Third year mandatory and OE courses Sem V

| Sr. No. | Course Name | Course Code | Branch |
|---|---|---|---|
| 1. | Biology for engineers | 7OE301 | All branches |
| 2. | German I (Open elective) | 7OE302 | All branches |
| 3. | Human resource management (Open elective) | 7OE303 | All branches |
| 4. | History of Science and Technology | 7OE304 | All branches |
| 5. | Constitution of India (Open elective) | 7OE307 | All branches |
| 6. | General studies for Engineers (Open elective) | 7OE308 | All branches |
| 7. | Environmental sciences (Mandatory) | 7VE301 | Civil, Mechanical, Electronics |
| 8. | Engineering economics and financial management (Mandatory) | 7EE311 | CSE, IT, Electrical |
| | | | |
| | | | |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2024-27**

| **Course Information** | |
|---|---|
| **Programme** | B.Tech. All Branches |
| **Class, Semester** | Third Year B. Tech., Sem V |
| **Course Code** | 7OE301 |
| **Course Name** | Biology for Engineers |
| **Desired Requisites:** | Basic science till 10th |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 03 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 00 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 03** | | | |

| **Course Objectives** | |
|---|---|
| **1** | To introduce basic biological concepts and explore how biological systems inspire and influence engineering solutions. |
| **2** | To foster collaboration between engineering and biology disciplines by engaging in interdisciplinary projects, discussions, and case studies |
| **3** | To explore the intersections between biology and engineering disciplines, focusing on how engineering principles can be applied to understand, manipulate, and design biological systems and technologies. |
| **4** | To motivate the students to develop interdisciplinary vision of biological engineering. |

**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** | Perceive the fundamental principles of biology and its relevance to engineering disciplines. | II | Understanding |
| **CO2** | Demonstrate effectively with other interdisciplinary team members to address challenges of biology and engineering. | III | Applying |
| **CO3** | Inspect the interactions between biological systems and engineered technologies, considering ethical, environmental, and societal implications. | III | Applying |
| **CO4** | Execute innovative biobased solutions for socially relevant problems. | III | Applying |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **BIOLOGY AND ITS RELEVANCE TO ENGINEERING**<br>Scope of biology in engineering fields, Overview of cell theory, structure, and function, Biomolecules: carbohydrates, proteins, lipids, nucleic acids | 4 |
| II | **GENETICS AND MOLECULAR BIOLOGY**<br>DNA structure, replication, transcription, translation; Mendelian and non-Mendelian genetics, Genetic engineering basics | 7 |
| III | **MICROBIOLOGY AND IMMUNOLOGY FOR ENGINEERS**<br>Microbial diversity: bacteria, viruses, fungi, Industrial and environmental microbiology, Basics of the immune system and biomaterials compatibility | 7 |
| IV | **BIOMECHANICS AND BIOPHYSICS**<br>Principles of biomechanics (bones, muscles, joints), Fluid dynamics in biological systems (blood flow, air flow), Bioelectricity (neuron signaling, | 7 |

| | | |
|---|---|---|
| | cardiac rhythms), neural networks in computation | |
| V | **TRENDS IN BIOENGINEERING**<br>Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Self- healing Bioconcrete, Bioremediation and Biomining. Systems Biology and Bioinformatics, Systems approach to biological networks, Basics of bioinformatics: sequence alignment, database mining | 7 |
| VI | **APPLIED BIOLOGY AND BIOTECHNOLOGY**<br>Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology). Transgenics.<br>• Application of Biotechnology in Health and Agriculture<br>• Introduction to transgenics: Gene therapy, Biosafety issues– Bio piracy<br>Biomimicry and Engineering Applications<br>Nature-inspired design (biomimicry) | 7 |
| **Textbooks** | | |
| 1 | T. S. Ranganathan, Text book of Human Anatomy, S. Chand and Company Ltd, 2002. | |
| 2 | P. S. Verma and V. K. Agarwal, Concept of Cell Biology, S. Chand and Company Ltd, 2002. | |
| 3 | R. D. Vidyarthi and P. N. Pandey, A Text book of Zoology, S. Chand and Company Ltd, 2004. | |
| 4 | Biology for Engineers by Arthur T. Johnson | |
| 5 | Molecular Biology of the Cell by Alberts et al. | |
| **References** | | |
| 1 | Bruce Alberts and Alexander Johnson, Molecular Biology of the Cell Garland Science, Taylor & Francis Group, 6th Edition, 2015. | |
| 2 | Peter H. Raven, George B. Johnson, Biology, McGraw hill, 11th edition, 2017. | |
| 3 | Laurence A. Cole, Biology of Life - Biochemistry, Physiology and Philosophy, Elsevier, 2016. | |
| **Useful Links** | | |
| 1 | https://www.youtube.com/watch?v=yaQhH9iKY0M | |
| 2 | https://www.youtube.com/watch?v=V6s0xOTNmT4 | |
| 3 | https://www.youtube.com/watch?v=5Q9LgvQs5Nw | |
| 4 | https://www.youtube.com/watch?v=nzJXq4YMPYE | |

