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
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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** 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** DNA structure, replication, transcription, translation; Mendelian and non-Mendelian genetics, Genetic engineering basics	7
III	**MICROBIOLOGY AND IMMUNOLOGY FOR ENGINEERS** Microbial diversity: bacteria, viruses, fungi, Industrial and environmental microbiology, Basics of the immune system and biomaterials compatibility	7
IV	**BIOMECHANICS AND BIOPHYSICS** 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** 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** Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology). Transgenics. • Application of Biotechnology in Health and Agriculture • Introduction to transgenics: Gene therapy, Biosafety issues– Bio piracy Biomimicry and Engineering Applications 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)

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

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

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)

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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** 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** 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** 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** 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** 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)

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

IV	**20th Century Technological Transformation** ☐ Electricity, telecommunications, computing, and automation ☐ Role of science in World Wars: radar, atomic energy, aerospace ☐ Globalization of science and technology ☐ Case study: The Manhattan Project and ethical dilemmas in engineering	7
V	**Contemporary and Emerging Technologies** ☐ Information Age: digital revolution, internet, AI ☐ Biotechnology and nanotechnology ☐ Sustainable technologies and green innovation ☐ Industry 4.0 and smart systems	7
VI	**Engineering, Society, and Future Perspectives** ☐ Interplay between science, technology, culture and politics ☐ Technology transfer and diffusion ☐ Gender and diversity in science and engineering history ☐ 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
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 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 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 Feature	6
III	**Contours of Constitutional Rights:** 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; Fundamental Duties.	7
IV	**Organs of Governance:** Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers Judiciary, 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 Elected and Appointed officials, Importance of grass root democracy	7

		Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	
VI			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** 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:** 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:** 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** Definition, scope, and importance of environmental science, Components of the environment: atmosphere, hydrosphere, lithosphere, and biosphere. Interdisciplinary nature of environmental science. **Ecosystems and Biodiversity** Ecosystem structure and function, Energy flow in ecosystems: food chains and food webs, Biodiversity: types, value, and conservation.	5

II	**Environmental Pollution:** *Types of pollution*: air, water, soil, and noise pollution, Sources and effects of pollutants, Pollution control measures and technologies, Case studies on pollution incidents. **Climate change:** 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). **Natural Resources Management:** *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)** *Introduction to EIA*: purpose, process, and benefits, Steps in conducting an EIA, Legal and regulatory framework for EIA, Case studies on successful EIA implementations. **Environmental Management Systems (EMS)** *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** *Solid and Hazardous waste management*: Introduction, categories, causes, effects and management of municipal solid waste, Hazardous waste *Disaster Management*: Introduction, types of disasters, Disaster mitigation. Case studies.		4
V	**Social Issues, Environmental Laws and Policies** *Environmental Ethics*: Introduction, Ethical responsibility, issues and possible solutions. *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** 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.
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

<table>
<tr><td colspan="2" align="center">Walchand College of Engineering, Sangli
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<tr><td colspan="2" align="center">AY 2025-26</td></tr>
<tr><td colspan="2" align="center">Course Information</td></tr>
<tr><td>Programm</td><td>B Tech. (All Branches)</td></tr>
<tr><td>Class Semister</td><td>Third Year B.Tech, Sem Viii</td></tr>
<tr><td>Course Code</td><td>7EE301</td></tr>
<tr><td>Course Name</td><td>Engineering economics and Financial management</td></tr>
<tr><td>Desired Requisites</td><td>Basic Knowledge Of Mathematics Economics And Finance</td></tr>
</table>

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 (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 ● Nature, scope and importance of financial management ● Role of finance in engineering and technology organizations ● Goals of financial management: Profit vs. Wealth Maximization ● Financial decision areas: Investment, Financing, Dividend	4
2	Financial Statements and Analysis ● Overview of financial statements: Balance Sheet, Income Statement, Cash Flow Statement ● Interpretation and analysis using key financial ratios: ○ Liquidity ratios ○ Profitability ratios ○ Efficiency ratios ○ Leverage ratios ● DuPont Analysis	4

List of course contents: Open electives

Sr. No	Offering Dept.	Code	Course name	Eligible B.Tech. programs					
				Civil	Mech	Ele	Eln	CSE	IT
1	HS	7OE351	Advanced physics	y	y	y	y	y	y
2	HS	7OE352	Bio-oraganic chemistry	y	y	y	y	y	y
3	HS	7OE353	Biotechnology	y	y	y	y	y	y
4	HS	7OE354	German II*	y	y	y	y	y	y
5	HS	7OE355	Cost accounting for engineering projects	y	y	y	y	y	y
6	HS	7OE356	General Studies II	y	y	y	y	y	y
7	HS	7OE357	Sanskrit**	y	y	y	y	y	y
8	HS	7OE358	Nanotechnology	y	y	y	y	y	y
9	HS	7OE359	IPR and engineering laws	y	y	y	y	y	y
10	HS	7OE360	Development of Life skills	y	y	y	y	y	y
11	CS dept	7OE361	Data Visualization and Dashboard Design	y	y	Y	Y	N	N
12	Mech Dept	7OE362	Operations research	y	N	y	y	y	y
13	Civil dept	7OE363	Project management	N	y	y	y	y	y
14	HS (NPTEL)	7OE364	Design, Technology and Innovation	y	y	y	y	y	y
15	HS (NPTEL)	7OE365	E-Business	y	y	y	y	y	y
16	HS (NPTEL)	7OE366	Advanced Financial Instruments for Sustainable Business and Decentralized Markets	y	y	y	y	y	y
17	HS (NPTEL)	7OE367	Economics of Public Policy	y	y	y	y	y	y
18	HS (NPTEL)	7OE368	Introduction to Commercial Banking and Fintech#	y	y	y	y	y	y

1. Advanced Physics

AY 2025-26 onwards

Course Information	
Programme	B. Tech. (All Branches)
Class, Semester	T. Y. B. Tech., SEM-V/VI
Course Code	7OE351
Course Name	Applied Instrumentation
Desired Requisites:	Students are expected to know the basics of Physics

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

Course Objectives
1. To provide accurate and reliable measurements of physical quantities
2. To gauge the electrical parameters using various devices in measurement system.
3. To gauge the various physical parameter by different transducers and digital appliances.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	**Level**
CO1	Ensure the quality and reliability of measurements in various applications, leading to improved process control, safety, and efficiency.	2	Understanding
CO2	Gain the understanding in using various types of ammeters and voltmeters, including DC, multirange, and RF ammeters, as well as DC, multirange voltmeters and multimeter.	3	Applying
CO3	Develop a comprehensive understanding of different types of transducers, their working principles, and their applications.	2	Understanding
CO4	Gain a broad understanding of the applications and benefits of digital appliances in daily life and industrial settings.	2	Understanding

CO – PO mapping

COs	Programme Outcomes (PO)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	
CO1	1				1							
CO2		2		1								
CO3					2							
CO4											2	

Module	Module Contents	Hours
I	**Qualities of Measurement-1:** Introduction, Performance Characteristics, Static Characteristics, Error in Measurement, Types of Static Errors, Dynamic Characteristics.	6
II	**Qualities of Measurement-2:** Static Analysis, Standards, Electrical Standards, Atomic Frequency and Time Standards, Graphical Representation of Measurement as a Distribution.	6

				Total Hrs : 30
III	**Ammeter:** DC Ammeter, Multirange Ammeter, Aryton/Universal Shunt, Requirement of Shunt, Extending of Ammeter Range, RF Ammeter.			5
IV	**Voltmeter & Multimeter:** DC Voltmeter, Multirange Voltmeter, Extending Voltmeter Range, Multimeter.			5
V	**Transducer:** Introduction, Classification, Transducer Selection, Displacement Transducer, Level Transducer, Temperature Transducer, Speed Measurement, Pressure Transducer.			4
VI	**Digital Appliances:** Digital Thermometer, Digital Watch, Weighing Machine, Washing Machine, Microwave Oven.			4

