |
| **Course Code** | 7ME272 |
| **Course Name** | Kinematics and Theory of Machines Lab |
| **Desired Requisites:** | |

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

## Course Objectives

| | |
|---|---|
| **1** | To develop skills of generation of gear tooth and cam profiles. |
| **2** | To prepare the students to perform the analysis of gear drives and mechanisms. |

## 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 kinematics to plot velocity and acceleration diagrams of mechanisms. | III | Apply |
| **CO2** | Investigate gear trains for various power transmission systems. | IV | Analyze |
| **CO3** | Evaluate various types of gears and belt drives. | V | Evaluate |
| **CO4** | Use knowledge of theories of machines to invent new mechanisms or improve existing ones, integrating different components to achieve desired functionalities. | VI | Create |

## List of Experiments / Lab Activities

**List of Experiments:**

**Term Work contains following:-**

1. To plot displacement, velocity and acceleration curves for two types of cam follower systems.
2. To verify angular displacement ratio of shafts connected by Hooke's joint
3. To find out Coriolis component of acceleration.
4. To develop computer program for velocity and acceleration analysis of four bar chain and single slider crank mechanism.
5. To generate involute gear tooth profile.
6. To solve problems on epicyclic gear train by tabular method.
7. To determine moment of inertia by Bi-filler suspension, Tri-filler suspension or compound pendulum method.
8. To study different mechanisms and analyse them with respect to links, joints, Degrees of freedoms.
9. To analyse gear trains in lathe, drilling, milling machine etc
10. To study any one automobile gearbox.

In case of mini-projects, drawing, presentations etc, write the relevant details of the same.

## Text Books


| | |
|---|---|
| 1 | Ratan S.S, "Theory of Machines", Tata McGraw Hill, New Delhi, 3rd Edition, 2011. |
| 2 | V. B. Bhandari, "Design of Machine Elements", Tata McGraw Hill, 3rd Edition, 2011 |
| 3 | Sadhu Singh,"Theory of Machines", Pearson Education, 2nd Edition, 2009 |


## References

| | |
|---|---|
| 1 | Thomas Bevan, “Theory of Machines”, CBS Publishers, New Delhi, 1st Edition, 2010. |
| 2 | J. F. Shigley,“Mechanical Engineering Design”, , McGraw Hill, New York. 4th Edition, 2011 |
| | |

| Useful Links | |
|---|---|
| 1 | Virtual Labs (vlabs.ac.in) |
| 2 | Kinematics and Dynamics of Mechanisms (iitkgp.ac.in) |

**CO-PO Mapping**

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

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

**Assessment**

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

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

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

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

**AY 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B. Tech. (Multi-Disciplinary Minor) |
| **Class, Semester** | Second Year B. Tech. SEM-II |
| **Course Code** | 7MDME201 |
| **Course Name** | Elements of Mechanical Engineering |
| **Desired Requisites:** | NA |

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

**Course Objectives**

| | |
|---|---|
| **1** | To engage students in analysing mechanisms used in Mechanical Engineering |
| **2** | To prepare the students for applying concepts of motion transmission using mechanisms and gears |

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

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

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Description** |
|---|---|---|---|
| **CO1** | Explain the operation of various power plants, first and second laws of thermodynamics | II | Understanding |
| **CO2** | Calculate degrees of freedom and understand the concept of inversion in mechanisms. | III | Applying |
| **CO3** | Classify gears based on type and terminology. | IV | Analysing |
| **CO4** | Select belts, chains, shafts, keys, couplings, and bearings for various power transmission applications. | V | Evaluating |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Conventional and nonconventional power plants** Steam power plants, hydropower plant, four stroke and two stroke petrol and diesel engines Diesel power plant, wind power plants | 7 |
| II | **Study of mechanical systems** Pumps, compressors, refrigeration, and air conditioning system, hydraulic and pneumatic systems. | 6 |
| III | **Basic thermodynamics** First and second law of thermodynamics. Gas processes, Cannot cycle, Otto cycle, Joule cycle, Air standard efficiency, numerical on above | 7 |
| IV | **Basics of Machines and Mechanisms** Objective of kinematic analysis of mechanism, classification of links, pairs, Basic terminology and kinematic symbols, kinematic chains, plane motion; constraints and degrees of freedom, mechanism and machines, inversion of mechanisms along with their practical applications. | 7 |
| V | **Elements of Power Transmission - I** Gears: Classification and Basic terminology, Fundamental law of gearing, the cycloidal and involute profile, standards in tooth forms, spur gears and other types of gears | 6 |
| VI | **Elements of Power Transmission – II** Introduction to belt and chain drives, types of belt drives, shafts, keys, couplings, sliding and rolling contact bearings | 6 |