**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** | | | 3 | | | | | 2 | | | | | | |
| **CO4** | | 2 | 2 | | | | | | | | | | | |

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

**Assessment**

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

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2024-25**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech All branches |
| **Class, Semester** | Third year Sem V |
| **Course Code** | 7OE302 |
| **Course Name** | German Language 1 (open elective) |
| **Desired Requisites:** | 10+2 level English |

**Credits: 3**

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 3hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 00 Hrs/week | 30 | 20 | 50 | 100 |
| | | | | | |

**Course Objectives**

| | |
|---|---|
| 1 | To learn colloquial German language |
| 2 | To enable students to communicate in German language in day to day situations |
| 3 | To create opportunities for using German language skills in engineering fields |

**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** | Developing strategies for further language learning and immersion | | Remember |
| **CO2** | Communicate clearly in German in different scenario | | Understand |
| **CO3** | Oral, Listening and written communications in German language confidently | | Apply |
| **CO4** | Remembering basic words and phrases and learning spoken language skills | | Apply |

| | | |
|---|---|---|
| I | **Module 1: Introduction to German Language and Culture**<br>1. Introduction to the German language: its importance and relevance<br>2. German-speaking countries and their cultures<br>3. Basic German pronunciation and alphabet<br>4. Greetings and common expressions<br>5. Overview of German grammar: nouns, articles, and pronouns | 5 |
| II | **Module 2 : Essential Vocabulary and Phrases**<br>1. Date and Days of Week<br>2. Names of months<br>3. Numbers 1 to 1000<br>4. Names of Continents, Countries and their Capitals<br>5. Languages and Nationalities, main cultural festivals<br>6. Health and Parts of body | 6 |
| III | **Module 3 : Introduction to basic Speaking and Listening skills**<br>1. To introduce oneself and others<br>2. Greeting people/colleagues at office/work-place etc.<br>3. Exchanging information about country of origin<br>4. Place of residence, professions | 7 |

| | | |
|---|---|---|
| IV | **Module 4:German Grammar: Basics and Sentence Structure**<br>1. German articles (definite, indefinite, and possessive)<br>2. Noun gender and plurals<br>3. Verb conjugation (present tense)<br>4. Word order in simple sentences<br>5. Introduction to separable and inseparable verbs<br>6. Forming questions<br>7. Conjunctions<br>8. Prepositions<br>9. Opposites | 7 |
| V | **Module 5 : Oral Communication**<br>1. Asking for and telling telephone numbers with dial code numbers h<br>2. Making request<br>3. Word order in sentences/statements and full question<br>4. Adding question tags<br>5. Speak on given topic<br>6. Asking questions ( Forming Question) | 7 |
| VI | **Module 6 : Written Communication : Basic Writing Skills**<br>1. Paragraph Writing<br>2. Comprehension<br>3. Short Essay Writing<br>4. Filling in Personal Information<br>5. Introduction to German punctuation and capitalization rules<br>6. Tips for improving reading and writing skills independently | 7 |