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Quiz / MCQ Test	Online/offline test consisting of multiple-choice conceptual questions based on Unit 1 and Unit 2.	10	9	3
	2	Assignment / Problem-Solving Task	Individual assignment including numerical problems and short descriptive questions.	10	6	5
MSE	3	Quiz / MCQ Test	Structured MCQ-based evaluation to assess comprehension, conceptual clarity, and application of Units 1–3.	15	9	1-8
	4	Numerical / Application Problems	Written test focusing on analytical and application-oriented questions.	15	9	1-8
ESE	5	Quiz / MCQ Test	Objective test assessing complete syllabus coverage focusing on theoretical and conceptual understanding.	15	6	9
	6	Numerical / Application Problems	Problem-solving questions requiring derivations, numerical solutions, and applications.	15	6	10
	7	**Seminars**	Students will present a topic related to instrumentation. Evaluation based on clarity, technical depth, delivery, and report quality.	20	15	11-15
			Total	**100**	**60 hrs**	

Text Books

1	K. C. Kali and Dr. A.C. Bhagali, "Fundamentals of Electronics and Computer", Mahalaxmi Publication House.
2	Deepa V. Remane *"Computer Instrumentation, Peripherals & their Interfacing"*, Vision Publications

References

1	Prof. Vishwajit K. Barbudhe, "*Electronic Instrumentation & Measurements*" Universe-Win Publication House and Research Services Pvt. Ltd.
2	Late. Ajay V Bakshi, Uday A Bakshi , "*Electronic Measurements and Instrumentation*" Technical Publications.
3	Syed Akhtar Imam, Vibhav Kumar Sachan "*Electronic Measurement and Instrumentation*" TechSar Pvt. Ltd
4	Prof. Vishwajit K. Barbudhe, "*Elements Of Electronics Instrumentation And Measurement*" Notion Press
5	H.S.Kalsi, "*Electronic Instrumentation*" Tata MacGraw Hill Education Pvt. Ltd.

Useful Links	
1	For optics https://nptel.ac.in/courses/122/107/122107035/
2	For Quantum Physics https://nptel.ac.in/courses/122/106/122106034/

2. Bio-organic chemistry

AY 2025-26 onwards	
Course Information	
Programme	B. Tech. (All Branches)
Class, Semester	T. Y. B. Tech., SEM-V/VI
Course Code	7OE352
Course Name	Bio-Organic Chemistry
	Students are expected to know the basics of Organic Chemistry

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

Course Objectives
1. To provide students with a comprehensive understanding of the structure, properties, synthesis, and reactions of organic compounds.
2. To give the Explore the role of bio-organic chemistry in the development of pharmaceuticals.
3. To make the synthetic techniques and mechanisms of bio-organic molecules

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	**Level**
CO1	Explain the principles of Bio-organic chemistry and their relevance to biological systems.	II	Understanding
CO2	Explain properties, and reactions of organic molecules, particularly those relevant to biological processes.	II	Understanding
CO3	Carbohydrate reactions, such as glycosidic bond formation, oxidation-reduction reactions, and the Maillard reaction. describe the various functions of lipids, including energy storage, membrane structure, and signaling.	II	Understanding
CO4	Rational drug design and combinatorial chemistry, Structure-activity relationship (SAR) studies,	III	Applying

Module	Module Contents	Hours
I	**Module: 1. Introduction to Bio-organic Chemistry:** Overview of bioorganic chemistry, Importance and applications in engineering and biology, Fundamentals of organic chemistry relevant to biological systems, Biomolecules: proteins, nucleic acids, carbohydrates, and lipids, Structural biology techniques.	6

	Module: 2. Amino Acids and Proteins: Structure and properties of amino acids, Peptide bond formation and peptide synthesis, Protein structure levels: primary, secondary, tertiary, quaternary, Protein folding and stability, Enzyme structure and function.	
II		6
III	Module: 3. Nucleic Acids and Nucleic Acid Chemistry: Structure and properties of nucleic acids (DNA and RNA), DNA replication, transcription, and translation, RNA processing and modification, Nucleic acid-protein interactions.	5
IV	Module: 4. Carbohydrates and Lipids: Structure and properties of carbohydrates, Carbohydrate metabolism and pathways (glycolysis, glycosylation, etc.), Lipid structure and classification, Lipid metabolism and lipid signalling, Membrane structure and function	5
V	Module: 5. Natural Products: Isolation, Structure, and Synthesis of Penicillin, Taxol (Paciltaxal), Resveratol, Morphine, Quinnine complex compounds and Applications of Natural Products.	4
VI	Module: 6. Bioorganic Chemistry in Drug Design and Development: Drug targets and drug-receptor interactions, Structure-activity relationship (SAR) studies, Rational drug design and combinatorial chemistry, Drug metabolism and pharmacokinetics.	4

Total Hrs : 30

CO – PO mapping

COs	Programme Outcomes (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2								2	
CO2	3	2	1							2	
CO3	3	2	1	1						2	
CO4	3	3	3	2	3					2	2

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Quiz / MCQ Test	Online/offline test consisting of multiple-choice conceptual questions based on Module 1 and Module 2.	10	9	3
	2	Assignment Solving Task	Individual assignment including Drug Design and Development and short descriptive questions.	10	6	5

MSE	3	Quiz / MCQ Test	Structured MCQ-based evaluation to assess comprehension, conceptual clarity, and application of Module 1-3.	15	9	1-8	
	4	Application and Deferent synthesis	Written test focusing on theoretical & application-oriented questions.	15	9	1-8	
ESE	5	Quiz / MCQ Test	Objective test assessing complete syllabus coverage focusing on theoretical and conceptual understanding.	15	6	9	
	6	Application Problems	Writing synthesis questions & applications.	15	6	10	
	7	**Seminars**	Students will present a topic related to the fundamentals of bio-organic chemistry, including biomolecules, natural products, metabolism, structural biology, and drug design principles. Students will present a topic related to Natural Products Evaluation based on clarity, technical depth, delivery, and report quality.	20	15	11-15	
			Total	**100**	**60 hrs**		

Text Books	
1	"Bioorganic Chemistry" by Christopher T. Walsh.
2	"Principles of Biochemistry" by Albert L. Lehninger, David L. Nelson, and Michael M. Cox.
3	"Molecular Biology of the Gene" by James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, and Richard Losick.
4	"Biochemistry" by Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer.
5	"Natural Products: Chemistry and Biological Significance" by J. Mann, R.S. Davidson, J.B. Hobbs, D.V. Banthorpe, and J.B. Harborne.
6	"Drug-like Properties: Concepts, Structure Design and Methods from ADME to Toxicity Optimization" by Li Di.

References	

1	Prof. Vishwajit K. Barbudhe, "*Electronic Instrumentation & Measurements*" Universe-Win Publication House and Research Services Pvt. Ltd.
2	Late. Ajay V Bakshi, Uday A Bakshi , "*Electronic Measurements and Instrumentation*" Technical Publications.
3	Syed Akhtar Imam, Vibhav Kumar Sachan "*Electronic Measurement and Instrumentation*" TechSar Pvt. Ltd
4	Prof. Vishwajit K. Barbudhe, "*Elements Of Electronics Instrumentation And Measurement*" Notion Press
5	H.S.Kalsi, "*Electronic Instrumentation*" Tata MacGraw Hill Education Pvt. Ltd.

