Marathwada Shikshan Prasarak Mandal's
DEOGIRI INSTITUTE OF ENGINEERING AND MANAGEMENT STUDIES
(An Autonomous Institute)
Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad | B.Tech. | M.Tech.
Affiliated to Dr. Babasaheb Ambedkar Marathwada University, CSN | MBA
Approved by AICTE/UGC-Govt. of India & DTE-Govt. of Maharashtra
Deogiri College Campus, Railway Station Road, Chhatrapati Sambhajinagar- 431 005 (M.S.)
DTE CODE : 2114 0240-2367567, 2367577 www.dietms.org director@dietms.org

Department of Mechanical Engineering
B.TECH. PROGRAM STRUCTURE (2025-29)

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	08	07	--	--	--	--	--	--	15
Engineering Science Course		08	07	--	--	--	--	--	--	15
Program Core Course (PCC)	Program Courses	--	02	10	10	10	10	12	--	54
Program Elective Course (PEC)		--	--	--	--	04	06	04	06	20
Vocational Courses (Industrial Collaboration Course)	Skill Courses	--	--	--	--	--	--	02	--	10
Skill Enhancement Course (Professional Development)		01	01	01	01	02	02	--	--	
Ability Enhancement Course (AEC -01, AEC-02) (Ex. Modern Indian Languages)	Humanities Social Science and Management (HSSM)	02	--	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--	--	02	02	--	--	--	--	04
Indian Knowledge System (IKS)		--	02	--	--	--	--	--	--	02
Value Education Course (VEC) (Ex. UHV-II, Environmental Courses)		--	--	02	02	--	--	--	--	04
Constitution of India		--	--	--	AU	--	--	--	--	AU
Do It Yourself (DIY)	Experiential Learning Courses	AU	AU	01	01	01	01	01	--	05
Problem/Project Based Learning (PBL)		01	01	01	01	01	01	01	--	07
Internship/On Job Training (OJT)		--	--	--	--	--	--	--	12	12
Co-curricular Courses (CC) (NSS / YOGA/ Health & Wellness)	Liberal Learning Courses	01	01	--	--	--	--	--	--	02

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Open Elective (OE)		--	--	04	02	02	--	--	--	08
Total Credits (Major)		**21**	**21**	**21**	**21**	**20**	**20**	**20**	**18**	**162**
Multidisciplinary Minor (MDM)	Multidisciplinary Courses	--	--	02	02	04	02	04	--	**14**
• **(B.E./ B.Tech. or Equivalent) in Engineering/ Technology with Multidisciplinary Minor** • **Major + MDM = 162+14 = 176 Credits**										**176**
Honors and Multidisciplinary Minor		--	--	02	04	04	04	04	--	**18**
• **4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engineering/ Technology - Honors and Multidisciplinary Minor** • **Major + Honors + MDM = 162+18+14 = 194 Credits** • Students with minimum **CGPA of 7.5** without backlog courses at the end of Second semester and should have earned **42 credits** are eligible for admission to the UG Bachelor's Degree with Honors.										**194**
Honors with Research and Multidisciplinary Minor		--	--	--	--	--	--	08	10	**18**
• **4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engineering/ Technology - Honors with Research and Multidisciplinary Minor** • **Major + Research MDM = 162+18+14 = 194 Credits** • Students with minimum **CGPA of 7.5** without backlog courses at the end of Sixth semester and should have earned **124 credits** are eligible for admission to the UG Bachelor's Degree with Research.										**194**
Double Minors (Multidisciplinary and Specialization Minors)		--	--	02	04	04	04	04	--	**18**
• **4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engineering/ Technology - Major Engineering Discipline with Double Minors (Multidisciplinary and Specialization Minors)** • **Major + MDM + Specialized Minor= 162+14+18 = 194 Credits** • Students with minimum **CGPA of 7.5** without backlog courses at the end of Second semester and should have earned **42 credits** are eligible for admission to the UG Bachelor's Degree with Double Minor.										**194**

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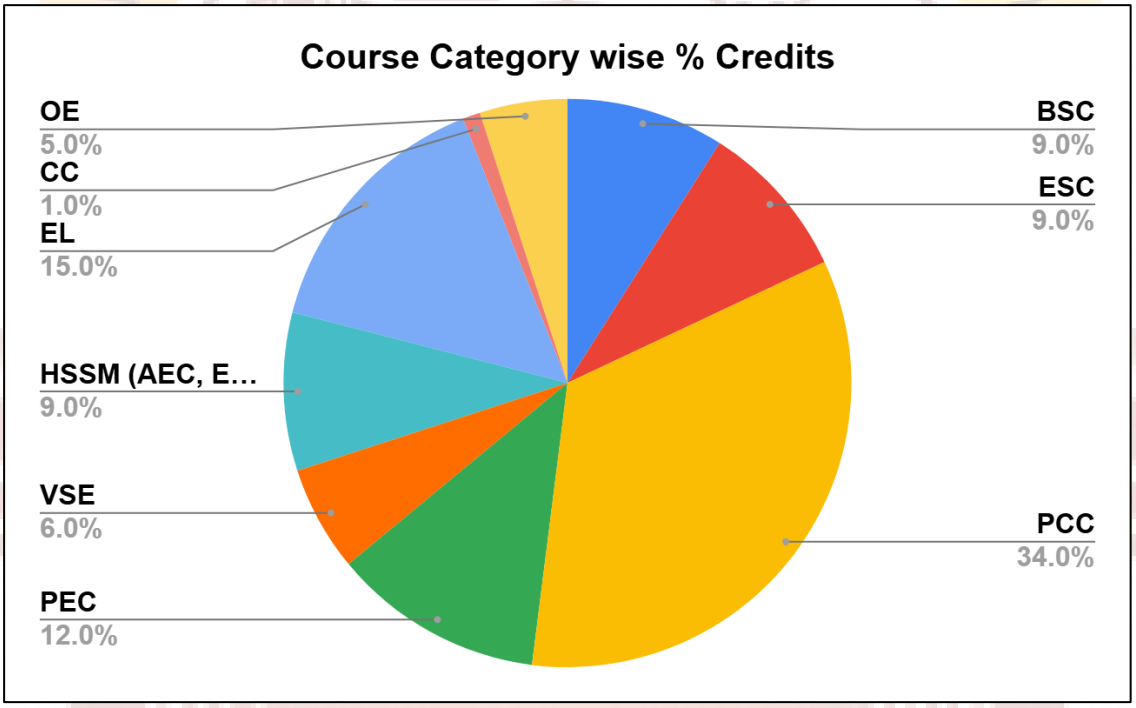
B.Tech. in Mechanical Engineering		
Course Category	**Credits**	**% Credits**
Basic Science **(BSC)**	15	9%
Engineering Science **(ESC)**	15	9%
Program Core Courses **(PCC)**	54	34%
Program Elective Courses **(PEC)**	20	12%
Vocational & Skill Enhancement **(VSE)**	10	6%
Humanity, Social Science & Management (AEC, EM, IKS, VEC) **HSSM**	14	9%
Experiential Learning **(EL)**	24	15%
Co-Curriculum Courses **(CC)**	02	1%
Open Electives **(OE)**	08	5%
Total Credits	**162**	