| **Textbooks** | |
|---|---|
| 1 | Hartmut Auf der strasse, Heiko Bock, Mechthild Gerdes, Jutta Mueller, Helmut Mueller,"Themen Aktuell1- Deutsch als Fremdsprache-Kursbuch",Max Hueber Verlag,Munich,Germany and Langers International Pvt.Ltd.,New Delhi ,ISBN: 3-19-0001690-9,Reprint 2014 |
| 2 | .Hartmut Auf der strasse, Heiko Bock, Mechthild Gerdes, Jutta Mueller,Helmut Mueller,"Themen Aktuell1- Deutsch als Fremdsprache-Arbeitsbuch",Max Hueber Verlag,Munich,Germany and Langers International Pvt.Ltd.,New Delhi ,ISBN: 3-19-011690-3,Reprint 201 |
| 3 | Alan B, Jones A."Themen Aktuell 1- Deutsch als Fremdsprache - Glossar",Max Hueber Verlag, Munich,Germany and Langers International Pvt.Ltd.,New Delhi ,ISBN: 3-19-0001690-9,Reprint 2014 |
| **References** | |
| 1 | Archana Gogate, "German Workbook", Shubhasha Publications,Pune, Reprint July 2016 |
| 2 | Stefanie Dengler,Paul Rusch,Helen Schmitz,Tanja Sieber, "Netzwerk A1- Deutsch als FremdspracheKursbuch ",Klett Langenscheidt, Munich,Germany and GOYAL Publishers Pvt. Ltd.,New Delhi, First Indian edition-2015 |
| 3 | Stefanie Dengler,Paul Rusch,Helen Schmitz,Tanja Sieber, "Netzwerk A1- Deutsch alsFremdspracheArbeitsbuch ",Klett Langenscheidt,Munich,Germany and GOYAL Publishers Pvt.Ltd.,New Delhi, First Indian edition-2015 |
| 4 | Stefanie Dengler,Paul Rusch,Helen Schmitz,Tanja Sieber, Gavin Schalliol"Netzwerk A1- Deutsch alsFremdsprache- Glossar ",Klett Langenscheidt, Munich, Germany and GOYAL Publishers Pvt.Ltd.,New Delhi, First Indian edition-2015 |
| **Useful Links** | |
| 1 | www.klett-sprachen.de/netzwerk |
| 2 | www.cornelsen.de/studio-d |

**CO-PO Mapping**

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

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High

| Each CO of the course must map to at least one PO. |
| --- |
| **Assessment** |
| The assessment is based on MSE, ISE and ESE.<br>MSE shall be typically on modules 1 to 3.<br>ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be Tests, assignments, oral, seminar etc. and is expected to map at least one higher order PO.<br>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.<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 2025-26**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. All Branches |
| **Class, Semester** | Third Year B. Tech., Sem V |
| **Course Code** | 7OE 303 |
| **Course Name** | Human Resource Management (Open Elective) |
| **Desired Requisites:** | - |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 02 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 00 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 02** | | | |

**Course Objectives**

These objectives aim to equip students with the knowledge and skills necessary to navigate interpersonal relationships and dynamics effectively within the workplace.

| | |
|---|---|
| **1** | To enable the students with an understanding about the very importance of human relations, its relationship with self and the processes involved in interaction with people at work. |
| **2** | To provide relevant knowledge to address human relations at work by exposure to personal growth and challenges at work. |
| **3** | To infuse the ability to positively consider other's views and to work effectively with others in team and to support a shared purpose or goal. |
| **4** | Explore the importance of trust and ethical behaviour in building successful work relationships. |
| **5** | Recognize and appreciate diversity in the workplace, and learn to leverage it for increased creativity and productivity. |

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

Upon successful completion of this course, students will be able to

| **CO** | **Course Outcome Statement/s** | **Bloom's Taxonomy Level** | **Bloom's Taxonomy Descriptor** |
|---|---|---|---|
| **CO1** | Sense a comprehensive understanding of the principles of human relations. | II | Understanding |
| **CO2** | Recall different forms of communication (verbal, non-verbal, written) and their importance in workplace interactions. | I | Remembering |
| **CO3** | Developing good work habits, value workload, understanding the changing roles of men and women in the society. | III | Applying |
| **CO4** | Demonstrate ethical behaviour, treat other team members respectfully, uphold personal values, foster team work and understand its significance in decision-making and various societal contexts. | III | Applying |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Human Relations and Personal Growth**<br>Understanding Human Relations, Managing Yourself and Human Relations, Attitude, Self-Esteem, Self-Confidence, Self-Motivation, Emotional Intelligence, Happiness, Values and Ethics, | 7 |
| II | **Challenges in Human Relations**<br>Dealing effectively with People, Communication in the Workplace, Specialized tactics for getting along with others in the workplace, Diversity and Cross-Cultural Competence. Managing or Resolving Conflict and Dealing with Difficult People, A Life Plan for Effective Human Relations. | 4 |
| III | **Teamwork** | 4 |

| | | |
|---|---|---|
| | Definition, Importance and Benefits of teamwork, promoting effective teamwork at workplace, Becoming an effective leader, Motivating Others. | |
| IV | **Personal Strategies for improving Human Relations**<br>Staying Physically Healthy: Yoga, Pranayama and Exercise, Improving Interpersonal Relations, Achieving Emotional Balance in a chaotic world, Finding Positive Energy. | 5 |
| V | **Individual Career Management**<br>Staying psychologically healthy, Managing Stress and Personal Problems, Meditation, Developing Career Thrust, Getting Ahead in Your Career, Learning and Developing Individual Strategies, Environmental Awareness, Career Goals, Strategies, Appraisal, Individual Career Management | 5 |
| VI | **Measures for Successful Human Relations**<br>Developing Good Work Habits. Responding and managing to work related stress, Valuing work load, The changing roles of men and women, Sexual harassment of women at workplace, Respect to employees (men, women and transgender). | 4 |