Useful Links	
1	For Introduction to Bio-organic Chemistry: https://www.thieme-connect.com/products/ejournals/abstract/10.1055/s-0034-1380264
2	For Amino Acids and Proteins: https://www.khanacademy.org/science/biology/macromolecules/proteins-and-amino acids/a/introduction-to-proteins-and-amino-acids
3	For Nucleic Acids and Nucleic Acid Chemistry : https://www.britannica.com/science/nucleic-acid
4	For Carbohydrates and Lipids: https://booksite.elsevier.com/samplechapters/9780323053716/Chapter%2003.pdf
5	For Natural Products: https://books.google.co.in/books?id=C3la6a_gnKUC&printsec=frontcover&source=gbs_atb#v=onepage&q&f=false
6	For Bioorganic Chemistry in Drug Design and Development: https://www.sciencedirect.com/special-issue/10PDJ9VMS1H

3. Biotechnology

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

AY 2025-26 onwards

Course Information

Programme	B. Tech. (All Branches)
Class, Semester	T. Y. B. Tech., SEM-VI
Course Code	7OE353
Course Name	Biotechnology
Desired Requisites:	

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

Course Objectives

1	To develop a working knowledge of biotechnology principles and their application in solving engineering problems.
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)

CO	Course Outcome Statement/s		Bloom's Taxonomy Level
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

CO – PO mapping

	Programme Outcomes (PO)										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2										1
CO2									2		
CO3							3				
CO4							1	1			1

Module	Module Contents	Hours
I	**INTRODUCTION TO BIOTECHNOLOGY** History and scope of biotechnology, Branches: Red, Green, White, and Blue Biotechnology, Overview of tools and techniques	5
II	**TRENDS IN BIOENGINEERING** 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	5
III	**PRINCIPLES AND PROCESS OF BIOTECHNOLOGY**: Genetic engineering (Recombinant DNA technology). Transgenics. CRISPR-Cas systems and genome editing Synthetic biology: designing new biological parts	5
IV	**BIOPROCESS ENGINEERING** Fermentation technology, Upstream and downstream processing, Bioreactor design and operation	5
V	**Environmental and Industrial Biotechnology** Wastewater treatment, bioremediation, Biosensors and biofuels, Enzyme technology in industry ,Biomimicry and Engineering Applications, Nature-inspired design (biomimicry) Case studies: Velcro, robotics, structural materials Future trends: synthetic biology, tissue engineering	5
VI	**Ethical, Legal, and Social Issues in Biotechnology** Bioethics, biosafety, and intellectual property, Regulatory frameworks (FDA, EMA guidelines), Emerging issues: GMOs, cloning, personalized medicine	5
		Total Hrs : 30

Course Assessment Plan (_for total 60 learning hours_**)**

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Quiz / MCQ Test	Online/offline test consisting of Multiple choice conceptual questions based on Unit 1 and Unit 2.	10	9	3
	2	Assignment / Problem-Solving Task	Individual assignment including any of written communication	10	6	5
MSE	3	Quiz / MCQ Test	Structured MCQ- based evaluation their understanding and conceptual questions	15	9	1-8
	4	Application Problems	Group Discussion/ Debate in German	15	9	1-8
ESE	5	Quiz / MCQ Test	Objective test assessing complete syllabus coverage focusing on theoretical and conceptual understanding.	30	6	9
	6	Numerical / Application Problems	Problem-solving questions logical and Analytical.	10	6	10
	7	Seminars	Students will present on a given topic.	10	15	11-15

		Total	100	60 hrs	

Text Books

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.

Useful Links

1	www.klett-sprachen.de/netzwerk
2	www.cornelsen.de/studio-d

4. German II

<table>
<tr><td colspan="5" align="center">Walchand College of Engineering, Sangli
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<tr><td colspan="5" align="center">Course Information</td></tr>
<tr><td>Programme</td><td colspan="4">B. Tech. (All Branches)</td></tr>
<tr><td>Class, Semester</td><td colspan="4">T. Y. B. Tech., SEM-VI</td></tr>
<tr><td>Course Code</td><td colspan="4">7OE354</td></tr>
<tr><td>Course Name</td><td colspan="4">Advance German Language</td></tr>
<tr><td>Desired Requisites:</td><td colspan="4">Basic German Language level</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">Teaching Scheme</td><td colspan="4" align="center">Examination Scheme (Marks)</td></tr>
<tr><td>Lecture</td><td>2 Hrs/week</td><td>MSE</td><td>ISE</td><td>ESE</td><td>Total</td></tr>
<tr><td>Interaction</td><td>1 Hr /week</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tutorial</td><td>-</td><td>30</td><td>20</td><td>50</td><td>100</td></tr>
<tr><td>Practical</td><td>-</td><td colspan="4" align="center">Credits: 3</td></tr>
</table>

Course Objectives

1. To articulate advance German Language vocabulary by interacting with others.
2. To enable students to communicate effectively in German Language.
3. To demonstrate advance German Language & express themselves fluently.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy Descriptor	Blooms Taxonomy Level
CO1	Ensure the quality and reliability of everyday familiar expression at the satisfaction of the needs of the concrete type and use grammar concept correctly.	2	Understanding
CO2	Execute one self and understand advance communication listening and written communication in language.	3	Applying
CO3	Develop a comprehensive understanding of different situation and debate and interact in a simple way provided other person talks clearly and is prepared to help.	2	Applying
CO4	Assess development in German Language vocabulary and presentation by interacting with others.	2	Understanding

CO – PO mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
						Programme Outcomes (PO)					
CO1	2						1				1
CO2									2		
CO3										3	
CO4							1	1			1

Module	Module Contents	Hours
I	**Module 1: German Language Fundamentals** I. Learning food and eating and order in restaurant	4

		II. Understanding and learning routine activities III. To understand the watch timing IV. Giving information about time V. Preposition and WH questions related to watch timings	
II		**Module 2: Essential vocabulary and phrases** I. Fruits and vegetables shopping list II. Beverages III. Names of colours IV. Rooms of the House V. Gifts ideas of special occasion	6
III		**Module 3: Introduction to Advanced Speaking and Listening Skills** I. Conversation to plan something together II. Speaking about birthday III. To Understand/Write an Invitation	5
IV		**Module 4: German Grammar Advances and Sentence Structure** I. Possessive articles in nominative and akkusative case II. Modalverbs: wollen müssen, können, möchten, mögen, sollen III. Ordinal numbers IV. Simple past tense of haben and sein V. Prepositions in akkusative VI. Prepositions in dative VII. Articles in dative VIII. Separable verbs	5
V		**Module 5: Oral Communication** I. Telling birthdate, birth years II. Congratulate someone III. Making request in hotel IV. Make suggestions about Food and Drinks V. Speak on given topic VI. Asking questions	6
VI		**Module 6: Written Communication** I. Letter writing II. Paragraph writing III. Essay writing IV. Tips for improving and reading/writing skills independently	4
			Total Hrs : 30

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Quiz / MCQ Test	Online/offline test consisting of multiple-choice conceptual questions based on Unit 1 and Unit 2.	10	9	3
	2	Assignment / Problem-Solving Task	Individual assignment including any of written communication	10	6	5

MSE	3	Quiz / MCQ Test	Structured MCQ-based evaluation their understanding and conceptual questions	15	9	1-8
	4	Application Problems	Group Discussion/ Debate in German	15	9	1-8
ESE	5	Quiz / MCQ Test	Objective test assessing complete syllabus coverage focusing on theoretical and conceptual understanding.	30	6	9
	6	Numerical / Application Problems	Problem-solving questions logical and Analytical.	10	6	10
	7	**Seminars**	Students will present on a given topic.	10	15	11-15

		Total	100	60 hrs	

Text Books	
1	Netzwerk neu A 1 (Deutsch als Fremdsprach) Kursbuch : Published by Goyal Publishers and Distributors Private Ltd.
2	Netzwerk neu A 1 (Deutsch als Fremdsprach) Arbeitsbuch : Published by Goyal Publishers And Distributors Private Ltd.