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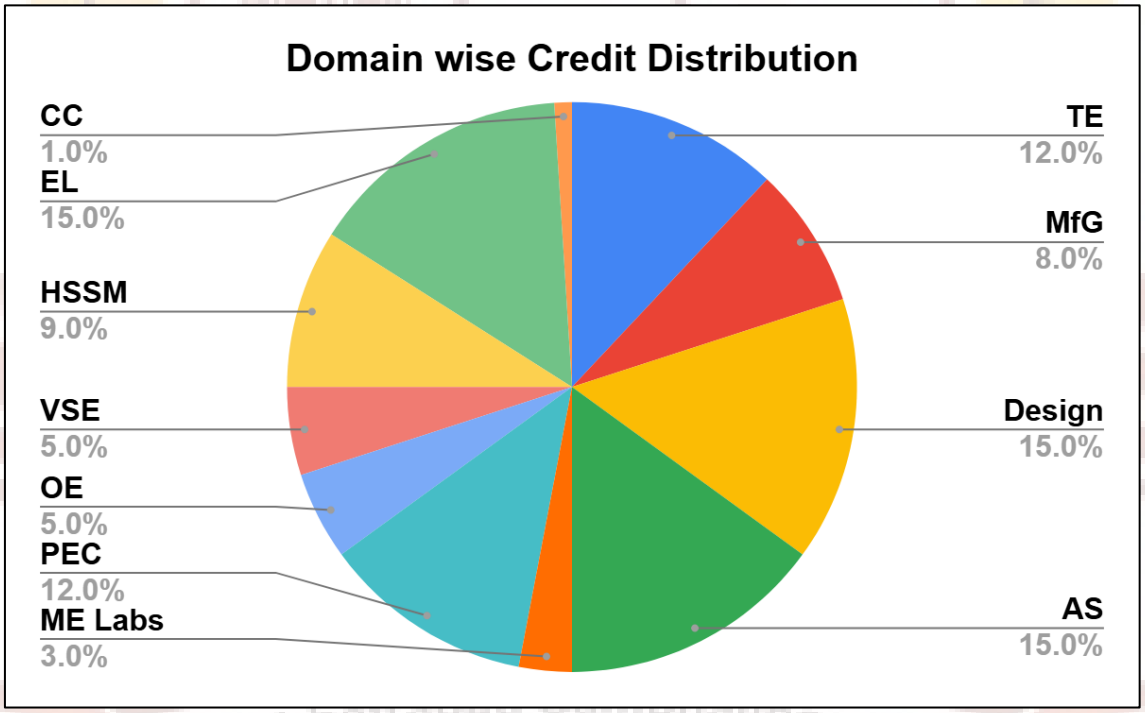
B.Tech. in Mechanical Engineering		
Domain	**Credits**	**% Credits**
Thermal and Heat Power Engineering (**TE**)	20	12
Manufacturing Engineering (**MfG**)	13	08
Design Engineering (**Design)**	25	15
Allied Science (**AS)**	24	15
Mechanical Engineering Labs (**ME Labs)**	04	03
Program Elective Courses (**PEC**)	20	12
Open Electives (**OE)**	08	05
Vocational & Skill Enhancement (**VSE**)	08	05
Humanity, Social Science & Management (AEC, EM, IKS, VEC) **HSSM**	14	09
Experiential Learning (**EL**)	24	15
Co-Curriculum Courses (**CC**)	02	01
Total Credits	**162**	



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SEMESTER I													
Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	PR	Total	CA-I	CA-II	MSE	ESE	Total	
BSC	NT251001	BSH	Linear Algebra and Calculus	3	1		4	10	10	20	60	100	4
BSC	NT251002	BSH	Applied Science II	3			3	10	10	20	60	100	3
ESC	GE251101	ME	Engineering Graphics	3			3	10	10	20	60	100	3
ESC	NT251102	CS	Programming for Problem Solving	3			3	10	10	20	60	100	3
AEC	GE251701	BSH	Modern Indian Language I	2			2	10	10	20	60	100	2
BSC	NT251003	BSH	Applied Science II Lab			2	2	15	15		20	50	1
ESC	GE251103	ME	Engineering Graphics Lab			2	2	15	15		20	50	1
ESC	NT251104	CS	Programming for Problem Solving Lab			2	2	15	15		20	50	1
CC	GE251901	BSH	NSS			2	2	25	25			50	1
EL	GE251801	-	PBL: Design Thinking Lab			2	2	15	15		20	50	1
VSE	GE251601	-	Professional Development I			2	2	15	15		20	50	1
Total				**14**	**1**	**14**	**29**					**800**	**21**
EL	*GE251802*	*ME/CE*	*Do It Yourself I*			*2*	*2*	*25*	*25*			*50*	*AU*

SEMESTER II													
Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	PR	Total	CA-I	CA-II	MSE	ESE	Total	
BSC	NT252004	BSH	Multivariable Calculus	3			3	10	10	20	60	100	3
BSC	NT252005	BSH	Applied Science I	3			3	10	10	20	60	100	3
ESC	GE252102	ET	Basic Electronics and Electrical Engineering	3			3	10	10	20	60	100	3
ESC	NT252105	CE	Engineering Mechanics	3			3	10	10	20	60	100	3
PCC	NT252201	ME/CE	Applied Engineering	2			2	10	10	20	60	100	2
IKS	GE252702	BSH	Indian Knowledge System	2			2	10	10	20	60	100	2
BSC	NT252006	BSH	Applied Science I Lab			2	2	15	15		20	50	1
ESC	NT252106	ME	Workshop Practices			2	2	15	15		20	50	1
CC	GE252902	BSH	Sports			2	2	25	25			50	1
EL	GE252803	-	PBL: Engineering Exploration Lab			2	2	15	15		20	50	1
VSE	GE252602	-	Professional Development II			2	2	15	15		20	50	1
Total				**16**		**12**	**28**					**850**	**21**
EL	*GE252804*	*ET*	*Do It Yourself II*			*2*	*2*	*25*	*25*			*50*	*AU*

Notes:

1. Multiple entry & exit criteria will be in accordance with the AICTE/UGC/DTE/NEP-2020 guidelines.

2. For audit courses (AU), participation is mandatory but not included in grade calculations.

Course Title: Linear Algebra and Calculus **Course Code: NT251001**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs / week	CA-1	10 Marks
Tutorial: 01 hrs / week	CA-2	10 Marks
Credits: 04	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite:

- Basic Algebra & Trigonometry – Equations, identities, functions.
- Basics of Calculus – Derivatives and simple integration.
- Basics of Matrix – Matrix types, operations and solving simple linear systems.

Course Description: This course covers essential topics in engineering mathematics, including matrices, eigenvalues, partial differentiation and multiple integrals. It focuses on solving linear systems, optimization and applying calculus to real-world problems like area and volume calculation. These mathematical tools form the backbone of many engineering fields and help to develop logical problem-solving skills.

Course Objectives:

1. To develop a strong foundation in matrix algebra and its applications in solving systems of equations and introduce the concepts of eigenvalues and eigenvectors and their role in engineering problems.
2. To understand partial differentiation and apply it to functions of several variables.
3. To apply multiple integrals in calculating areas, volumes and other engineering-related quantities.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the basic concepts related to matrices and calculus.	Remember (Level 1)
CO2	Compute solutions using the fundamental concepts of linear algebra and multivariable calculus.	Understand (Level 2)
CO3	Solve mathematical problems based on the concepts related to matrices and multivariable calculus.	Apply (Level 3)
CO4	Analyze mathematical problems by identifying and applying appropriate concepts from matrices, partial derivatives, and multiple integrals.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-

Assessment	
CA-1 (a)	Subjective Test / Assignment/ MCQ Test etc.
CA-2 (b)	Subjective Test / Assignment/ MCQ Test etc.
MSE (c)	Subjective Test

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Course Contents		
Unit 1	**Linear Algebra- Matrices-I** Introduction; Definition and types of matrices; Matrix Operations; Rank of a matrix; Canonical form of a matrix; Normal form of a matrix; Consistency of non-homogeneous and homogeneous system of linear equations.	6 Hrs.
Unit 2	**Linear Algebra- Matrices-II** Introduction; Linear dependence and independence of vectors; Eigen values and eigen vectors; Properties of eigen values and eigen vectors (without proofs); Cayley Hamilton's theorem (without proof) and its applications; Quadratic Forms.	6 Hrs.
Unit 3	**Partial Differentiation** Introduction; Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables.	6 Hrs.
Unit 4	**Applications of Partial differentiation** Introduction; Jacobians - properties; Taylor's and Maclaurin's theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange's method of undetermined multipliers.	6 Hrs.
Unit 5	**Multiple Integrals** Introduction; Reduction formulae for $\int_0^{\Pi/2}\sin\theta\, d\theta$, $\int_0^{\Pi/2}\cos\theta\, d\theta$, $\int_0^{\Pi/2}\sin\theta\cos\theta d\theta$; Evaluation of Double Integrals in Cartesian and polar co-ordinates with and without limit, evaluation of integral by changing to polar; Triple integral in Cartesian and polar.	6 Hrs.
Unit 6	**Applications of Multiple Integrals** Introduction; Applications of multiple integrals to find area as double integral in cartesian and polar, Surface area; volume as triple integral.	6 Hrs.

Sr. No.	Textbooks
1.	Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 2012.
2.	Ramana, B.V., Higher Engineering Mathematics, McGraw Hill Education India, 2008.
3.	Bali, N.P., & Goyal, M. (2019). Textbook of Engineering Mathematics. Laxmi Publications, 10th Edition.
	Reference Books
1.	Kreyszig, Erwin, Advanced Engineering Mathematics, Wiley India, 2007.
2.	Jain, R.K., and Iyengar, S.R.K., Engineering Mathematics Vol. 1 & 2, Narosa Publishing House, 2002.
3.	Dass, H.K., Advanced Engineering Mathematics, S. Chand Publishing, 2010.
4.	Thomas, George B., and Finney, R.L., Calculus and Analytic Geometry, Pearson, 2010.
5.	Singh, Ravish & Bhatt, Mukul, Engineering Mathematics: A Tutorial Approach, McGraw Hill Education India, 2017.
	Web Resources
1.	Matrix Analysis with Applications, NPTEL, https://nptel.ac.in/courses/111107112
2.	Calculus – II, NPTEL, https://nptel.ac.in/courses/111104125
3.	Engineering Mathematics – I, NPTEL, https://nptel.ac.in/courses/111105121

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Course Title: Applied Science II **Course Code: NT251002**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite: Chemistry course at secondary and higher secondary level.