| **Textbooks** | |
|---|---|
| 1 | Dubrien, A. J. (2018). Human Relations for Career and Personal Success: Concepts, Applications and Skills, 11th edition. Upper Saddle River, NJ: Pearson. |
| 2 | Barry Reece and Monique Reece (2016). Effective Human Relations: A Guide to People at Work, 13th edition, Cengage Learning. |
| 3 | Lowell H. Lamberton and Leslie Minor-Evans (2020). Human Relations: Strategies for Success, 6th edition, McGraw-Hill Education. |

| **References** | |
|---|---|
| 1 | Greenberg, J. S. (2017). Comprehensive stress management 14th edition. New York: McGraw Hill. |
| 2 | Udai, Y. (2015). Yogasan aur Pranayam. New Delhi: N.S. Publications. |
| 3 | Brian Luke Seaward, (2017). Managing Stress: Principles and Strategies for Health and Well-Being, 9th edition, Jones & Bartlett Learning. |

| **Useful Links** | |
|---|---|
| 1 | https://hbr.org/topic/subject/organizational-culture |
| 2 | https://www.apa.org/topics/healthy-workplaces |
| 3 | https://www.mindtools.com/caiprxt/team-management |
| 4 | https://www.verywellmind.com/how-to-deal-with-stress-at-work-3145273 |

**CO-PO Mapping**

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

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

**Assessment**

The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be Orals, assignments, group discussions 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 2024-27**

| **Course Information** | | | | | |
|---|---|---|---|---|---|
| **Programme** | B.Tech. All Branches | | | | |
| **Class, Semester** | Third Year B. Tech., Sem V | | | | |
| **Course Code** | 7OE304 | | | | |
| **Course Name** | History of Science and Technology | | | | |
| **Desired Requisites:** | | | | | |
| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
| **Lecture** | 03 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 00 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 03** | | | |

| **Course Objectives** | |
|---|---|
| **1** | To explore the origins and development of science and technology across cultures and time periods. |
| **2** | To understand the influence of scientific revolutions and industrialization on modern engineering. |
| **3** | To examine the reciprocal relationship between technology and society through history. |
| **4** | To prepare engineers to critically engage with the ethical and societal implications of their work. |

**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** | Describe major historical milestones in science and technology and their influence on engineering practice. | II | Analysing |
| **CO2** | Analyse the evolution of scientific thought and its impact on technological innovation across civilizations. | III | Applying |
| **CO3** | Critically evaluate ethical, cultural, and societal dimensions of engineering advancements. | III | Applying |
| **CO4** | Demonstrate historical insight to inform responsible and sustainable engineering design for the future. | III | Creating |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | **Foundations of Science and Technology in Ancient Civilizations**<br>□ Science and engineering in ancient Egypt, Mesopotamia, India, China, and Greece<br>□ Contributions in mathematics, astronomy, metallurgy, and architecture<br>□ Indigenous knowledge systems and traditional technologies<br>□ Historical case study: Water management in the Indus Valley Civilization | 4 |
| II | **The Scientific Revolution and Industrial Foundations**<br>□ Key figures: Galileo, Newton, Kepler, Descartes<br>□ Development of scientific method<br>□ Enlightenment science and mechanization<br>□ Pre-industrial and early industrial technologies | 8 |
| III | **Industrial Revolution and Rise of Modern Engineering**<br>□ Steam engine, textile manufacturing, metallurgy, and railroads<br>□ Birth of professional engineering disciplines<br>□ Impact on urbanization, labor, and economy<br>□ Case study: James Watt and the refinement of the steam engine | 7 |

| | | |
|---|---|---|
| IV | **20th Century Technological Transformation**<br>• Electricity, telecommunications, computing, and automation<br>• Role of science in World Wars: radar, atomic energy, aerospace<br>• Globalization of science and technology<br>• Case study: The Manhattan Project and ethical dilemmas in engineering | 7 |
| V | **Contemporary and Emerging Technologies**<br>• Information Age: digital revolution, internet, AI<br>• Biotechnology and nanotechnology<br>• Sustainable technologies and green innovation<br>• Industry 4.0 and smart systems | 7 |
| VI | **Engineering, Society, and Future Perspectives**<br>• Interplay between science, technology, culture and politics<br>• Technology transfer and diffusion<br>• Gender and diversity in science and engineering history<br>• Project: Timeline of major scientific-technological milestones with engineering impacts | 6 |
| **Textbooks** | | |
| 1 | The Structure of Scientific Revolutions – Thomas S. Kuhn | |
| 2 | “Science and Technology in World History" – James E. McClellan III & Harold Dorn | |
| 3 | "A Short History of Nearly Everything" – Bill Bryson | |
| 4 | Science in India: A Historical Perspective – B.V. Subbarayappa | |
| | | |

| **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** | | | 3 | | | | | 2 | | | | | | |
| **CO4** | | 2 | 2 | | | | | | | | | | | |
| 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. 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. 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 2022-23**