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 und Arbeitsbuch, Klett Langenscheidt, Munich, Germany and GOYAL Publishers Pvt. Ltd., New Delhi, First Indian edition-2015
3	Stefanie Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, Gavin Schalliol"Netzwerk Al-Deutsch alsFremdsprache- Glossar , Klett Langenscheidt, Munich, Germany and GOYAL Publishers Pvt.Ltd., New Delhi, First Indian edition-2015
4	Prof. Vishwajit K. Barbudhe, "*Elements Of Electronics Instrumentation And Measurement*" Notion Press
5	H.S.Kalsi, "*Electronic Instrumentation*" Tata MacGraw Hill Education Pvt. Ltd.

Useful Links	
1	www.klett-sprachen.de/netzwerk
2	www.cornelsen.de/studio-d

5. Cost accounting for engineering projects

<table>
<tr><td colspan="6" align="center">Walchand College of Engineering, Sangli
<i>(Government Aided Autonomous Institute)</i></td></tr>
<tr><td colspan="6" align="center">AY 2025-26 onwards</td></tr>
<tr><td colspan="6" align="center">Course Information</td></tr>
<tr><td>Programme</td><td colspan="5">B. Tech. Engineering</td></tr>
<tr><td>Class, Semester</td><td colspan="5">T.Y. B.Tech. Sem : vi</td></tr>
<tr><td>Course Code</td><td colspan="5">7OE355</td></tr>
<tr><td>Course Name</td><td colspan="5">Cost Accounting for Engineering Projects</td></tr>
<tr><td>Desired Requisites:</td><td colspan="5">Basic knowledge of engineering economics or accounting</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">Teaching Scheme</td><td colspan="4" align="center">Examination Scheme (Marks)</td></tr>
<tr><td>Lecture</td><td>2 Hrs/week</td><td align="center">MSE</td><td align="center">ISE</td><td align="center">ESE</td><td align="center">Total</td></tr>
<tr><td>Interaction</td><td>1 Hr /week</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tutorial</td><td>-</td><td align="center">30</td><td align="center">20</td><td align="center">50</td><td align="center">100</td></tr>
<tr><td>Practical</td><td>-</td><td colspan="4" align="center">Credits: 3</td></tr>
</table>

Course Objectives

To provide foundational knowledge of cost accounting concepts relevant to engineering projects.
To enable students to identify, allocate, and control costs during the life cycle of a project.
To develop practical skills in budgeting, cost estimation, and cost control techniques for engineering applications.

	Description	Blooms Taxonomy Level Descriptor
CO1	Explain the fundamental concepts of cost accounting and its importance in engineering projects.	Understanding
CO2	Classify different types of costs and prepare cost sheets for engineering-related activities	Understanding, Applying
CO3	Analyse cost behaviour and apply cost-volume-profit (CVP) analysis for decision-making in engineering projects.	Applying Analysing,
CO4	Compute standard costs and evaluate variances to control project expenditures effectively	Applying, Evaluating
CO5	Design job costing, process costing, and activity-based costing systems for specific engineering project scenarios.	Applying Creating,

CO – PO mapping

	Programme Outcomes (PO)										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1										
CO2		3									
CO3					2	3					
CO4			3	2							

Module	Module Contents	Hours
I	**Introduction to Cost Accounting** Definition, scope and objectives of cost accounting Cost accounting vs. financial accounting Importance of cost accounting in engineering projects Classification of costs: Direct, Indirect, Fixed, Variable, Semi-variable	4

II	**Elements of Cost** Direct Materials: procurement, inventory control techniques Direct Labor: types, methods of wage payment Overheads: classification, allocation, apportionment and absorption Prime cost, factory cost, cost of production, and total cost		4
III	**Cost Estimation for Engineering Projects** Cost estimation methods for project planning Types of cost estimates (preliminary, detailed, definitive) Factors affecting cost estimation Tools: Quantity take-off, BOQ (Bill of Quantities), Cost Indices		5
IV	**Costing Techniques** Job costing, Batch costing, Contract costing Process costing and Operation costing Activity-Based Costing (ABC) in engineering services Lifecycle costing in large-scale engineering projects		5
V	**Budgeting and Budgetary Control** Types of budgets: fixed, flexible, zero-based Project budgeting process Variance analysis for cost control Performance budgeting and its use in engineering projects		6
VI	**Standard Costing, Variance Analysis, Cost Control and Project Monitoring** Setting cost standards, Material, labour, and overhead variances Interpretation of variances and corrective actions Techniques of cost control: Earned Value Management (EVM) Cost performance index (CPI) and schedule performance index (SPI) Tools: Gantt charts, S-curves, cash flow management Use of software (e.g., MS Project, Primavera) in cost tracking		6
		Total Hrs : 30	

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	week
ISE	1	Quiz / MCQ Test	Online/offline test consisting of multiple-choice conceptual questions based on Unit 1 and Unit 2.	10	9	3
	2	Assignment / Problem-Solving Task	Individual assignment including numerical problems and short descriptive questions.	10	6	5
MSE	3	Quiz / MCQ Test	Structured MCQ-based evaluation to assess comprehension, conceptual clarity, and application of Units 1–3.	15	9	1-8
	4	Numerical / Application Problems	Written test focusing on analytical and application-oriented questions	15	9	1-8
ESE	5	Blog Creation	Personal finance blog	10	6	1-8

	6	Making Business Model Canvas	Step by step process to build business model canvas which will focus on costing element	20	6	9-11		
	7	Seminar	Students will present a topic related to Life cycle costing for selected project. Evaluation based on clarity, technical depth, delivery, and report quality	20	15	12- 15		
			Total	100	60 hrs			

Text Books

1	Cost Accounting: Principles and Practice" by M.N. Arora
2	Cost and Management Accounting" by S.P. Jain and K.L. Narang
3	"Project Management: A Systems Approach to Planning, Scheduling, and Controlling" by Harold Kerzner
4	Engineering project cost estimation manuals (NHAI, CPWD, etc.)

Useful Links

1	**https://www.linkedin.com/pulse/cost-accounting-engineers-miguel-pinilla-iq3qc**
2	**https://pm.umd.edu/course/project-cost-accounting-and-economics/**
3	**https://www.cmu.edu/cee/projects/PMbook/12_Cost_Control%2C_Monitoring%2C_and_Accounting.html**

Walchand College of Engineering, Sangli	
(Government Aided Autonomous Institute)	
AY 2025-26 onwards	
Course Information	
Programme	B. Tech. (All Branches)
Class, Semester	T. Y. B. Tech., SEM-V/VI
Course Code	7OE356
Course Name	General studies II
Desired Requisites:	

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

Course Objectives

1. To develop **comprehension and effective communication skills** for interpersonal and professional contexts
2. To enhance **logical reasoning and analytical thinking** to interpret information and draw valid conclusions.
3. To build **decision-making and problem-solving abilities** to address real-life and engineering-related situations.
4. To strengthen **general mental ability and basic numeracy skills**, including data interpretation using charts, graphs, and tables.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Explain and demonstrate **effective interpersonal communication skills** in academic and professional scenarios.	2	Understanding
CO2	Analyze problems using **logical reasoning and analytical techniques** to identify patterns and relationships.	4	Analysing
CO3	Apply appropriate **decision-making strategies and problem-solving methods** to structured and unstructured problems.	3	Applying
CO4	Interpret and evaluate **numerical data, charts, graphs, and tables** to draw meaningful conclusions.	2	Analyse

CO – PO mapping

COs	Programme Outcomes (PO)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	
CO1	2						1				1	
CO2									2			
CO3										3		
CO4							1	1			1	