Course Description: Chemistry is the backbone of all Engineering disciplines. Chemistry is not just important in Engineering, it's essential. Chemistry is an imperative part of every degree program in Engineering & Technology. This course is generally incorporated in the first-year syllabus of Bachelor of Technology degree in Engineering, and it is structured in a manner that its different theoretical concepts are studied along with their practical applications. This course cover topics like Water technology, Fuels and Electrochemical energy sources, High polymers, Corrosion and its control, Lubricants and Environmental chemistry along with practical laboratory experiments. The goal is to help students to understand the chemical principles behind various engineering materials, processes, and systems.

Course Objectives:

1. To understand the technology involved in analysis and improving quality of water.
2. To Study the various energy sources and alternative fuels with respect to their characteristics and applications.
3. To understand the properties and applications of various engineering materials, such as polymers.
4. To Understand Corrosion mechanisms and methods of prevention for corrosion control.
5. To study the mechanism, classification and properties of lubricants.
6. To examine the chemical aspects of environmental issues, such as air and water pollution, and pollution control.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the knowledge of water treatment, fuels and electrochemical energy sources, polymers, corrosion, lubricants and pollution.	Remember (Level 1)
CO2	Explain the water softening processes, analysis of coal, preparation of polymers, mechanism of corrosion, lubricants and pollution control.	Understand (Level 2)
CO3	Predict the total hardness of water based on the compounds responsible for water hardness.	Apply (Level 3)
CO4	Analyze the sources of air and water pollutants and their impacts on human health and ecosystems and effective control strategies.	Analyze (Level 4)
CO5	Apply basic techniques used in chemistry laboratory for volumetric analysis such as conductometric titration that is useful for best industrial practices.	Apply (Level 3)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-

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Assessment	
CA-1 (a)	Subjective Test / Assignment / Open book test / PowerPoint Presentation etc.
CA-2 (b)	Subjective Test / Assignment / Open book test /Presentation etc.
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Water Technology** Introduction, Hardness, types of Hardness, Disadvantages of hard water for domestic and industrial use, Numerical based on hardness, determination of hardness of water by EDTA method, Water softening methods: Zeolite method and Ion Exchange method.	6 Hrs.
Unit 2	**Fuels and Electrochemical Energy Sources** Introduction, Classification of fuels, Calorific value, higher calorific value (HCV) & Lower calorific value (LCV), Characteristics of good fuels, Analysis of Coal: Proximate analysis, Refining of crude oil, Introduction to Biomass and hydrogen fuel. Rechargeable batteries: Lithium-ion battery, Fuel Cell: H_2-O_2 Fuel cell.	6 Hrs.
Unit 3	**High Polymers** Introduction, Polymerization and its types, thermo softening and thermosetting plastics, preparation, properties, and uses of: Polymethyl methacrylate (PMMA), Urea formaldehyde resin, Styrene –butadiene rubber, conducting polymers its types and applications, Introduction to polymer materials for 3-D printing.	6 Hrs.
Unit 4	**Corrosion and its Control** Introduction, types of corrosion- Chemical and Electrochemical corrosion, mechanism of electrochemical corrosion, factors influencing rate of corrosion, Prevention of corrosion by galvanizing, tinning and cathodic protection method.	6 Hrs.
Unit 5	**Lubricants** Introduction, Classification of lubricants, Mechanism of lubrication, properties of lubricants- Viscosity and viscosity index, surface tension, flash point and fire point, cloud point and pour point, acid value and saponification number.	6 Hrs.
Unit 6	**Environmental Chemistry** Introduction, Air pollution: Types of air pollutants, Control of air pollution, Water pollution: sources of water pollution and its control, determination of dissolved oxygen in water by Iodometric/Winkler's method.	6 Hrs.

Sr. No.	Textbooks
1.	Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992.
2.	S. S. Dara, Text Book of Engineering Chemistry, S. Chand & Co, New Delhi.
3.	Bhal &Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi.
4.	C. Parmeshwara Murthy, C.V. Agarwal, Andra Naidu, Textbook of Engineering Chemistry, BS Publications, Hyderabad.
	Reference Books
1.	Shikha Agarwal, Engineering Chemistry- Fundamentals & applications, Cambridge Publishers - 2015.
2.	Gurdeep Chatwal & S. Anand, Instrumental methods of Chemical Analysis, Himalaya Publishing, New Delhi.
3.	O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
4.	V. R. Gowarikar, Polymer Science, New Age International Publication.

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Course Title: Applied Science II Lab **Course Code: NT251003**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks

Course Prerequisite:

- Titration method.
- Concept of normality and morality.
- Theory of acid and bases.

Course Description: An Engineering Chemistry Lab course provides students with practical experience in applying chemical principles to engineering problems. It aims to build a solid foundation in chemistry laboratory techniques and analytical methods, enabling students to conduct experiments, analyze data, and draw conclusions relevant to various engineering fields. The main objective of Engineering Chemistry Laboratory is to furnish the conceptual understanding of the basic principles involved in chemical analysis. Most of the experiments are correlated to theoretical concepts. This course lays the foundation of certain basic concepts and skills that can be repeatedly employed by the students in their future endeavors. This course also helps to improve the scientific temper of the students to conduct the various experiments.

Course Objectives:

1. To help students understand the chemical principles behind various engineering materials, processes, and systems.
2. To develop experimental skills and to acquire insight into societal and environmental issues.
3. To help the students procure conceptual clarity of engineering chemistry through laboratory experiments.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the knowledge of water treatment, fuels, and electrochemical energy sources, polymers, corrosion, lubricants, and pollution.	Remember (Level 1)
CO2	Explain the water softening processes, analysis of coal, preparation of polymers, mechanism of corrosion, lubricants, and pollution control.	Understand (Level 2)
CO3	Predict the total hardness of water based on the compounds responsible for water hardness.	Apply (Level 3)
CO4	Analyze the sources of air and water pollutants and their impacts on human health and ecosystems, and effective control strategies.	Analyze (Level 4)
CO5	Apply basic techniques used in a chemistry laboratory for volumetric analysis, such as conductometric titration, which is useful for best industrial practices.	Apply (Level 3)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-

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Assessment	
CA-I (a)	Based on practical: Sr. No. 1 to 4
CA-II (b)	Based on practical: Sr. No. 4 to 8

Sr. No.	List of Experiments	Hours
1	Determination of the hardness of water by the EDTA method.	2 Hrs
2	Preparation of Urea –formaldehyde resin.	2 Hrs
3	To study the factors influencing the rate of corrosion.	2 Hrs
4	To determine the acid value of a given oil sample.	2 Hrs
5	To determine the surface tension of a given liquid by the drops number method.	2 Hrs
6	To determine the viscosity of a given liquid by Ostwald's viscometer.	2 Hrs
7	To determine the oxygen dissolved in a water sample by Winkler's method.	2 Hrs
8	To determine normality and strength of given acid solution conductometrically (Strong Acid vs. strong Base)	2 Hrs

Sr. No.	Reference Books
1.	A. Sethi, Systematic experiments in Chemistry, New Age International Publication, New Delhi.
2.	A. I. Vogel, Practical Inorganic Chemistry, ELBS Publication.
3.	S. S. Dara, Practical in Engineering Chemistry, S. Chand and Co, New Delhi.

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Course Title: Engineering Graphics **Course Code: GE251101**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Lectures:03 hrs./ week	CA-1	10 Marks
Tutorial: --	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite:

- Knowledge of Geometry (Linear and angular), Coordinate Geometry.
- Basic Mathematics.

Course Description: Engineering Graphics is a basic course for all undergraduate engineering programs. This course is introduced to provide basic understanding of the fundamentals of Engineering Drawing, mainly visualization, graphic theory, standards and conventions of drawing, the tools of drawing and use of drawing in engineering applications. A picture speaks thousands of words. A message conveyed by a picture is much more effective than a message conveyed by words. The human being used the language of drawing to convey their ideas, thoughts, feelings, emotions since before the start of civilization. With development in science and technology humans felt the need for standardized drawing that it could be understood universally. This standardized language was then termed as Engineering Drawing.