**Course Information**

| | |
|---|---|
| **Programme** | B. Tech. (All Branch) |
| **Class, Semester** | Third Year B. Tech., Sem. V |
| **Course Code** | 7OE307 |
| **Course Name** | Constitution of India |
| **Desired Requisites:** | |

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

**Course Objectives**

| | |
|---|---|
| **1** | To review and create awareness on various provisions in the constitution of India. |

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

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

| | | |
|---|---|---|
| **CO1** | Explain the premises informing the twin themes of liberty and freedom from a civil rights perspective. | understand |
| **CO2** | Address the growth of Indian opinion regarding modern Indian intellectuals constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism | understand |
| **CO3** | Address the role of socialism in India after the commencement of the Bolshevik<br>Revolution in 1917 and its impact on the initial drafting of the Indian Constitution | understand |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | History of Making of the Indian Constitution Drafting Committee, (Composition & Working | 5 |
| II | **Philosophy of the Indian Constitution :** Preamble, Salient<br>Feature | 6 |
| III | **Contours of Constitutional Rights:**<br>Fundamental Rights; Right to Equality; Right to Freedom; Right against Exploitation; Right to Freedom of Religion; Cultural and Educational Rights; Right to Constitutional Remedies; Directive Principles of State Policy;<br>Fundamental Duties. | 7 |
| IV | **Organs of Governance:**<br>Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers Judiciary,<br>Appointment and Transfer of Judges, Qualifications, Powers and Functions | 7 |
| V | **Local Administration:** District"s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of<br>Elected and Appointed officials, Importance of grass root democracy | 7 |

| | | |
|---|---|---|
| VI | **Election Commission:**<br>Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning.<br>Institute and Bodies for the welfare of SC/ST/OBC and women. | 7 |

| | | |
|---|---|---|
| **Text Books** | | |
| 1 | Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015. | |
| 2 | M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014 | |
| 3 | D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015 | |
| | **References** | |
| | 1 | The Constitution of India, 1950 (Bare Act), Government Publication |
| | **Useful Links** | |
| | 1 | https://en.wikipedia.org/wiki/Constituent_Assembly_of_India |
| | 2 | https://nptel.ac.in/courses/129/106/129106003/ |
| | 3 | https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-lw02/ |
| | 4 | https://eci.gov.in/about/about-eci/the-functions-electoral-system-of-india-r2/ |

**CO-PO Mapping**

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

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

**Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course**

The assessment is based on 2 in-semester examinations in the form of MSE 30 and ISE of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 50 marks. MSE shall be typically on modules 1 and 2, ISE based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

| | | |
|---|---|---|
| Prepared by | DAC/BoS Secretary | Head/BoS Chairman |

# Walchand College of Engineering, Sangli

*(Government Aided Autonomous Institute)*

**AY 2024-27**

**Course Information**

| | |
|---|---|
| **Programme** | B.Tech. All Branches |
| **Class, Semester** | Third Year B. Tech., Sem V |
| **Course Code** | 7OE308 |
| **Course Name** | General studies for Engineers I |
| **Desired Requisites:** | Nil |

| **Teaching Scheme** | | **Examination Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| **Lecture** | 03 Hrs/week | **MSE** | **ISE** | **ESE** | **Total** |
| **Tutorial** | 00 Hrs/week | 30 | 20 | 50 | 100 |
| | | **Credits: 03** | | | |

**Course Objectives**

| | |
|---|---|
| **1** | To develop awareness of national and international current events and their impact on engineering, technology, and society. |
| **2** | To introduce the historical foundation of modern India and its relevance in understanding constitutional values and civic responsibilities. |
| **3** | To provide a foundational understanding of the Indian polity, economy, geography, and governance systems that influence policy and development. |
| **4** | To sensitize students to environmental issues, sustainability, and basic scientific principles essential for responsible engineering practices. |