Module	Module Contents	Hours
I	Comprehension	5
II	Interpersonal skills including communication skills;	5
III	Logical reasoning and analytical ability	5

IV		Decision-making and problem-solving				5
V		General mental ability				5
VI		Basic numeracy (numbers and their relations, orders of magnitude, etc.), Data interpretation (charts, graphs, tables, data sufficiency etc.)				5
					Total Hrs : 30	

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Quiz / MCQ Test	Online/offline test consisting of multiple-choice conceptual questions based on Unit 1 and Unit 2.	10	9	3
	2	Assignment / Problem-Solving Task	Individual assignment including hypothetical problems and short descriptive questions.	10	6	5
MSE	3	Quiz / MCQ Test	Structured MCQ-based evaluation to assess comprehension, conceptual clarity, and application of Units 1–3.	15	9	1-8
	4	Hypothetical / Application Problems	Group discussion or debate current legal topics.	15	9	1-8
ESE	5	Quiz / MCQ Test	Objective test assessing complete syllabus coverage focusing on theoretical and conceptual understanding.	15	6	9
	6	Hypothetical / case studies /Application Problems	Written test focusing on analytical and application-oriented questions	15	6	10
	7	**Seminars**	Students will present on a given topic	20	15	11-15
	8… …..					
			Total	**100**	**60 hrs**	

Text Books

1	**R.S. Aggarwal** *Quantitative Aptitude* S. Chand Publishing *Covers:* Basic numeracy, arithmetic, data interpretation, logical thinking *Level:* Class X to engineering entry level
2	**Barun K. Mitra** *Personality Development and Soft Skills* Oxford University Press *Covers:* Communication skills, interpersonal skills, general mental ability

References

1	**Lesikar, Flatley & Rentz** *Business Communication: Making Connections in a Digital World* McGraw-Hill
2	**Edgar Thorpe & Showick Thorpe** *The Pearson Guide to Quantitative Aptitude for Competitive Examinations;* Pearson Education

Useful Links

1	https://www.indiabix.com
2	https://nptel.ac.in
3	https://learnenglish.britishcouncil.org

7. Sanskrit

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

AY 2025-26 onwards

Course Information

Programme	B. Tech. (All Branches)
Class, Semester	T. Y. B. Tech., SEM-VI
Course Code	7OE357
Course Name	Sanskrit
Desired Requisites:	Sanskrit till 10th std

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

Course Objectives

1	Students will learn how to determine the etymology of words
2	Students will learn about the ancient Indian educational advancements
3	Students will gain knowledge of the major traditions of Sanskrit literature. They will also learn about the literary styles of individual authors.

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Students should learn to read, write and understand Sanskrit texts, recognize scripts and fonts, and understand the structure of the language.	I	Remember
CO2	Students should learn to read and understand Sanskrit texts, recognize scripts and fonts, and understand the structure of the language.	II	Understanding
CO3	Students should learn the basics of Sanskrit grammar, including rules and examples	III	Apply

CO – PO mapping

	Programme Outcomes (PO)											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
CO1	2						1				1	
CO2									2			
CO3									3			
CO4							1	1			1	

Module	Module Contents	Hours
I	**Module 1. Introduction** a) Sanskrit Alphabets- Devanagari Script b) Rules to identify- words and gender	5
II	**Module 2.** pronouns and verbs	5

		Modules 3. past/ present/future tense- simple tenses	5
III		**Modules 3.** past/ present/future tense- simple tenses	5
IV		**Module 4 :** order and roots	5
V		**Module 5:** a) Sanskrit literature and science b)Technical information for engineers	5
VI		**Module 6:** conversation- simple (Introduction)	5
			Total Hrs : 30

**Course Assessment Plan (*for total 60 learning hours)*

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Quiz / MCQ Test	Online/offline test consisting of multiple-choice conceptual questions based on Unit 1 and Unit 2.	10	9	3
	2	Assignment / Problem- Solving Task	Individual assignment including any of written communication	10	6	5
MSE	3	Quiz / MCQ Test	Structured MCQ- based evaluation their understanding and conceptual questions	15	9	1-8
	4	Application Problems	Group Discussion/ Debate in German	15	9	1-8
ESE	5	Quiz / MCQ Test	Objective test assessing complete syllabus coverage focusing on theoretical and conceptual understanding.	30	6	9
	6	Numerical / Application Problems	Problem-solving questions logical and Analytical.	10	6	10
	7	**Seminars**	Students will present on a given topic.	10	15	11-15

			Total	**100**	**60 hrs**	

Text Books	
1	Teach yourself Sanskrit- Prathama Deeksha- Rashtriya Sanskrit Sansthanam, New Delhi.
2	India's glorious Scientific Tradition- Suresh Soni, Ocean Books (P) ltd, New Delhi
3	Sanskrit Primer by Edward Delavan Perry- Ginn and Company publication, Boston

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, surprise or declared test etc.

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 onwards

Course Information

Programme	B. Tech. Engineering
Class, Semester	T.Y. B.Tech. Sem : vi
Course Code	7OE358
Course Name	Nanotechnology
Desired Requisites:	Basic knowledge of Chemistry at Higher Secondary Level

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

Course Objectives

To provide foundational knowledge of Nanoscience and Technology relevant to engineering projects.
To provide an in-depth understanding of the physical, mechanical, optical, magnetic, and ferroelectric behaviors of nanomaterials, and explore their applications in advanced functional systems and technologies.
To develop practical skills in synthesis of materials at Nanoscale.

	Description	**Blooms Taxonomy Level** Descriptor
CO1	Describe the fundamental concepts, historical evolution, and synthesis approaches (top-down and bottom-up) in nanotechnology.	Understanding
CO2	Analyze thermodynamic and mechanical behaviors of nanomaterials, including grain size effects, Inverse Hall-Petch relationship, and superplasticity	Understanding, Applying
CO3	Evaluate the size-dependent optical, magnetic, and ferroelectric properties of nanomaterials and their implications in advanced technologies.	Applying Analysing,
CO4	Apply knowledge of processing techniques such as Severe Plastic Deformation (SPD) to develop nanocomposites and bulk nanostructured materials for real-world applications	Applying, Evaluating

CO – PO mapping

COs	Programme Outcomes (PO)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	1										
CO2		3									
CO3				2	3						
CO4			3	2							

Module	Module Contents	Hours

I	**Introduction to Nanotechnology and Nanomaterials** Definition and scope of nanotechnology, Historical development and milestones in nanoscience, Types and classification of nanomaterials, Dimensional classification (0D, 1D, 2D, 3D nanostructures), Top-down and bottom-up approaches to synthesis, Thermodynamic considerations in nanoscale systems- Surface energy and surface-to-volume ratio, Gibbs-Thomson effect, Role of thermodynamics in nanoparticle stability and synthesis.	4	
II	**Mechanical Properties at the Nanoscale** Inverse Hall-Petch relationship: Grain size dependence of strength, Mechanism and implications of grain boundary sliding, Superplasticity in nanomaterials: Criteria and conditions for superplastic behavior, Applications and limitations, Comparison with conventional materials.	4	
III	**Optical Effects of Nanomaterials** Size-dependent optical properties, Surface Plasmon Resonance (SPR), Quantum confinement effects in semiconductors, UV-Vis, photoluminescence, and other spectroscopic techniques for nanomaterials, Applications in sensors, imaging, and photonics	5	
IV	**Magnetic and Ferroelectric Effects at Nanoscale** Magnetic effects in nanomaterials: Super-paramagnetism, Magnetic anisotropy and size effects. Applications in data storage and biomedical fields Ferroelectric effects at nanoscale: Size-dependent ferroelectric behavior, Polarization switching and domain structure changes, Applications in Nanoelectronics and memory devices	5	
V	**Processing Techniques – Severe Plastic Deformation (SPD)** Introduction to SPD techniques: Equal Channel Angular Pressing (ECAP), High Pressure Torsion (HPT), Accumulative Roll Bonding (ARB), Role of SPD in grain refinement, Microstructural evolution during SPD, Applications in producing bulk nanostructured materials	6	
VI	**Nanocomposites and Bulk Nanostructured Materials** Definition, types, and synthesis of nanocomposites, Properties and advantages of nanocomposites over conventional materials, Fabrication methods: In-situ and ex-situ approaches, Bulk nanostructured materials: Production methods, Mechanical and functional properties, Structural and functional applications (e.g., aerospace, automotive, coatings)	6	
		Total Hrs : 30	