Course Objectives:

1. To Know and Understand the Concepts of Projection of Points, Lines, Planes, Solids, and Development of Surfaces.
2. To Construct 2D and 3D views of objects.
3. To communicate effectively in Engineering Environment

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the basic standards, types of projections, and the steps involved in drawing various polygons and the projection of points, lines, planes, and solids.	Remember (Level 1)
CO2	Interpret the importance of reference planes while drawing the front view and top view in the projection of points, lines, planes, and solids.	Understand (Level 2)
CO3	Transform multi-views to isometric View/Projection and vice-versa.	Apply (Level3)
CO4	Analyze the relationships between front, top, and side views in orthographic projection to identify hidden and visible features.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	2	-	-

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Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Introduction to Engineering Drawing & Geometrical Construction** Importance of Engineering Graphics, Scope and applications, Basic Geometrical Construction- Line Bisection, Angle Bisector, dividing a line into an equal number of parts, Drawing Standards-IS/BIS standards SP-46, Drawing Instruments, Sheet Layout, Lettering, Types of Lines, Aligned and Unidirectional Method of Dimensioning. Drawing of a Polygon by General Method, Arcs Method, and Inscribed Circle Method. Pentagon by the Special Methods Circle method, the Diagonal Method, and the Inscribed Circle Method.	6Hrs
Unit 2	**Projection of Points & Orthographic Projection** Principle of Projection, Quadrant System, Reference Planes, and Reference Line. Point, Points is situated in different quadrants. Methods of Projection (Orthographic, Isometric, Oblique, and Perspective Projection), Symbols of First angle and Third angle, Difference between First angle and Third angle Projection.	6Hrs
Unit 3	**Projection of Straight Lines** Straight Line, Various Positions of Lines with respect to Reference Planes. Line inclined to one Plane; Projection of lines inclined to both the planes (First Quadrant Only). Traces of Lines.	6Hrs
Unit 4	**Projection of Planes** Planes, Types of Planes (Simple Plane, Composite Plane), and Various Positions of Planes with respect to Reference Planes. Planes Inclined to one reference Plane; Planes Inclined to both reference Planes. (Apparent Angle Concept)	6Hrs
Unit 5	**Projection of Solids and Development of Surfaces** Solid, Types of Solids, Various Positions of Solids. Projection of a solid with an axis inclined to one Reference planes only. Projection of Solids Numerical limited to Regular Cone, Cylinder, Pyramid, and Prisms only. Introduction to Development of Surfaces, Method of Development- Parallel Line, Radial Line, Triangulation, and Approximate Method. Development of Cylinder, Cone, Pyramid, and Prism.	6Hrs
Unit 6	**Isometric Projection** Isometric Projection, Isometric Axis, Isometric Lines, Isometric Planes, Isometric Scale and the Different between Isometric Drawing/ View and Isometric Projection.	6Hrs

Deogiri Institute of Engg & Management Studies ★ Chhatrapati Sambhajinagar ★

Sr.No.	Textbooks
1.	K. Venugopal & V. Prabhuraja, A Textbook of Engineering Graphics, New Age International (P) Limited 1st t Edition
2.	P.H. Jain. A Textbook of Engineering Graphics, Soham Publication, 5th Edition
	Reference Books
1.	N.D. Bhatt, Engineering Drawing, Charotar Publication, 50th Edition
2	Dhananjay A. Jolhe, Engineering Drawing, Mc Graw Hill 19th Edition
	Web Resources
1.	Engineering Graphics, NPTEL, https://nptel.ac.in/courses/105104148
2.	Engineering/Architectural Graphics https://www.youtube.com/watch?v=VrU73IwRyc4&list=PLLy_2iUCG87Bw9XPfEF3r3EW5UlAOv8iz

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Deogiri Institute of Engg & Management Studies
Chhatrapati Sambhajinagar

Course Title: Engineering Graphics Lab **Course Code: GE251103**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks

Course Prerequisite:

- Knowledge of Geometry (Linear and angular), Coordinate Geometry.
- Basic Mathematics.

Course Description: Engineering Graphics is a basic course for all undergraduate engineering programs. This course is introduced to provide a basic understanding of the fundamentals of Engineering Drawing, mainly visualization, graphic theory, standards and conventions of drawing, the tools of drawing, and the use of drawing in engineering applications. A picture speaks a thousand words. A message conveyed by a picture is much more effective than a message conveyed by words. Human beings have used the language of drawing to convey their ideas, thoughts, feelings, and emotions since before the start of civilization. With the development of science and technology, humans felt the need for standardized drawing so that it could be understood universally. This standardized language was then termed as Engineering Drawing.

Course Objectives:

1. To Know and Understand the Concepts of Projection of Points, Lines, Planes, Solids, and Development of Surfaces.
2. To Construct 2D and 3D views of objects.
3. To communicate effectively in an Engineering Environment

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the basic standards, types of projections and the steps involved in drawing various polygons and projection of points, lines, planes and solids.	Remember (Level1)
CO2	Interpret the importance of reference planes while drawing the front view and top view in projection of points, lines, planes and solids.	Understand (Level2)
CO3	Transform multi-views to isometric View/Projection and vice-versa.	Apply (Level3)
CO4	Analyze the relationships between front, top, and side views in orthographic projection to identify hidden and visible features.	Analyze (Level4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	2	-	-

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Assessment	
CA-I (a)	Based on Practical: Sr. No. 01 to 05
CA-II (b)	Based on Practical: Sr. No. 06 to 10

Sr. No.	List of Experiments	Hours
1	Lines, lettering and dimensioning.	2 Hrs.
2	Geometrical Construction.	2 Hrs.
3	Projections of Points.	2 Hrs.
4	Orthographic Projections- (First Angle Method)	2 Hrs.
5	Orthographic Projections- (Third Angle Method)	2 Hrs.
6	Projections of Lines.	2 Hrs.
7	Projections of Planes.	2 Hrs.
8	Projections of Solids.	2 Hrs.
9	Development of Surfaces.	2 Hrs.
10	Isometric Projections.	2 Hrs.

Sr.No.	Textbooks
1.	K. Venugopal & V. Prabhuraja, A Textbook of Engineering Graphics, New Age International (P) Limited 1st t Edition
2.	P.H. Jain. A Textbook of Engineering Graphics, Soham Publication, 5th Edition
	Reference Books
1.	N.D. Bhatt, Engineering Drawing, Charotar Publication, 50th Edition
2	Dhananjay A. Jolhe, Engineering Drawing, Mc Graw Hill 19th Edition
	Web Resources
1.	Engineering Graphics, NPTEL, https://nptel.ac.in/courses/105104148
2.	Engineering/Architectural Graphics https://www.youtube.com/watch?v=VrU73IwRyc4&list=PLLy_2iUCG87Bw9XPfEF3r3EW5UlAOv8iz

Deogiri Institute of Engg & Management Studies
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Course Title: Programming for Problem Solving **Course Code: NT251102**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite:

- Basic Computer Literacy
- Logical Thinking and Problem-Solving Skills
- Basic Mathematics Knowledge

Course Description:

This course introduces the fundamentals of computing and problem-solving using Python programming language. It is designed to develop computational thinking among Civil and Mechanical Engineering students through hands-on programming exercises. Topics include programming constructs, data structures, file handling, and the use of standard libraries in Python. The course emphasizes writing efficient, readable, and reusable code for solving real-world engineering problems.

Course Objectives:

1. To introduce fundamental concepts of computers and programming.
2. To understand Python syntax and semantics for problem solving.
3. To develop structured and modular programs using control structures and functions.
4. To use Python data structures like lists, tuples, sets, and dictionaries.
5. To handle file operations and exceptions using Python.
6. To explore Python libraries for data analysis and visualization.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall Python fundamentals, syntax, control flow, data structures, file handling, and libraries.	Remember (Level 1)
CO2	Explain Python program structure, logic flow, data handling, and library usage.	Understand (Level 2)
CO3	Implement Python programs using functions, control flow, data structures, files, and libraries.	Apply (Level 3)
CO4	Analyze Python code to select appropriate logic, structures, and libraries for problem-solving.	Analyze (Level 4)

CO-PO Mapping

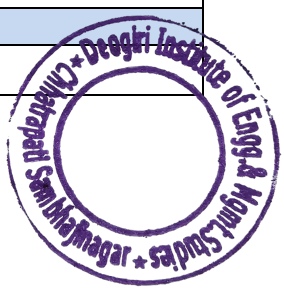
CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	1	1	-	-	-	-	-	-	-	-	1	-	-
CO4	3	1	1	-	-	-	-	-	-	-	-	1	-	-