**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** | Analyze national and international current affairs with an understanding of their implications on technology and development. | III | Applying |
| **CO2** | Explain key events from Indian history and their relevance to modern India's growth and governance. | III | Applying |
| **CO3** | Interpret basic concepts of Indian polity, economy, and environment in relation to engineering and sustainable development. | IV | Analysing |
| **CO4** | Apply general scientific knowledge and geographic awareness in addressing real-world socio-technical challenges | V | Evaluating |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| I | Indian History and Freedom Movement<br>Ancient to modern Indian history (brief overview), Major movements in India's freedom struggle (1857–1947), Key personalities and their contributions, Evolution of the Indian Constitution | 7 |
| II | **Indian Polity and Governance:**<br>Basic structure and salient features of the Constitution, Fundamental Rights and Duties, Parliamentary system, President, Prime Minister, Judiciary, Panchayati Raj and public policy framework | 7 |
| III | **Indian and World Geography:**<br>Physical geography: landforms, rivers, climate, natural resources, Economic geography: agriculture, industries, infrastructure, Human geography: population, urbanization, migration, Mapping and satellite data relevance in engineering | 8 |
| IV | **Economic and Social Development:** | 8 |

| | | |
|---|---|---|
| | Indian economy: basic concepts, planning, and sectors, Government initiatives on sustainable development, Demographics and employment trends, Inclusive growth, social justice, and digital inclusion | |
| V | **Environment, Climate Change:** Environmental ecology and biodiversity, Climate change: causes, effects, and mitigation, Renewable energy. | 5 |
| VI | **General Science:** Basic principles of physics, chemistry, and biology relevant to engineers and green technologies. | 5 |
| | | |
| **Textbooks** | | |
| 1 | **Pandey, M.** (2023). *General studies manual – Paper I* (Latest ed.). Arihant Publications. | |
| 2 | **Laxmikanth, M.** (2023). *Indian polity* (7th ed.). McGraw Hill Education. | |
| 3 | **Leong, G. C.** (2000). *Certificate physical and human geography* (Revised ed.). Oxford University Press. | |
| 4 | **Singh, R.** (2023). *Indian economy* (15th ed.). McGraw Hill Education. | |
| 5 | **Rajagopalan, R.** (2016). *Environmental studies: From crisis to cure* (3rd ed.). Oxford University Press. | |
| **References** | | |
| 1 | Gadgil, M., & Guha, R. (1992). *This fissured land: An ecological history of India*. University of California Press. | |
| 2 | Sachs, J. D. (2012). *From millennium development goals to sustainable development goals*. The Lancet, 379(9832), 2206–2211. | |
| 3 | Dreze, J., & Sen, A. (2013). *An uncertain glory: India and its contradictions*. Princeton University Press. | |
| **Useful Links** | | |
| 1 | **https://www.insightsonindia.com** | |
| 2 | **https://www.unep.org** | |

**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 | | | | | | 3 | | | | |
| **CO3** | | | | | 2 | | | | | 3 | | | | |
| **CO4** | | 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 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 2025-26**

| Course Information | |
|---|---|
| **Programme** | B.Tech. |
| **Class, Semester** | Third Year B. Tech., Sem V and VI |
| **Course Code** | 7VE301 |
| **Course Name** | Environmental Science |
| **Desired Requisites:** | -Nil- |

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

| Course Objectives | |
|---|---|
| **1** | To provide a thorough understanding of natural environmental systems, their interactions and to introduce the principles of ecology and biodiversity to the engineering students. |
| **2** | To provide a thorough knowledge of the impacts of excess human population, pollution, globalization, and climate change on the environment and society. |
| **3** | To inculcate an understanding of the legal, ethical, policy frameworks, environmental regulations and compliance and modern concept of green industry. |
| **4** | To provide knowledge about the approaches to pollution control, Environment management tools and methods used for environmental and resource management, sustainable development and cleaner technologies. |

| Course Outcomes (CO) with Bloom's Taxonomy Level | | |
|---|---|---|
| **CO1** | Articulate the structure and function of various environmental systems and understand ecological principles and the importance of biodiversity. | Understanding |
| **CO2** | Predict impact of contemporary issues (Population Explosion, Climate change, Environmental pollution) on the environment. | Understanding |
| **CO3** | Assess the environmental impact of engineering activities. Identify and evaluate major environmental issues such as pollution and climate change. | Understanding |
| **CO4** | Demonstrate knowledge of environmental laws and regulations in their professional practice and make ethical decisions regarding environmental protection. | Applying |
| **CO5** | Implement practices that minimize environmental harm by utilizing environmental management tools such as Environmental Impact Assessment (EIA) and Environmental Management Systems (EMS) in both the corporate sector and society. | Applying |