**Text Books**

| | |
|---|---|
| 1 | Beer and Johnson, Mechanics of Materials, McGraw Hill, 6th Edition , 2013 |
| 2 | S S Rattan, Theory of Machines, McGraw Hill, 3rd edition, 2016 |
| 3 | R. Yadav, Applied Thermodynamics, Central Publishing House, 3rd Edition, 2011 |
| | |
| **References** | |
| 1 | Den Hartog, Jacob P., Strength of Materials. Dover Publications Inc., 3rd Edition 1961 |
| 2 | Yunus A Cengel and Michael Boles, Thermodynamics: An engineering approach, McGraw Hill, 9th Edition, 2015 |
| | |
| **Useful Links** | |
| 1 | https://archive.nptel.ac.in/courses/112/104/112104188/ |
| 2 | https://www.youtube.com/watch?v=kC2SEiGaqoA |
| 3 | https://nptel.ac.in/courses/112104304 |

**CO-PO Mapping**

| | Programme Outcomes (PO) | | | | | | | | | | | | PSO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | |
| **CO1** | 1 | | 2 | | 2 | | | 2 | | | 1 | | | | |
| **CO2** | 1 | 3 | 2 | | | | 2 | | | | | | | | |
| **CO3** | 2 | | | 1 | | 1 | | | | | | | | | |
| **CO4** | 1 | | | | 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.
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. (Mechanical Engineering) |
| **Class, Semester** | Second Year B. Tech., Sem IV |
| **Course Code** | 7ESME201 |
| **Course Name** | Numerical Methods |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 2Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 1 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 3** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | Recall and define the basic concepts of numerical errors, stability, and convergence in numerical methods |
| **2** | Understand the theoretical foundations of various numerical methods, including their strengths and weaknesses |
| **3** | Apply numerical methods in computer programs to solve problems in engineering and science, interpreting the results critically |

**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** | Analyze and solve various types of algebraic and transcendental equations using appropriate numerical methods | IV | Analyzing |
| **CO2** | Evaluate the accuracy, convergence, and limitations of different numerical methods for solving problems in engineering and science | V | Evaluating |
| **CO3** | Apply numerical methods to curve fitting, interpolation, differentiation, and integration of real-world data | III | Applying |
| **CO4** | Analyze and solve ordinary and partial differential equations using numerical techniques appropriate for specific applications | IV | Analyzing |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Roots of Algebraic Equations** Bracketing methods- Bisection method, false position method, Open methods- Newton Rapson, Multiple roots, System of non-linear equations. Roots of polynomials | 5 |
| II | **Linear Algebraic Equation** Gauss elimination method-Naïve Gauss elimination, Pitfalls of elimination methods, nonlinear system of equations. Cramer's rule, Matrix inversion- LU decomposition, Gauss Seidel method. | 5 |
| III | **Curve Fitting** Least square regression- Linear regression, Polynomial regression. Interpolation-Newton's divided difference, Interpolating Polynomials | 4 |
| IV | **Numerical Differentiation and Integration** Newton cote's integration formulae – Trapezoidal rule, Simpson's rule, Integration of unequal segments. Romberg's integration and Gauss quadrature. Numerical Differentiation- Differentiation Formulae, Richardson Extrapolation, Derivation of unequally spaced data | 5 |

| | | |
|---|---|---|
| V | **Ordinary Differential Equation**<br>Euler method, improved Euler's method, Runge-Kutta methods, System of equations. Boundary value and Eigen value problem: shooting method, Finite difference method, Eigen value problem, power method | 5 |
| VI | **Partial Differential Equation**<br>Finite Difference – Elliptic Equatiosn – Laplace equation, Liebmen method, Boundary conditions. Parabolic equations, explicit method, implicit method, Crank Nicolson method | 4 |