Deogiri Institute of Engg & Management Studies * Chhatrapati Sambhajinagar *

Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Unit 1: Fundamentals of Computers and Programming** Introduction to computers, components, memory management, and software types, Operating systems and networking concepts. **Programming process**: editing, compiling, error checking, executing, testing, debugging, Basics of algorithms and flowcharts, Introduction to programming languages.	6Hrs
Unit 2	**Introduction of Python programming** Features of Python, History of Python and version, Python Applications, Installation of Python IDE, Indentation and Comment in Python, Input and output Statements, Keyword, Identifier, Literals Variables and data types, Operators.	6Hrs
Unit 3	**Control Flow and Functions** **Decision making Statements:** Conditional Statements- if, else, elif, Loops: for and while loop, Break and Continue statement. **Functions:** Defining functions, Parameters and return, Lambda & Recursive function.	6Hrs
Unit 4	**Data Structures in Python** **Lists (list) :**Creating and Accessing Lists, List Methods (append(), insert(), pop(), remove(), sort(), etc.) List Comprehension Slicing and Iteration. **Tuples (tuple):**Tuple Characteristics and Usage Tuple Packing and Unpacking Immutable Nature of Tuples. **Sets (set):**Properties of Sets Set Operations (Union, Intersection, Difference) Removing Duplicates using Sets. **Dictionaries (dict):** Dictionary Methods (keys(), values(), items(), get(), pop(), etc. Dictionary Comprehension, Nested Dictionaries	6Hrs
Unit 5	**File Handling and Exception handling** **File Handling:** Type of file, File Operation, Open file, Reading & writing files, Close file. **Exception handling:** Error, Types of Exception, try, except, finally, user defined exception.	6Hrs
Unit 6	**Introduction to Popular Libraries** NumPy for numerical computing, Pandas for data manipulation, Matplotlib for data visualization, Plotly for data visualization, Scikit-learn for Data Preprocessing, py.abacs, Flask, py. ansys.	6Hrs

Sr.No.	Textbooks
1.	Charles Dierbach, "Introduction to Computer Science Using Python", Wiley India Edition.
2.	Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press.
	Reference Books
1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly Media
2.	Wesley J. Chun, "Core Python Programming", Prentice Hall
	Web Resources
1.	https://nptel.ac.in/courses/106106182



Course Title: Programming for Problem Solving Lab **Course Code: NT251104**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks

Course Prerequisite:

- Basic Computer Literacy
- Logical Thinking and Problem-Solving Skills
- Basic Mathematics Knowledge

Course Description: This course introduces the fundamentals of computing and problem-solving using Python programming language. It is designed to develop computational thinking among Civil and Mechanical Engineering students through hands-on programming exercises. Topics include programming constructs, data structures, file handling, and the use of standard libraries in Python. The course emphasizes writing efficient, readable, and reusable code for solving real-world engineering problems.

Course Objectives:

1. To introduce fundamental concepts of computers and programming.
2. To understand Python syntax and semantics for problem solving.
3. To develop structured and modular programs using control structures and functions.
4. To use Python data structures like lists, tuples, sets, and dictionaries.
5. To handle file operations and exceptions using Python.
6. To explore Python libraries for data analysis and visualization.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall Python fundamentals, syntax, control flow, data structures, OOP, file handling, and libraries.	Remember (Level1)
CO2	Explain Python program structure, logic flow, OOP, data handling, and library usage.	Understand (Level2)
CO3	Implement Python programs using functions, control flow, data structures, OOP, files, and libraries.	Apply (Level3)
CO4	Analyze Python code to select appropriate logic, structures, OOP features, and libraries for problem-solving.	Analyze (Level4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	-	2	-	-	-	-
CO2	3	1	-	-	-	-	-	-	-	2	-	-	-	-
CO3	3	1	-	-	1	-	-	-	-	2	-	-	-	-
CO4	3	1	-	-	1	-	-	-	-	2	-	-	-	-

Assessment	
CA-I (a)	Based on Practical: Sr. No. 01 to 04
CA-II (b)	Based on Practical: Sr. No. 04 to 08

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Sr. No.	List of Experiments	Hours
1	Demonstrates user input, basic arithmetic operations, and flow control.	2 Hrs
2	Python Program to Check Prime Numbers Using Control Flow Constructs	2 Hrs
3	Python Program to Find Factorial Using Function.	2 Hrs
4	Python Program to Demonstrate Different Data Structures, Creation, and Modification	2 Hrs
5	Performing Matrix Operations in Python: Addition and Multiplication Using NumPy	2 Hrs
6	Demonstrates Python Program Using Pandas for Basic Statistical Computations in Python	2 Hrs
7	Python Program to Visualize Student Marks Using Bar Charts and Line Graphs in Matplotlib	2 Hrs
8	Building a Simple Linear Regression Model with TensorFlow	2 Hrs

Sr.No.	Textbooks
1.	Charles Dierbach, "Introduction to Computer Science Using Python", Wiley India Edition.
2.	Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press.
	Reference Books
1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly Media
2.	Wesley J. Chun, "Core Python Programming", Prentice Hall
	Web Resources
1.	https://nptel.ac.in/courses/106106182

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EST. 2009

Course Title: Modern Indian Language I **Course Code: GE251701**		**Course Category: AEC**
Teaching Scheme	**Examination Scheme**	
Lectures: 02 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 02	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite:

- Basic knowledge of English grammar and vocabulary.
- Ability to read and comprehend simple English texts.
- Willingness to actively participate in listening, speaking, reading, and writing activities.

Course Description: This course aims to develop foundational communication skills in English, essential for academic, professional, and personal contexts. It introduces students to the core concepts of communication, including verbal, non-verbal, and written forms.

Course Objectives:

1. To recall key concepts of English grammar, phonetics, vocabulary, and basic language structures
2. To understand the use of language in various contexts—academic, professional, and everyday
3. communication
4. To apply correct grammar, pronunciation, and vocabulary in spoken and written English
5. To create well-structured and purpose-driven written texts such as reports, letters, and emails

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall and recognize grammatical forms, sentence structures, phonetic symbols, and vocabulary items	Remember (Level 1)
CO2	Interpret and explain the function of language in comprehension, speech, and writing	Understand (Level 2)
CO3	Apply language skills—grammar, phonetics, and vocabulary in oral communication and writing tasks	Apply (Level 3)
CO4	Compose clear, grammatically accurate, and well-formatted texts for academic and professional purposes	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
CO2	-	-	-	-	-	-	-	2	1	2	-	2	-	-
CO3	-	-	-	-	-	-	-	2	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	2	2	3	-	3	-	-

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Assessment	
CA-1 (a)	Group Discussion
CA-2 (b)	Business writing assessment.
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Communication and Communication Processes** Introduction to Communication, Process & elements involved in Communication, Forms and functions of Communication, Barriers to Communication and overcoming them.	4 Hrs.
Unit 2	**Listening Skill & Reading Skill** Listening Skills: Importance of Listening, Types of Listening, Barriers to Listening. Reading Skills: Introduction to Reading, Types of Readers and Reading, Barriers to Reading, Strategies for Reading, Comprehension.	3 Hrs
Unit 3	**Verbal & Non-verbal Communication** Use of Language in Spoken Communication, Appropriate Use of Non-verbal Communication, Principles and Practice of Group Discussion, Public Speaking Interview Techniques, Presentation Skills.	5 Hrs
Unit 4	**Study of Sounds in English** Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English.	4 Hrs.
Unit 5	**English Grammar** Grammar: Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Common Errors in English language.	4 Hrs.
Unit 6	**Writing Skills** Features of Good Language, Writing Emails, Technical Reports: Report Writing: Format, Structure and Types. Letter Writing: Types & Layouts, Letters and Job Application and Resume.	4 Hrs.

Sr. No.	Textbooks
1.	Mohd. Ashraf Rizvi, Communication Skills for Engineers, Tata McGraw Hill
2.	M.S. Rao, Effective Communication Skills, Himalaya Publishing House
	Reference Books
1.	Wren & Martin, English Grammar and Composition, S. Chand Publishing
2.	Dr. T. Balasubramanian, A Course in Phonetics and Spoken English, Foundation Books
3.	Meenakshi Raman & Sangeeta Sharma, Technical Communication, Oxford University Press
	Web Resources
1.	https://tinyurl.com/vv953ryp
2	Soft Skills, NPTEL, https://nptel.ac.in/courses/109107121
3	https://www.coursera.org/specializations/people-and-soft-skills-for-professional-success

Deogiri Institute of Engg & Management Studies ★ Chhatrapati Sambhajinagar

Course Title: NSS **Course Code: GE251901**		**Course Category: CC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: 01	CA-II	25 Marks
Semester: First Year (Semester I)	ESE	-

Course Prerequisite:

- Basic Awareness of Social Issues.
- Interest in Community Service.
- Willingness to Engage in Extracurricular Activities.
- Basic Communication Skills.