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	week
ISE	**1**	Quiz / MCQ Test	Online/offline test consisting of multiple-choice conceptual questions based on Unit 1 and Unit 2.	**10**	**9**	**3**
	2	Assignment / Problem-Solving Task	Individual assignment including numerical problems and short descriptive questions.	**10**	**6**	**5**

MSE	3	Quiz / MCQ Test	Structured MCQ-based evaluation to assess comprehension, conceptual clarity, and application of Units 1–3.	15	9	1-8
	4	Numerical / Application Problems	Written test focusing on analytical and application-oriented questions	15	9	1-8
ESE	5	Blog Creation	Nanomaterial Synthesis	10	6	1-8
	6	Characterization	Characterization of Materials at Nanoscale	20	6	9-11
	7	Seminar	Students will present a topic related to Life cycle costing for selected project. Evaluation based on clarity, technical depth, delivery, and report quality	20	15	12- 15
			Total	**100**	**60 hrs**	

Text Books

1	**Charles P. Poole Jr. and Frank J. Owens**, *"Introduction to Nanotechnology"*, Wiley-Interscience, 1st Edition, 2003.
2	**Guozhong Cao and Ying Wang**, *"Nanostructures and Nanomaterials: Synthesis, Properties and Applications"*, World Scientific Publishing, 2nd Edition, 2011.
3	**C.N.R. Rao, A. Müller and A.K. Cheetham (Eds.)**, *"The Chemistry of Nanomaterials: Synthesis, Properties and Applications"*, Wiley-VCH, 1st Edition, 2004.
4	Mark Ratner and Daniel Ratner, *"Nanotechnology: A Gentle Introduction to the Next Big Idea"*, Pearson Education, 1st Edition, 2003.

Useful Links

1	https://www.coursera.org/learn/nanotechnology
2	https://www.sciencedirect.com/journal/nanotechnology
3	https://www.youtube.com/playlist?list=PLLy_2iUCG87CQhELCytH3xEwlHRXDLVG2
4	https://nanohub.org/resources

9. IPR and engineering laws

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

AY 2025-26 onwards

Course Information	
Programme	B. Tech. (All Branches)
Class, Semester	T. Y. B. Tech., SEM-V/VI
Course Code	7OE359
Course Name	IPR and Engineering Laws
Desired Requisites:	Students are expected to know the basics of laws useful in the Engineering carrier and protection of their innovations.

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

Course Objectives

1. To enable students to identify , understand and apply basic concepts of intellectual property rights for protecting innovation and creative work.
2. To help students understand, interpret and apply fundamental laws and legal responsibilities related to engineering practice.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Identify different forms of intellectual property and their significance	2	Understanding
CO2	Explain procedure for registration and protection of IPR and apply IPR concepts to protect innovations and creative work.	3	Applying
CO3	Understand fundamental laws applicable to engineering profession and legal principles to engineering and industrial situation.	2	Understanding
CO4	Analyse ethical and legal responsibilities of engineers in society.	2	Analyse

CO – PO mapping

COs	Programme Outcomes (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2						1				1
CO2									2		
CO3									3		
CO4							1	1			1

Module	Module Contents	Hours
I	**Introduction to Intellectual property :** Introduction to Intellectual Property Concept and Need for IPR, Evolution and Importance of IPR in Technology Development, Types of IP: Patents, Copyrights, Trademarks, Industrial Designs.	6

II	**Intellectual Property Rights (IPR) for Engineers** - Patent, copyright, trademark, industrial design, trade secrets. Patent filing procedures and the role of Patent Office. IPR in AI, software, and technology transfer. Open-source licensing and ethical innovation.		6
III	**Introduction to Legal Framework for Engineers-** Nature, scope, and role of law in engineering and technology Sources of Indian law: ethical duties of engineers Engineers as "professionals" under law		5
IV	**Cyber, Data Protection, and Technology Laws** – Information Technology Act, 2000 and amendments. Digital Personal Data Protection Act, 2023 – compliance obligations. Cyber security standards (CERT-In Guidelines 2022). Cybercrime, data theft, and liability of engineers in digital systems.		5
V	**Consumer Protection and Product Liability Laws** - Consumer Protection Act, 2019 – consumer rights and product liability Role of engineers in quality control and service delivery Product safety, warranty, and accountability for defects		4
VI	**Labour and Industrial Laws** – Overview: Labour Codes 2020 – modernization of Indian labour law. Industrial Relations Code, 2020 and Industrial Disputes Act, 1947 – strikes, lockouts, retrenchment. Factories Act, 1948 / OSH Code, 2020 – health, safety, and welfare in engineering workplaces. Wages, Gratuity, and Bonus Acts – compliance and employee benefits		4
		Total Hrs : 30	

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Quiz / MCQ Test	Online/offline test consisting of multiple-choice conceptual questions based on Unit 1 and Unit 2.	10	9	3
	2	Assignment / Problem-Solving Task	Individual assignment including hypothetical problems and short descriptive questions.	10	6	5

MSE	3	Quiz / MCQ Test	Structured MCQ-based evaluation to assess comprehension, conceptual clarity, and application of Units 1–3.	15	9	1-8
	4	Hypothetical / Application Problems	Group discussion or debate current legal topics.	15	9	1-8
ESE	5	Quiz / MCQ Test	Objective test assessing complete syllabus coverage focusing on theoretical and conceptual understanding.	15	6	9
	6	Hypothetical / case studies /Application Problems	Written test focusing on analytical and application-oriented questions	15	6	10
	7	**Seminars**	Students will present on a given topic	20	15	11-15
	8……..					
			Total	**100**	**60 hrs**	

Text Books	
1	P.M. Rao & H.S. Ramakrishna – Laws Relating to Engineering Profession
2	S.C. Srivastava – Industrial Relations and Labour Laws

References	
1	M.S. Ramaiah College Publication, Laws for Engineers: Professional and Ethical Perspectives, 2022 Edition
2	NPTEL Course: Intellectual Property Rights and Management – IIT Kharagpur.

Useful Links	
1	https://ipindia.gov.in – National IPR Portal
2	https://labour.gov.in – Ministry of Labour & Employment

10. Development of Life Skills

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 and VI
Course Code	7OE360
Course Name	Development of Life Skills
Desired Requisites:	Basic proficiency in English communication and problem-solving

Teaching Scheme		Examination Scheme (Marks)			
Lecture	02 Hrs/week	MSE	ISE	ESE	Total
Interaction	01 Hr/week	30	20	50	100
		Credits: 03			

Course Objectives	
1	To equip students with essential life skills such as communication, teamwork, and problem-solving for personal and professional growth.
2	To foster emotional intelligence, resilience, and adaptability in diverse environments.
3	To develop critical thinking and decision-making abilities for real-world challenges.
4	To promote ethical awareness and social responsibility in personal and professional contexts.