| **Text Books** | |
|---|---|
| 1 | Chapra, Steven C., and Raymond A. Canale. Numerical Methods with Applications: An Introduction. McGraw-Hill Education, 5th edition, 2018. |
| 2 | Burden, Richard L., J. Douglas Faires, and Anil M. Kainen. Numerical Analysis. Brooks/Cole Cengage Learning, 3rd Edition, 2016. |
| 3 | Atkinson, Kendall A. An Introduction to Numerical Analysis. John Wiley & Sons, 2008. |

| **References** | |
|---|---|
| 1 | Press, William H., Brian P. Flannery, Saul A. Teukolsky, and William T. Vetterling. Numerical Recipes 3.0: The Art of Scientific Computing. Cambridge University Press, 3rd edition, 2007. |
| 2 | Dahlquist, Germund, and Åke Björck. Numerical Methods. Dover Publications, 1st edition, 2008. |
| 3 | Kantorovich, L. V. Lectures on Numerical Methods. Dover Publications, 1964. |

| **Useful Links** | |
|---|---|
| 1 | |
| 2 | |

**CO-PO Mapping**

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

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

**Assessment**

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

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2024-25**

| **Course Information** | |
|---|---|
| **Programme** | B.Tech. (All branches) |
| **Class, Semester** | Second Year B.Tech., Sem - II |
| **Course Code** | |
| **Course Name** | Employability Skills Development (ESD) |
| **Desired Requisites:** | -- |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 4Hrs/week | **ISE** | **MSE** | **ESE** | **Total** |
| **Tutorial** | - | 20 | 30 | 50 | 100 |
| **Practical** | - | | | | |
| **Interaction** | - | **Credits: 2** | | | |

| **Course Objectives** | |
|---|---|
| **1** | To improve the problem-solving skills of students |
| **2** | To understand the approach towards problem solving |
| **3** | Understanding the sectional cut-offs for different companies |

| **Course Outcomes** | | |
|---|---|---|
| **CO1** | Ability to improve the accuracy percentage | |
| **CO2** | Understand the current changing recruitment trends | |
| **CO3** | Understanding the differential marking scheme in papers | |
| **CO4** | Performance improvement in competitive exams like CAT, GATE | |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Arithmetic I**<br><br>Ratio, Proportion, Mark Up & Discount, Averages, Mixtures & Alligations, Simple & Compound Interest | 6 |

| | | |
|---|---|---|
| II | **Arithmetic II**<br><br>Percentages, Profit & Loss, Time & Work, Time, Speed & Distance, Boat & Streams, Linear Races s | 8 |
| II | **Numbers**<br><br>Cyclicity, Remainders, Cyclicity of Remainders, Indices, Factors, LCM, HCF | 4 |
| III | **Permutation, Combination, Probability**<br><br>Fundamental principal of counting, Arrangements, Selection, Grouping, Distribution, Independent Events, Conditional Probability, Binomial Distribution | 6 |
| IV | **Logical Reasoning**<br><br>Clocks, Calendars, Games & Tournaments, Analytical Puzzles, Binary Logic, Blood relations, Directions, Coding, Decoding, Seating Arrangement (Linear, Circular & Rectangular) | 6 |
| V | **Verbal Ability I**<br><br>Vocabulary - Synonyms, Antonyms, Analogies<br>Reading Comprehension, Para Jumbles | 6 |
| VI | **Verbal Ability II**<br><br>Parts of Speech, Tenses, Subject Verb Agreement | 4 |
| | | |
| **Text Books** | | |
| 1 | Quantitative Aptitude - Abhijit Guha | |
| 2 | Quantitative Aptitude - Sarvesh Agarwal | |
| | | |
| **References** | | |
| 1 | Quicker Maths - M. Tyra | |
| 2 | Quantitative Aptitude - Chandresh Agarwal | |
| 3 | Puzzles to puzzle you - Shakuntala Devi | |
| | | |
| **Useful Links** | | |
| 1 | www.campusgate.co.in | |
| 2 | www. Lofoya.com | |
| 3 | www.brainbashers.com | |

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

| Assessment |
|---|
| The assessment is based on the MCQ test which will be conducted online through the platform and it will be a proctored test. No negative marking will be there in the test. Test will be of 60 minutes with 20 questions each on Quantitative Aptitude, Logical Reasoning & Verbal Ability |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2024-25**