Course Description: The **National Service Scheme (NSS)** is a flagship program of the Government of India, designed to promote voluntary community service among students. The program aims to foster a sense of social responsibility, leadership, and civic engagement among youth, particularly within educational institutions. NSS provides students with opportunities to participate in meaningful activities that address real-world community challenges, helping them develop both personally and professionally.

Course Objectives:

1. Promote Social Responsibility and Civic Engagement.
2. Develop Leadership Skills.
3. Enhance Awareness of Social Issues.
4. Foster Youth Empowerment.
5. Engage in Community Development Activities.
6. Build a Spirit of National Integration.

Course Outcomes:

COs	**After completion of the course: Student should be able to**	**Bloom's Level**
CO1	Recall the aims, objectives, and core values of the National Service Scheme in relation to various activities in NSS.	Remember (Level 1)
CO2	Identify the role of youth in community development and their responsibilities in promoting social welfare.	Understand (Level 2)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	2	1	-	1	1	-	1	-	-
CO2	-	-	-	-	-	2	2	-	1	1	-	1	-	-

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Assessment	
CA-I (a)	Based on Activities 01 to 06
CA-II (b)	Based on Activities 07 to 12

Sr. No.	List of Activities	Hours
1	**Introduction, Aims and Objectives of NSS:** Report writing on understanding the social impact of NSS.	02 Hrs
2	**Youth & Community:** Debate on role of youth in society and their responsibility toward community development.	02 Hrs
3	**Importance and Role of Youth Leadership:** Presenting the role model and the leadership qualities of the role model which influence them.	02 Hrs
4	**Importance and Role of Youth Leadership:** Group activity to understand the importance of leadership and how to apply it in real life scenarios.	02 Hrs
5	**Health, Hygiene and Diseases:** Case study on hygiene in rural India.	02 Hrs
6	**Needs and Meaning of Socio-Economic Survey:** Poster making on water conservation awareness	02 Hrs
7	**Needs and Meaning of Socio-Economic Survey:** Survey on road safety awareness	02 Hrs
8	**Needs and Meaning of Socio-Economic Survey:** Presentation on Swachh Bharat Abhiyan.	02 Hrs
9	**Environment and Energy Conservation Concepts:** Survey based on Environmental awareness.	02 Hrs
10	**Environment and Energy Conservation Concepts:** Essay competition Renewable Energy.	02 Hrs
11	**Disaster Management:** Survey preparedness to face any disaster.	02 Hrs
12	**National Integration:** Stage activity of students group on fostering awareness of unity in diversity.	02 Hrs

Sr. No.	Reference Books
1.	Gurmeet Hans, Case Materials as training aid for field workers, National Library of Australia, 1996.
2.	Ram Ahuja, Social Problems in India, Rawat Publications, 2012
	Web Resources
1.	www.nss.gov.in
2.	https://nss.gov.in/sites/default/files/manualNss2006.pdf

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EST. 2009

Deogiri Institute of Engg & Management Studies
Chhatrapati Sambhajinagar

Course Title: PBL: Design Thinking Lab **Course Code: GE251801**		**Course Category: EL**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks
Course Prerequisite: None. An open mind and willingness to work in diverse teams is essential.		
Course Description: The course introduces the students of engineering to the practices and principles of Design Thinking tool as a powerful method for the issues related to the society. The pedagogy used for the course content delivery is through various hands-on activities, real time case studies and collaborative projects. With this pedagogy students will learn to apply the steps of design thinking i.e. Empathy, Problem Defining, Ideation, Prototyping and Testing in a systematic manner. The framework of course emphasizes the students to use stakeholder-centred approach to identify the pressing issues the community faces. The course is merged with Engineering Design Process, with the various tools and techniques students will generate the impactful solutions. The course is inclined to culminates the team-based projects align with United Nations Sustainable Development Goals (SDGs).		
Course Objectives: 1. Introduce students of engineering to the concept and process of Design Thinking approach. 2. Introduce the students to the United Nations Sustainable Development Goals (SDGs). 3. Encourage the students to identify the real-world social challenges. 4. Culminate the empathy-driven skills among the students for identifying the critical issues and solving the real-world social problems. 5. To foster creativity, problem-solving skills and teamwork.		

Course Outcomes:		
COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Describe the steps of the design thinking approach to solve the problems.	Remember (Level 1)
CO2	Identify the real-world social-based problems (SDGs align) and use an empathetic approach (Tools/Techniques) to generate user-centered insights.	Understand (Level 2)
CO3	Formulate a clear problem statement (SMART) from the client/user/designer point of view.	Apply (Level 3)
CO4	Generate, evaluate, and select multiple innovative feasible ideas with structured brainstorming techniques through teamwork.	Analyze (Level 4)
CO5	Develop a low-cost, lower to medium fidelity prototype (Physical/Digital) to communicate the ideas and test through the potential user feedback.	Create (Level 6)

CO-PO Mapping:

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2		1		2	1					3		
CO2	1	2	1	1		1						3		
CO3		1	2						1			3		
CO4		1	2	2	1				1	1		3		
CO5	2	2	1		3	1			2	3	1	3		

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Assessment	
CA-I (a)	• Identify the problems faced by the society/ community (SDG Align). • Empathize with the design thinking approach. • Synthesize with empathy map. Identify the constraints and enlist the objectives as a designer point of view. • Take the decision to prioritize the objectives with the multi-criteria decision matrix. • Define the problem statement with SMART Technique.
CA-II (b)	• Ideate the solution for the defined problem/challenge. • Use principle of decomposition and generate multiple ideas with Brainwriting Techniques. • Select and filter the ideas. • Use Feasibility-Impact and Morphological chart for the evaluation of generated solutions. • Develop and test the Prototype (Digital/Poster).

Sr. No.	List of Experiments/Activities	Hours
1.	To explore the process of Design Thinking through case studies aligned with Sustainable Development Goals (SDG's).	2 Hrs
2.	To understand the various problem framing techniques for social challenges.	2 Hrs
3.	To conduct the empathy research and synthesize with empathy map.	4 Hrs
4.	To formulate the Point of View (PoV) statement for the design challenge through empathy map and multi-criteria decision-making techniques.	4 Hrs
5.	To apply the divergent & convergent thinking techniques for generation and evaluation of ideas.	2 Hrs
6.	To build low to medium fidelity prototype to represent the ideas.	4 Hrs
7.	To test and iterate the designed prototype using the structured test plans.	2 Hrs

Sr. No.	Textbooks
1.	Nigel Cross, Design Thinking- Understanding How Designers Think and Work, Bloomsbury Publisher, 2nd Edition.
2.	Chandramouli Subramanian, Thiyagarajan Paramasivan and Sankaran Venkataramani Design Thinking: A Hands-on Approach, Orient Blackswan, 1st Edition, 2024.
	Reference Books
1.	Ann Saterbak & Mattew Wettergreen, Introduction to Engineering Design Workbook, Springer Nature Switzerland AG, 1st Edition, 2022.
	Web Resources
1.	UNDP Sustainable Development Goals & Design Thinking, https://www.undp.org/sustainable-development-goals
2.	Design Thinking: A Primer, NPTEL https://www.youtube.com/watch?v=AamBSYPJlcA

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Course Title: Professional Development I **Course Code: GE251601**		**Course Category: VSE**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks

Course Prerequisite:

- Willingness to participate actively in oral and group communication tasks.
- Basic understanding of English language (reading, writing, speaking).

Course Description: This course is designed to develop essential professional and interpersonal skills in students through interactive and activity-based learning. It emphasizes spoken English, confidence building, and real-world communication situations such as introductions, interviews, debates, and presentations. Through practical exposure to public speaking, storytelling, group discussions, and more, students will enhance their communication abilities and become effective, confident speakers capable of navigating academic and professional environments.