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	Demonstrate effective communication and interpersonal skills.	III	Applying
CO2	Apply problem-solving and decision-making techniques in real-life scenarios.	III	Applying
CO3	Analyse and manage emotions and stress in personal and professional settings..	IV	Analysing
CO4	Collaborate in teams to achieve common goals with ethical considerations	III	Applying

Module	Module Contents	Hours
I	**Communication and Interpersonal Skills** Verbal and non-verbal communication. Active listening and feedback. Conflict resolution and negotiation skills. .	5
II	**Emotional Intelligence and Resilience** Understanding emotions, empathy, and self-awareness in high-pressure engineering environments. Techniques for stress management: mindfulness, time management, and work-life balance. Building resilience to adapt to technological disruptions and project setbacks.	5
III	**Critical Thinking and Problem-Solving** Logical reasoning and creative problem-solving for engineering challenges. Decision-making models: SWOT analysis, cost-benefit analysis, and risk assessment. Application of root cause analysis and design thinking in technical projects.	5
IV	**Teamwork and Leadership** Team dynamics in multidisciplinary engineering teams. Leadership styles: transformational, situational, and agile leadership. Collaborative tools: Trello, Jira, and Microsoft Teams.	5

V	**Ethics and Social Responsibility** Ethical dilemmas in engineering: intellectual property, safety standards, and environmental impact. Social accountability in engineering projects: community engagement and stakeholder analysis.	5	
VI	**Career Readiness and Professional Development** Resume writing, interview skills, and workplace etiquettes. Networking, personal branding, and lifelong learning strategies.	5	

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.	Assessment Type	Brief Description	Marks	Notional Learning Hours	Weeks	Category
1	Quiz / MCQ Test	Conceptual quiz on Modules I & II	10	6	3	ISE
2	Assignment	Individual assignment on communication & EI	10	6	5	ISE
3	Case Study Analysis	Real-life problem-solving case	10	6	7	ISE
4	Mid-Sem Exam	Written exam on Modules I–III	30	15	8	MSE
5	Group Presentation	Team presentation on ethics/leadership	20	12	11–12	ESE
6	End-Sem Exam	Oral Examination (Modules I–VI)	20	15	15	ESE
Total			100	60		

Textbooks	
1	Daniel Goleman, Emotional Intelligence: Why It Can Matter More Than IQ, Bantam, 2005.
2	Stephen R. Covey, The 7 Habits of Highly Effective People, Simon & Schuster, 1989.
3	Dale Carnegie, How to Win Friends and Influence People, Simon & Schuster, 1936.

References	
1	Carol S. Dweck, Mindset: The New Psychology of Success, Random House, 2006.
2	John C. Maxwell, The 21 Irrefutable Laws of Leadership, Thomas Nelson, 2007.
3	Mihaly Csikszentmihalyi, Flow: The Psychology of Optimal Experience, Harper, 1990.

Useful Links	
1	https://youtu.be/iCvmsMzlF7o?si=C33IiiZy1yntOPv4
2	https://youtu.be/eIho2S0ZahI?si=-7u8IX8w6uxuhr9Z

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		2		
CO3								2		2				
CO4									2	2				

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

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

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

AY 2025-26 onwards

Course Information

Programme	B. Tech. Computer Science and Engineering
Class, Semester	Third Year B.Tech. Sem :VI
Course Code	7OE361
Course Name	Open Elective 1: Data visualization and Dashboard design
Desired Requisites:	Basic knowledge of Mathematics

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

Course Objectives

1. To grasp the definition, goals, and significance of data visualization, and recognize its importance in effective decision-making.
2. To create and interpret basic visualizations for univariate, bivariate and multivariate data analysis, including different charts.
3. To learn dashboard design, including the use of KPIs, charts, and interactive features using Power BI.
4. To analyze real-world data sets in different sectors (e.g., sales, healthcare, HR) and develop case study-based dashboards that solve domain-specific problems.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy Descriptor	Level
CO1	describe and compare different types of data and various data visualization tools.	II	Understand
CO2	apply data cleaning techniques and demonstrate the use of appropriate visual encodings to represent different types of data.	III	Apply
CO3	analyze datasets and select appropriate visualization techniques based on the data type.	IV	Analyze
CO4	select and justify the most suitable visualization tools and dashboard components to meet user requirements and design goals.	V	Evaluate
CO5	design and implement interactive dashboards and visualizations for real-time data using appropriate tools, ensuring effective user engagement and decision-making.	VI	Create

CO – PO mapping

COs	Programme Outcomes (PO)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	2										
CO2		2									
CO3			2	2							
CO4			2		2			2			2
CO5			2		3			2	2	2	2

Module	Module Contents	Hours

I	**Introduction to data visualization** Definition, goals, and significance of data visualization, Importance of visual communication in decision-making, Types of data (Numerical, Categorical, etc.), Common use cases and applications, Overview of visualization tools: Power BI, Tableau, Excel, Comparison of features and use cases	5
II	**Data Cleaning and visual encodings** Data Cleaning Techniques: Handling missing data, outliers, and inconsistencies. Data encodings, Retinal variables, Mapping variables to encodings, visual encodings.	5
III	**Basic Visualizations** Univariate and Bivariate Analysis: Exploring individual variables and relationships between them. Bar Chart, stacked bar chart, Line Chart, Histogram, Pie chart, Frequency Polygon, Box plot, Scatter plot, Regression curves and other visualizations to analyze data distributions.	6
IV	**Advanced Visualizations** Heat maps, Treemaps, Sunburst Charts, 3D plots, and real-time data feeds, etc., Custom visuals and integrating them into Power BI	5
V	**Dashboard design** What is dashboard, types, Core components of a dashboard: KPIs, charts, controls, layout, Dashboard design principles, best practices, Adding interactivity with slicers, filters, and bookmarks. Examples, Dashboard designing using Power BI.	5
VI	**Real-world applications and case studies** Sales Trend Analysis, Education Sector Analysis, Healthcare Operations Dashboard, HR Analytics Dashboard, Academic Performance Tracker etc.	4
		Total Hrs : 30	

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Quiz	MCQ on concepts discussed	10	5	3
	2	Design of Experiment	Identifying suitable problem in respective domain and selecting appropriate data	10	10	4
MSE	3	Oral/Viva		10	5	5
	4	Digital Poster Making using tools	Preparation of charts and identifying relationship based on given data	10	5	6
	5	Assignment	Problems related to studied concepts	10	10	7
ESE	5	Critical problem method	Analytical questions based on real time scenario	20	5	11
	6	Mini Project	Creation of dashboards for assigned problem.	20	15	12
	7	Seminar/Presentation	Presentation on created dashboard	10	5	13
			Total	**100**	**60 hrs**	

Text Books

1	"Data Visualization: A Practical Introduction", Kieran Healy, Princeton University Press 2018
2	"The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios", Steve Wexler, Jeffrey Shaffer, Andy Cotgreave ,Wiley 2017

References

1	Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures, Claus O. Wilke, O'Reilly, 2019
2	Data Science for Business Intelligence: Visualizations, Dashboards, and Reporting Tools, Galit Shmueli, Peter C. Bruce, Nitin R. Patel, Wiley, 2020

	Useful Links
1	https://learn.microsoft.com/en-us/power-bi/fundamentals/
2	https://learn.microsoft.com/en-us/power-bi/create-reports/

Walchand College of Engineering, Sangli	
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AY 2025-26 onwards	
Course Information	
Programme	B. Tech. Engineering
Class, Semester	T.Y. B.Tech. Sem : VI
Course Code	7OE362
Course Name	Open Elective: Operations Research
Desired Requisites:	

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

Course Objectives

1. To enable the students to formulate and solve linear programming problems.
2. To prepare the students to use mathematical models for solving optimization problems.
3. To train the students to analyze real-world problems in view of finding optimal solutions