## Course Information

| | |
|---|---|
| **Programme** | B.Tech. (Information Technology) |
| **Class, Semester** | Second Year B. Tech., Sem III & IV |
| **Course Code** | 7IK201 |
| **Course Name** | Introduction to Ancient Indian Technology |
| **Desired Requisites:** | General curiosity, maturity expected from adult student. |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| Lecture | 02 Hrs/week | MSE | ISE | ESE | Total |
| Tutorial | 0 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 2** | | | |

## Course Objectives

| | |
|---|---|
| 1 | The course is designed for undergraduate students, interested in learning about the ancient Indian technology which is the hallmark of glorious Indian civilization. |
| 2 | The objective is to emphasize on nature centric aspects of ancient Indian technologies that can be adopted in modern time. |
| 3 | The course is to expose the students to ancient science and technologies which can be adopted for modern technological 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** | Name the ancient Indian technological achivments | 1 | Remenbering |
| **CO2** | Comprehend the concept of Indian traditional knowledge and its relevance | 2 | Understanding |
| **CO3** | Explain the Indian contribution to the world at large | 2 | Understanding |
| **CO4** | Judge the ancient Indian technology. | 5 | Evaluating |

| Module | Module Contents | Hours |
|---|---|---|
| I | Introduction: Why are ancient Indian science and technology relevant today? What is science? How is it different from technology? . | 4 |
| II | Philosophy of ancient Indian technology, how is different from modern technology? Ancient Indian Scientific methods. Glimpses of ancient Indian science and technology?. | 4 |
| III | Material technology in ancient India : Mining, Metals and Metallurgy, Iron Making and craftsmanship, Wootz Steel Technology | 5 |
| IV | Extraction of Zinc in ancient India, Glass making, Bead making Techniques, Ceramic Technology. | 4 |
| V | Water Harvesting Technology, Irrigation Systems. Town planning, Building construction, Sanitation from ancient India period. | 5 |
| VI | Agriculture and Textile Technology in context of ancient India i.e Bharat. | 4 |

| | | |
|---|---|---|
| | **Textbooks** | |
| | 1 | Transcript of the NPTEL course available at https://archive.nptel.ac.in/courses/101/104/101104065/. Title of the course "Introduction To Ancient Indian Technology" by Prof. D.P. Mishra Department of Aerospace Engineering, IIT Kanpur |
| | | |
| | **References** | |
| | 1 | The NPTEL course available at https://archive.nptel.ac.in/courses/101/104/101104065/. Title of the course "Introduction To Ancient Indian Technology" by Prof. D.P. Mishra Department of Aerospace Engineering, IIT Kanpur |
| | | |
| | **Useful Links** | |
| | 1 | https://archive.nptel.ac.in/courses/101/104/101104065/ |

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

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

**Assessment**

The assessment is based on MSE, ISE and ESE.
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 2024-25**

## Course Information

| | |
|---|---|
| **Programme** | B.Tech. (Mechanical Engineering) |
| **Class, Semester** | Second Year B. Tech., Sem IV |
| **Course Code** | 7VSME271 |
| **Course Name** | Computer Aided Design and Drafting Lab |
| **Desired Requisites:** | Basics of Engineering Drawing |

| **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 make the student familiar with Indian Standards for drawing. |
| **2** | To make the student acquainted with standard machine parts and sub-assemblies readily available in market. |
| **3** | To develop students to apply knowledge of different limits, fits, and tolerances on assembly drawings. |
| **4** | To provide sound knowledge of detail and assembly procedure. |
| **5** | To highlight the importance of auxiliary views and interpenetration. |
| **6** | To learn to use suitable drafting software. |

## 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** | Use Bureau of Indian Standards drawing conventions in drawings and drafting software to draw assembly and detail drawings. | II | Understanding |
| **CO2** | Produce proportionate sketches of standard machine components with use limits, fits and tolerances on assembly drawings. | III | Applying |
| **CO3** | Produce detail drawings from given assembly drawings and vice-versa. | III | Applying |
| **CO4** | Create the solid models and assemblies using the 3D modelling softwares. | V | Evaluating |

## List of Experiments / Lab Activities/Topics

**List of Lab Activities:**

**PART A.** Following sheets are to be completed on A2 size drawing sheet.

Sheet No 1. Based on BIS conventions

Sheet No 2. Based on free hand sketching

Sheet No 3. Drawing details and assembly containing maximum twelve parts by taking actual measurement on parts.