| Module | Module Contents | Hours |
|---|---|---|
| I | **Introduction to Environmental Science**<br>Definition, scope, and importance of environmental science, Components of the environment: atmosphere, hydrosphere, lithosphere, and biosphere. Interdisciplinary nature of environmental science.<br>**Ecosystems and Biodiversity**<br>Ecosystem structure and function, Energy flow in ecosystems: food chains and food webs, Biodiversity: types, value, and conservation. | 5 |

| | | |
|---|---|---|
| II | **Environmental Pollution:**<br>***Types of pollution***: air, water, soil, and noise pollution, Sources and effects of pollutants, Pollution control measures and technologies, Case studies on pollution incidents.<br>**Climate change:**<br>Causes and effects of climate change, Mitigation and adaptation strategies, Global environmental issues: ozone depletion, acid rain, deforestation, international agreements and protocols (e.g., Paris Agreement).<br>**Natural Resources Management:**<br>***Types of natural resources***: renewable and non-renewable, Sustainable management of water, soil, forests, and minerals, Energy resources: conventional and renewable energy sources, Case studies on resource management. | 5 |
| III | **Environmental Impact Assessment (EIA)**<br>***Introduction to EIA***: purpose, process, and benefits, Steps in conducting an EIA, Legal and regulatory framework for EIA, Case studies on successful EIA implementations.<br>**Environmental Management Systems (EMS)**<br>***Introduction to EMS***: principles and standards (ISO 14001), Steps in implementing an EMS, Auditing and continuous improvement, Case studies on EMS in the corporate sector. | 5 |
| IV | **Solid, Hazardous Waste and Disaster Management**<br>***Solid and Hazardous waste management***: Introduction, categories, causes, effects and management of municipal solid waste, Hazardous waste<br>***Disaster Management***: Introduction, types of disasters, Disaster mitigation. Case studies. | 4 |
| V | **Social Issues, Environmental Laws and Policies**<br>***Environmental Ethics***: Introduction, Ethical responsibility, issues and possible solutions.<br>***Environmental Legislation***: Environmental Protection Act 1986, Water (prevention and control of pollution) Act 1974, Air (prevention and control of pollution) Act 1981, Wildlife Protection Act 1972, and Forest Conservation Act 1980. Municipal Solid Wastes (Management and Handling) Rules, 2000. | 4 |
| VI | **Sustainable Development and Green Engineering**<br>Principles of sustainable development, Sustainable engineering practices, green building concepts and LEED certification, Case studies on sustainable engineering projects. | 3 |
| | | |
| **Text Books** | | |
| 1 | Mrinalini Pande, "Disaster Management", Wiley Publications New Delhi, First edition, 2014 | |
| 2 | N.K Uberoi, "Environmental Studies", Excel Books Publications New Delhi, first edition, 2005. | |
| 3 | R. Rajagopalan, "Environmental Studies from crisis to cure" Oxford university press, second edition, 2011 | |
| | | |
| **References** | | |
| 1 | William. Cunningham and Barbara Woodworth Saigo, "Environmental Science: A Global Concern", WCB/McGraw Hill publication, 5th Edition, 1999. | |
| 2 | Peter. H. Raven, Linda. R. Berg, George. B. Johnson, "Environment", McGraw Hill publication, 2nd -Edition, 1998. | |
| 3 | Catherine Allan & George H. Stanley (Editors), "Adaptive Environmental Management", Springer Publications. 2009. | |
| | | |

| Useful Links | |
|---|---|
| 1 | https://www.youtube.com/watch?v=1Ht2uwDh6ro |
| 2 | https://www.youtube.com/watch?v=bvXrL5shxO4&list=PLSsIp6g3OZyVZgG0imE46NCXH3iwvD9SF |
| 3 | https://www.youtube.com/watch?v=ZngDF4jfRdw&list=PLyqSpQzTE6M_vO7rLpxKZWqai4uJP2bDa |
| 4 | https://www.youtube.com/watch?v=mIPBPG-5dUw |

| CO-PO Mapping | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (PO) | | | | | | | | | | | PSO | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 1 | 2 | 3 |
| **CO1** | **2** | | | | | | **2** | | | | | | | |
| **CO2** | **2** | | | | | | **2** | | | | | | | |
| **CO3** | **3** | | | | | | **3** | | | | | | | |
| **CO4** | | | | | | **3** | | | | | | | | |
| **CO5** | | | | | **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 (for Theory Course) |
|---|
| The assessment is based on In-semester examinations in the form (Test-1) of 20 marks, Mid Semester Exam (Test-2) of 30 marks and an End Semester examination (ESE) of 50 marks. ISE & MSE shall be typically on modules 1, 2 & 3 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 3 and 50% weightage on modules 4 to 6. |