Course Objectives:

1. To help students recall essential terminology, formats, and structures used in oral communication.
2. To familiarize students with the foundational principles of effective oral communication in academic and professional settings.
3. To provide students with opportunities to practice and apply communication strategies through structured speaking activities.
4. To develop students' ability to design and deliver creative and context-appropriate oral communication tasks.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall key concepts and techniques involved in basic oral communication tasks.	Remember (Level 1)
CO2	Explain the principles and techniques of effective oral communication in personal, academic, and professional contexts.	Understand (Level 2)
CO3	Apply appropriate speaking strategies in activities such as group discussions, interviews, and presentations.	Apply (Level 3)
CO4	Design and deliver structured oral communication tasks using appropriate style, tone, and language.	Create (Level 6)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	2	2	3	-	2	-	-
CO2	-	-	-	-	-	-	-	2	2	3	-	2	-	-
CO3	-	-	-	-	-	-	-	1	3	3	-	2	-	-
CO4	-	-	-	-	-	-	-	1	3	3	-	3	-	-

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Assessment	
CA-I (a)	Based on Practical: Sr. No. 01 to 05
CA-II (b)	Based on Practical: Sr. No. 06 to 10

Sr. No.	List of Activities	Hours
1	Self-Introduction Practice	2 Hrs
2	Know Your Friend	2 Hrs
3	Elocution	2 Hrs
4	Extempore Speaking	2 Hrs
5	Public Speaking	2 Hrs
6	Group Discussion (GD)	2 Hrs
7	Debate Participation	2 Hrs
8	Interview Techniques	2 Hrs
9	Presentation Skills	2 Hrs
10	Storytelling	2 Hrs

Sr. No.	Textbooks
1.	Mohd. Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill
2	Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press
	Reference Books
1.	Krishna Mohan & Meera Banerji, Developing Communication Skills, Macmillan India
2.	Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press
	Web Resources
1.	https://www.coursera.org/specializations/professional-skills-for-the-workplace
2.	https://www.coursera.org/learn/emotional-intelligence-in-leadership-1
3.	https://www.coursera.org/learn/managing-professional-work-teams

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Course Title: Do It Yourself I **Course Code: GE251802**		**Course Category: EL**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: AU	CA-II	25 Marks
Semester: First Year (Semester I)	ESE	-

Course Prerequisite:

- Basic concepts of Mechanical and Civil.
- Unit Measurement and Conversion.
- General safety protocols.

Course Description: This course provides hands-on experience with the identification and application of various mechanical tools and fasteners; practices of precision measurement using instruments such as Vernier calipers and micrometers and develop an understanding of mechanical systems through the assembly and disassembly. DIY civil engineering course is designed for beginner students who are curious about the basic civil engineering and want to learn by doing the activities. It introduces essential concepts of construction, material, structures and site work through interactive, practical activities.

Course Objectives:

1. Introducing students to various mechanical tools and building components and plumbing accessories.
2. Develop competency in the use of precision measuring instruments and to understand the procedure of disassembly and assembly of mechanical components.
3. Provide hands-on experience with machine tools and drawing layouts.

Course Outcomes:

COs	**After completion of the course:** **Students should be able to**	**Bloom's Level**
CO1	Recognize basic mechanical tools, various building components and plumbing accessories.	Remember (Level 1)
CO2	Explain the procedures involved in the disassembly of mechanical assemblies and the use of basic measuring and surveying instruments.	Understand (Level 2)
CO3	Demonstrate basic machining operations, construct models of structural elements, and prepare layout plans for 1BHK/2BHK residential units using manual tools	Apply (Level 3)
CO4	Analyze measurement data obtained from measuring instruments to identify dimensional variations and accurately represent the ground profile.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	1	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	1	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	1	-	-

Assessment	
CA-I (a)	Based on Activities related to Mechanical / Civil
CA-II (b)	Based on Activities related to Mechanical / Civil

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Sr. No.	List of Activities	Hours
1	Study of Different Mechanical Tools and Fasteners.	2 Hrs.
2	Assembly and Disassembly of 4 Stroke Petrol Engine.	2 Hrs.
3	Assembly and Disassembly of Bicycle.	2 Hrs.
4	Measurement of components using Vernier Caliper, Screw Gauge and Vernier Height Gauge.	2 Hrs.
5	Hands on Lathe Machine and Drilling Machine.	2 Hrs.
6	Study and Application of Leveling Instruments.	2 Hrs.
7	Use survey instruments to prepare profile of ground on site and draw the same profile on drawing sheet.	2 Hrs.
8	Reinforcement model of Column, Beam, Footing and Slabs as per the drawing provided.	2 Hrs.
9	Laying out center line plan of foundation for 1BHK / 2BHK	2 Hrs.
10	Introduction to Plumbing accessories and connections.	2 Hrs.

Sr. No.	Textbooks
1.	B.S. Raghuwanshi, Workshop Technology Vol. 1 & Vol. 2, Dhanpatrai Publication
2.	R.K. Jain, Metrology and Quality control, Khanna Publication
3.	Mathur and Sharma, Internal Combustion Engine, Dhanpatrai Publication
4.	G.K. Hiraskar, Basic Civil Engineering, Dhanpat Rai Publications in 2004
5.	Anurag Kandya, Elements of Civil Engineering, Charotar Publishing House Pvt. Limited, 2003
	Reference Books
1.	N.V. Raghavendra L. Krishnamurthy, Engineering Metrology and Measurement Oxford University Press
2.	Arora S. P. and Bindra S.P., Building Construction, Dhanpat Rai and Sons, Delhi.
	Web Resources
1.	Basics of Mechanical Engineering, https://nptel.ac.in/courses/112104526
2.	https://www.youtube.com/watch?v=JASHFJFxaeE
3.	https://www.youtube.com/watch?v=6sVi7goQKQE

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Course Title: Multivariable Calculus
Course Code: NT252004 **Course Category: BSC**

Teaching Scheme	Examination Scheme	
Lectures: 03 hrs./ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks

Course Prerequisite:

- Basic Calculus: Understanding of differentiation and integration, including higher-order derivatives and integrals.
- Elementary Differential Equations: A foundational understanding of simple ordinary differential equations (ODEs), including first-order equations and basic solution techniques.
- Multivariable Calculus: Familiarity with partial derivatives and multiple integrals, which is essential for vector calculus and partial differential equations.

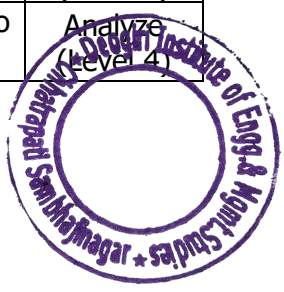
Course Description: This course covers the study of differential equations and vector calculus with applications in engineering. It focuses on solving first-order and higher-order ordinary differential equations (ODEs), including exact linear, Bernoulli's equations and applying shortcut methods for linear equations with constant coefficients. The course also introduces partial differential equations (PDEs) and their solution techniques. Students will learn vector calculus concepts such as gradient, divergence, curl and apply vector integral theorems like Green's, Gauss' and Stokes' theorems. The course emphasizes practical applications in mechanical, electrical and civil engineering providing the mathematical tools needed to solve real-world engineering problems.

Course Objectives:

1. To solve first-order and higher-order differential equations, including exact, linear and Bernoulli's equations with engineering applications.
2. To learn methods for solving linear differential equations with constant coefficients using shortcut techniques.
3. To apply linear differential equations to real-world mechanical and civil engineering problems and solve partial differential equations using techniques like separation of variables.
4. To understand and apply vector calculus concepts (gradient, divergence, curl) in physical fields.
5. To use vector integral theorems (Green's, Gauss', and Stokes') for solving engineering and physics problems.

Course Outcomes:

COs	After completion of the course: Students should be able to	Bloom's Level
CO1	Recall the concepts of vector calculus and techniques for solving the differential equations.	Remember (Level 1)
CO2	Compute the solution of mathematical problems related to differential and vector calculus.	Understand (Level 2)
CO3	Solve the mathematical problems involving differential equations and vector operations.	Apply (Level 3)
CO4	Analyze ordinary and partial differential equations and vector calculus concepts to solve engineering problems using appropriate analytical techniques.	Analyze (Level 4)



CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-

Assessment	
CA-1 (a)	Subjective Test / Assignment/ MCQ Test etc.
CA-2 (b)	Subjective Test / Assignment/ MCQ Test etc.
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Ordinary Differential Equations of First Order and First Degree and Their Applications** Introduction; Exact differential equations; Linear equations; Reducible to linear equations (Bernoulli's equation); Applications to orthogonal trajectories, mechanical engineering and electrical engineering.	6 Hrs.
Unit 2	**Linear Differential Equations with Constant Coefficients** Introduction; complementary function, particular integral; Rules for finding complementary functions and particular integrals (Shortcut Methods – Type I $X = e^{ax} / k / a^x$, Type II $X = \sin ax / \sin(ax+b)$, Type III $X = \sinh ax / \sinh(ax+b)$, Type IV $X = x^m$ (polynomial in x), Type V $X = e^{ax}V$, Type VI $X = xV$ (where V is function of x only).	6 Hrs.
Unit 3	**Applications of Linear Differential Equations with Constant Coefficients** Introduction; Cauchy's homogeneous linear equations; Legendre's linear equations; applications to mechanical engineering and civil engineering.	6 Hrs.
Unit 4	**Partial Differential Equations** Introduction; Formation of Partial differential equations by eliminating arbitrary constants and arbitrary functions, Direct Integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables.	6 Hrs.
Unit 5	**Vector Differential Calculus** Introduction; Definition and types of vectors; Scalar point function and vector point function: Gradient, divergence and curl; Solenoidal and irrotational vector fields (Conservative field).	6 Hrs.
Unit 6	**Vector Integral Calculus** Introduction; Vector Integration & its application: line integral, Work done, Circulation; Green's theorem, Gauss' divergence theorem and Stokes' theorem (without proofs).	6 Hrs.