Sheet No 4. Drawing details and assembly from given drawing of details and entering limits fits and tolerances, surface finish symbols, geometrical tolerances etc.

**PART B.** Following drawings to be completed using suitable drafting software on A4 size papers

Sheet No.5 Simple 2D figures

Sheet No.6 One detail and assembly drawing containing not more than ten parts

Sheet No.7 One 3D object.

## Textbooks

| | |
|---|---|
| 1 | P.S.Gill, "*Machine Drawing*", S.K. Kataria and Sons,2002. |

| | |
|---|---|
| 2 | N.D.Bhatt, "*Machine Drawing",* Charotor Publication House ,2001. |
| 3 | N.Sidheshwar, P.Kannaiah and V.V.S.Sastry, "*Machine Drawing*"McGraw Hill,2001. |
| | |
| **References** | |
| 1 | I.S.:SP46 *Engineering drawing practice for schools and colleges* BIS Publication. |
| 2 | I.S.:696 *Code of practice for general engineering drawings*. BIS Publication. |
| 3 | I.S.:2709 *Guide for selection of fits*. BIS Publication. |
| | |
| **Useful Links** | |
| 1 | https://nptel.ac.in/courses/112102101 |
| 2 | https://www.youtube.com/watch?v=5xQdrWly1ls&list=PLbkIghvjQ7P8qhyX-L2HYBbDzzF4ntW7w |
| 3 | https://www.youtube.com/watch?v=ptJfomL1I7o&list=PLLvBXFAV-DeIsmVkmcNv2RzwCuT1XvhTV |

**CO-PO Mapping**

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

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

**Assessment**

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

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

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

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2024-25**

## Course Information

| | |
|---|---|
| **Programme** | B.Tech. (Mechanical Engineering) |
| **Class, Semester** | Second Year B. Tech., Sem III |
| **Course Code** | 7CE271 |
| **Course Name** | Field Study |
| **Desired Requisites:** | Basics of Mechanical Engineering |

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

## Course Objectives

| | |
|---|---|
| **1** | Gain practical insights into industry operations through visits and interactions. |
| **2** | Promote an interdisciplinary approach to problem-solving, integrating technological, business, and societal perspectives. |
| **3** | Instill a sense of ethical responsibility and social impact in the development and implementation of solutions. |
| **4** | Strengthen written and oral communication skills for presenting and defending case studies. |
| **5** | Promote an interdisciplinary approach to problem-solving, integrating technological, business, and societal perspectives. |

## 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 the ability to critically observe and understand the operations of various industries, and effectively identify key challenges and inefficiencies within these settings. | II | Understanding |
| **CO2** | Exhibit strong analytical skills, capable of conducting thorough research and systematic documentation. | III | Applying |
| **CO3** | Showcase the ability to approach problem-solving from an interdisciplinary perspective, integrating technological, business, and societal considerations. | III | Applying |
| **CO4** | Possess enhanced written and oral communication skills, enabling them to effectively present and defend their case studies. | V | Evaluating |

## List of Experiments / Lab Activities/Topics

1. **Introduction and Fundamentals:**
   - Overview of techno-societal case studies: definition, importance, and objectives.
   - Understanding industry operations, processes, and key performance indicators.
2. **Problem Identification and Research:**
   - Techniques for identifying operational challenges and inefficiencies.
   - Methods for collecting and documenting data during industry visits, including ethical considerations.
3. **Data Analysis and Solution Development:**
   - Analytical methods and tools for interpreting collected data.
   - Developing innovative and feasible technological solutions.
   - Evaluating solutions based on feasibility, cost-effectiveness, and social impact.
4. **Case Study Development and Presentation:**
   - Structuring and writing comprehensive case studies.
   - Enhancing communication skills for effective presentation and defense of case studies.
   - Practical industry exposure through visits and interaction with industry professionals, culminating in a capstone project that integrates all course elements.

| Textbooks | |
|---|---|
| | NA |

| References | |
|---|---|
| | NA |

| Useful Links | |
|---|---|
| | NA |

**CO-PO Mapping**

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

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

**Assessment**

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

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

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