| Prepared by | DAC/BoS Secretary | Head/BoS Chairman |
|---|---|---|

| Walchand College of Engineering, Sangli<br>(Government Aided Autonomous Institute) | |
|---|---|
| **AY 2025-26** | |
| **Course Information** | |
| **Programm** | B Tech. (All Branches) |
| **Class Semister** | Third Year B.Tech, Sem Viii |
| **Course Code** | 7EE301 |
| **Course Name** | Engineering economics and Financial management |
| **Desired Requisites** | Basic Knowledge Of Mathematics Economics And Finance |

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

| **Course Objectives** | |
|---|---|
| 1 | To introduce engineers to the fundamentals of financial management and decision-making. |
| 2 | To equip students with tools for capital management cost analysis, and financial planning. |
| 3 | To develop analytical skills for evaluating engineering projects from a financial perspective |

| | **Course Outcomes with Bloom's Taxonomy Level**<br>(At the end of the course, the students will be able to) |
|---|---|
| C01 | Explaining fundamental concepts demonstrates comprehension. |
| CO2 | Using techniques like NPV, IRR, and Payback Period shows practical application. |
| CO3 | Interpreting financial statements and ratios requires critical thinking. |
| CO4 | Assessing financing options and their impact demonstrates higher-level thinking. |
| CO5 | Designing a financial plan showcases creative problem-solving. |

| **Module** | **Module Contents** | **Hours** |
|---|---|---|
| **1** | Introduction to Financial Management<br>● Nature, scope and importance of financial management<br>● Role of finance in engineering and technology organizations<br>● Goals of financial management: Profit vs. Wealth Maximization<br>● Financial decision areas: Investment, Financing, Dividend | **4** |
| **2** | Financial Statements and Analysis<br>● Overview of financial statements: Balance Sheet, Income Statement, Cash Flow Statement<br>● Interpretation and analysis using key financial ratios:<br>○ Liquidity ratios<br>○ Profitability ratios<br>○ Efficiency ratios<br>○ Leverage ratios<br>● DuPont Analysis | **4** |

| | | |
|---|---|---|
| **3** | Time Value of Money<br>● Concept and importance<br>● Present and future value computations<br>● Annuities and perpetuities<br>● Applications in project evaluation and engineering economics | **4** |
| **4** | Working Capital Management<br>● Components of working capital<br>● Operating cycle and cash conversion cycle<br>● Management of inventory, receivables, and payables<br>● Cash and liquidity management | **5** |
| **5** | Financing and Dividend Decisions<br>● Sources of finance: Equity, Debt, Hybrid Instruments<br>● Financial planning and capital raising<br>● Dividend policy theories and practices<br>● Factors affecting dividend decisions | **5** |
| **6** | Financial Risk Management and Engineering Applications<br>● Financial risks in engineering projects<br>● Hedging instruments: Forwards, Futures, Options (introductory)<br>● Budgeting and cost control in engineering projects<br>● Case studies of financial decisions in engineering firms | **4** |

| **References** | |
|---|---|
| **1** | Principles of Corporate Finance" by Richard Brealey and Stewart Myers |
| **2** | Engineering Economy" by Leland Blank and Anthony Tarquin |
| **3** | Financial Management: Theory and Practice" by Prasanna Chandra |
| **4** | Fundamentals of Financial Management" by Eugene F. Brigham and Joel F. Houston |
| | **Useful Links** |
| 1 | https://www.vaia.com/en-us/explanations/engineering/professional-engineering/finance-in-engineering/ |
| 2 | https://corporatefinanceinstitute.com/resources/financial-modeling/financial-engineering/ |
| 3 | https://ecornell.cornell.edu/certificates/engineering/finance-for-engineers/ |
| 4 | https://ecornell.cornell.edu/certificates/financial-management/financial-management/ |

| | Programme Outcomes(PO) | | | | | | | | | | | PSO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 1 | 2 |
| CO1 | 1 | | | | | | | | | | | | |
| CO2 | | 3 | | | | | | | | | | | |
| C03 | | | 3 | 2 | | | | | | | | | |
| CO4 | | | | | 3 | | | | | | | | |

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

**Assessment**

The assessment is based on MSE, ISE, and ESE.
MSE shall be typically on module 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of the assessment can field visit, assignment etc. And is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on module 1 to 3 and 60%weightage on module 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 separate head of passing)