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	**Level**
CO1	Summarize objectives, constraints and variables in O.R. models	Understand	II
CO2	Solve linear programming problems	Apply	III
CO3	Formulate mathematical models for real life cases.	Analyse	IV
CO4	Select models for optimization under different constraints.	Evaluate	V

CO – PO mapping

COs	Programme Outcomes (PO)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	
CO1	2	2		2								
CO2	3			3							2	
CO3		3		3	1						2	
CO4			2	2	1						2	

Module	Module Contents	Hours
I	**Linear programming problem** History and development of OR, applications, modelling in operation research, O.R. models and their applications. Formulation of linear programming problem, Graphical solution to solve LPP, Simplex procedure for maximization and minimization.	7
II	**Transportation models** Mathematical formulation, methods to obtain initial basic feasible solution, conditions for testing optimality, MODI method for testing optimality solution of balanced and unbalanced problems, degeneracy and its resolution.	5
III	**Assignment models** Mathematical formulation, balanced and unbalanced assignment problems, maximization problems, assignment with restrictions, traveling salesman problem.	4

		Decision theory		4
IV		Introduction, Pay off table, Opportunity loss or regret table, Decisions under uncertainty, Laplace Criterion, Maximin or minimax principle, Hurcuilicz principle, Decisions under risk – maximum likelihood criteria, Expectation principle, Expected opportunity loss or expected regret, decision trees.		4
V		**Game theory** Introduction, minimax and maximin principle, solution of zero sum two persons games, saddle point, algebraic method, dominance properties, graphical method.		4
VI		**Queuing and Replacement models** Queuing model: Introduction, Queuing system, Terminology, Kendall's notation classification of queuing models, Model I (M/ M/ I) : (00/fcfs). Replacement model: for items whose maintenance cost increases with time (money value constant) and with change in money value, replacement of items that fail suddenly, individual and group replacement policies.		6
			Total Hrs : 30	

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Assignments	Two assignments on Module 1, 2 and 3	10	6	A1: Wk 2 A2: Wk 4
	2	Assignments	Two assignments on Module 4, 5 and 6	10	6	A3: Wk 9 A4: Wk 11
MSE	3	Test	Based on Module 1, 2 and 3	20	12	Wk- 6
	4	Critical problems	Based on Module 1, 2 and 3	10	6	Wk- 5
ESE	5	Case Study	On Module 1, 2 and 3	10	6	Wk- 14
	6	Class Test	Module 4, 5 and 6	40	24	Wk- 16
			Total	**100**	**60 hrs**	

Text Books

1	Hira D.S. and Premkumar Gupta, "Operation Research", S. Chand and Co. Ltd., 7e, Edition, 2021
2	Sharma J.K., "Operations Research: Theory and Applications", Trinity Press, New Delhi, 6e, 2016
3	Sharma S. D., "Operation Research", Kedarnath and Rannath & Co, 4e, 2012

References

1	R. Panneerselvam, "Operations Research", Prentice Hall India Pvt. Ltd.,3e, 2023
2	Vohra N.D., "Quantitative Techniques in Management", McGraw Hill, 6e, 2021
3	F.S.Hillier, "Introduction to operations Research", McGraw Hill Education, 10e, 2017

Useful Links

1	https://www.youtube.com/watch?v=a2QgdDk4Xjw
2	https://youtu.be/-cLsEHP0qt0?si=USXpBHTlT3DgiuH0
3	https://youtu.be/Tm2HhqMu5Jg?feature=shared

| 4 | https://youtu.be/EjefXOqv6WU?si=iH2c0C2e3mtKyqYm |

13. Project management

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

AY 2025-26 onwards

Course Information

Programme	B. Tech. Engineering
Class, Semester	T.Y. B.Tech. Sem : VI
Course Code	7OE363
Course Name	Project Management
Desired Requisites:	

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

Course Objectives

Provide students with a solid foundation in project management theories, tools, and techniques, with a focus on their relevance to civil engineering applications.
Enable students to apply project management methodologies to real-world civil engineering scenarios, fostering critical thinking and problem-solving skills.
Equip students with essential project communication, leadership, and teamwork skills necessary for their future roles as effective civil engineering professionals.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Apply the skills to develop project plans, schedules, and budgets, and apply critical methods for managing project uncertainties.	Applying	III
CO2	Develop project plans incorporating work breakdown structures (WBS), Gantt charts, and critical path analysis for civil engineering projects, ensuring effective resource allocation and time management.	Creating	VI
CO3	Apply project monitoring and control methods to track progress, identify deviations, and implement corrective actions to ensure successful project delivery.	Applying	III

CO – PO mapping

	Programme Outcomes (PO)										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1			3		1						1
CO2			3								
CO3							3				2

Module	Module Contents	Hours
I	**Introduction to Project Management** Definition and importance of project management in civil engineering. Project life cycle and phases. Key project stakeholders and their roles. Overview of project management processes and knowledge areas.	5
II	**Project Initiation and Planning** Project selection and feasibility analysis. Defining project scope, objectives, and deliverables. Work breakdown structure (WBS) and its development. Creating a project schedule using Gantt charts and network diagrams.	6
III	**Project Scheduling** Critical Path Method (CPM) and its application. Resource allocation and levelling. Schedule compression techniques. Introduction to project management software tools.	6
IV	**Project Budgeting and Cost Management** Cost estimation techniques: top-down vs. bottom-up. Budget development and monitoring. Earned Value Management (EVM) principles. Cost control and variance analysis.	5
V	**Project Communication and Team Management** Importance of effective communication in project success. Developing a communication plan. Leadership and team dynamics. Conflict resolution and motivation in project teams.	4
VI	**Project Closure and Lessons Learned** Project handover and closeout procedures. Conducting post-project reviews and lessons learned sessions. Documentation and archiving.	4
	Total Hrs : 30	

Course Assessment Plan (*for total 60 learning hours*)

Assessment No.		Formative Assessment type	Brief Description	Marks	Notional Learning hours	Week
ISE	1	Assignments	Assignments on Individual Modules	10	09 hrs	3
	2	Quiz/ MCQ Test	Online/ offline test based on Modules covered	10	05 hrs	10
MSE	3	Critical Problem Solving	Written test focussing on analytical applications of the various points	15	09 hrs	1-7
	4	Technical blog writing/ Literature review	On the basis of points covered, students are expected to write a technical blog/ review relevant literature and present the review.	15	09 hrs	6-7
ESE	5	Seminar and Report/ Case Study Report	Students have to present the topic with details, research papers, study materials, etc. with report/ Students have to undergo case study to the relevant topic and report	15	06 hrs	9-10
	6	Preparing and Presenting Portfolio followed by Group Discussion	Students have to prepare their key responsibility area or portfolio as an official for a project and discuss role and responsibilities	15	09 hrs	10-11
	7	Developing Project Plan from Initial to Final stage	Students have to consider a project and prepare as far as possible detailed and implementable plan for proper execution of the project.	20	13 hrs	12-13
			Total	**100**	**60 hrs**	

Text Books

1	Kumar NeerajZha, "Construction Project Management", Pearson India Education, 1st edition,2011
2	Chitkara K K, "Construction Project Management: Planning, Scheduling and Controlling‖, Tata McGraw - Hill Education, 2nd edition, 2010
3	Seetharaman S., "Construction Project Management: Planning, Scheduling, and Control", Tata McGraw - Hill Education,1st edition, 2014

References

1	Jha, Sinha, and Sinha "Construction Project Management: Theory and Practice'' Himalaya Publishing House, 2nd Edition 2019
2	P K Joy, Handbook of Construction Management, Macmillan India Limited,2nd edition(2000)
3	Barrie D.S. & Paulson B C, "Professional Construction Management", McGraw Hill

Useful Links	
1	https://nptel.ac.in/courses/110107430
2	https://nptel.ac.in/courses/110107081

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