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Sr.No.	Textbooks
1.	Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 2012.
2.	Ramana, B.V., Higher Engineering Mathematics, McGraw Hill Education India, 2008.
3.	Bali, N.P., & Goyal, M. (2019). A Textbook of Engineering Mathematics. Laxmi Publications, 10th Edition.
	Reference Books
1.	Kreyszig, Erwin, Advanced Engineering Mathematics, Wiley India, 2007.
2.	Jain, R.K., and Iyengar, S.R.K., Engineering Mathematics Vol. 1 & 2, Narosa Publishing House, 2002.
3.	Dass, H.K., Advanced Engineering Mathematics, S. Chand Publishing, 2010.
4.	Thomas, George B., and Finney, R.L., Calculus and Analytic Geometry, Pearson, 2010.
5.	Singh, Ravish, and Bhatt, Mukul, Engineering Mathematics: A Tutorial Approach, McGraw Hill Education India, 2017.
	Web Resources
1.	Differential Equations for Engineers, https://nptel.ac.in/courses/111106100
2.	Advanced Calculus for Engineers, https://nptel.ac.in/courses/111105160
3.	Advanced Engineering Mathematics, https://nptel.ac.in/courses/111107119

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Course Title: Applied Science I **Course Code: NT252005**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks

Course Prerequisite:

- Basic knowledge of secondary and higher Physics
- Basic knowledge of algebra and trigonometry

Course Description: Physics is the backbone of all engineering disciplines. Physics is not just important in engineering, it's essential. It empowers engineers to understand the world, design with precision, innovate responsibly, and build solutions that improve lives. In structural analysis Physics is used in calculating stress, strain, and load distribution in buildings and bridges. In Soil Mechanics Physics is used for Understanding pressure and fluid flow through soils. In Earthquake Engineering Physics wave propagation is used to design earthquake-resistant structures. In Traffic and Water Flow Models, Physics is used for Applying fluid dynamics in drainage and water systems.

Course Objectives:

1. To provide a firm grounding in the basic physics principles and concepts to resolve many Engineering and Technological problems.
2. To study the fundamentals of wave motion and optics.
3. To introduce the fundamental principles of quantum mechanics and nuclear physics, enabling students to study the behaviour of macroscopic & microscopic objects.
4. To provide a fundamental understanding of crystal structures and the principles of X-ray generation and diffraction.
5. To understand and study the Physics principles behind the development of engineering materials.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the fundamental principles, laws, and basic concepts of classical Physics and modern Physics.	Remember (Level 1)
CO2	Interpret the behavior of macroscopic & microscopic objects using fundamentals of wave motion, Optics, quantum mechanics, crystal structure & electromagnetic waves.	Understand (Level 2)
CO3	Use fundamental principles and the laws of physical optics, crystallography and quantum mechanics in various engineering applications.	Apply (Level 3)
CO4	Examine the behavior of physical systems based on wave dynamics, optical effects and advanced engineering materials.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	1	-	-

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Assessment	
CA-1 (a)	Subjective Test / Assignment /PowerPoint Presentation etc.
CA-2 (b)	Subjective Test /Model Making / Assignment / Presentation etc.
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Wave Motion** **Oscillations**: Free oscillation, damped oscillation, Forced Oscillation-Definitions, Applications. **Acoustics**: Introduction, Reflection of sound (reverberation and echo), absorption coefficient, Acoustical planning of building and factors affecting architectural acoustics of building. **Ultrasonic Waves**: Properties, Production of Ultrasonics waves: Magnetostriction method and Piezoelectric method, Applications, Numerical.	6 Hrs
Unit 2	**Engineering Optics** **Interference**: Interference, Types of Interference, Newton's ring- Formation, derivation of diameter. **Lasers**: Characteristics, Absorption, spontaneous emission and stimulated emission; metastable state, population inversion, pumping, resonant cavity, He-Ne Laser, Applications of Lasers **Optical fiber**: Structure, Principle, Acceptance angle, Acceptance cone, Numerical aperture, applications of fiber optics. Numerical**.**	6 Hrs
Unit 3	**Quantum Mechanics & Nuclear Physics** **Quantum Mechanics**: De-Broglie hypothesis of matter waves, Heisenberg's uncertainty principle, Schrodinger's time-dependent wave equation, Schrodinger's time-independent wave equation, Introduction to quantum computing (bits & qubits), Numericals. **Nuclear Physics**: Nuclear Fission & Fusion, Properties of α, β and γ rays, Geiger Muller Counter	6 Hrs
Unit 4	**Crystal Structure and X-rays** **Crystal Structure**: Fundamental concepts (lattice, basis, unit cell, crystal systems), Cubic structure: Number of atoms per unit cell, atomic radius, co-ordination number, packing fraction, Miller indices, Relation between ρ and a **X-rays**: Introduction to X-ray, X-ray diffraction, Explanation of Line and Continuous Spectrum of X-ray, Applications, Numerical.	6 Hrs
Unit 5	**Newtonian Mechanics & Electromagnetism** **Newtonian Mechanics**: Newtons laws of motion, Velocity, Work, Power, Energy- Law of conservation of Energy, Kinetic Energy, Potential Energy, Strain Energy, **Introduction to Electromagnetic theory**: Motion of electron in electric field, motion of electron in magnetic field, Motion of electron in cross field, Numericals	6 Hrs
Unit 6	**Physics of Advanced Materials** **Magnetic materials**: Introduction, Properties of Diamagnetic, Paramagnetic and Ferromagnetic materials, Applications, B-H Curve. **Superconductors**: Definition, critical magnetic field, critical temperature, Zero resistance, Meissner effect, Type I and Type II Superconductors.	6 Hrs

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Sr. No.	Textbooks
1.	R.K. Gaur and S. L. Gupta, Engineering Physics Dhanpat Rai Publications Pvt. Ltd.-New Delhi.
2.	M.N. Avadhanulu and P.G. Kshirsagar, Engineering Physics, S. Chand and Company LTD.
	Reference Books
1.	Ajoy Ghatak, Optics, MacGraw Hill Education (India) Pvt. Ltd.
2.	Charles Kittel, Introduction to solid state physics. John Willey and Sons
3.	A.J. Dekker, Solid State Physics McMillan India –Limited.
4.	Halliday, Fundamentals of physics Electricity and Magnetism, Wiley India, 2011
5.	Beiser A; Mahajan S, Concept of Modern Physics, Tata McGraw-Hill Publishing Company Limited.
	Web Resources
1.	Applied Optics, NPTEL, https://nptel.ac.in/courses/115107131
2.	Fundamentals of Engineering Physics, https://nptel.ac.in/courses/122103011
3.	Concepts in Magnetism & Superconductivity, NPTEL, https://nptel.ac.in/courses/115105131

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Course Title: Applied Science I Lab **Course Code: NT252006**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Practical's/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15Marks
Semester: First Year (Semester II)	ESE	20 Marks

Course Prerequisite:

- Awareness of common lab equipment like Vernier calipers, micrometers etc.
- Knowledge of physical quantities, units, and measurement techniques.
- Ability to interpret and plot graphs.

Course Description: Physics is the backbone of all engineering disciplines. It empowers engineers to understand the world, design with precision, innovate responsibly, and build solutions that improve lives. In structural analysis Physics is used in calculating stress, strain, and load distribution in buildings and bridges. In Soil Mechanics Physics is used for Understanding pressure and fluid flow through soils. In Earthquake Engineering Physics wave propagation is used to design earthquake- resistant structures. In Traffic and Water Flow Models, Physics is used for Applying fluid dynamics in drainage and water systems.

Course Objectives:

1. To provide a firm grounding in the basic physics principles and concepts to resolve many Engineering and Technological problems.
2. To understand and study the Physics principles behind the development of engineering materials.

Course Outcomes:

COs	**After completion of the course:** **Students should be able to**	**Bloom's Level**
CO1	Recall the fundamental principles, laws, and basic concepts of classical Physics and modern Physics.	Remember (Level 1)
CO2	Interpret the behavior of macroscopic & microscopic objects using fundamentals of wave motion, Optics, quantum mechanics, crystal structure & electromagnetic waves.	Understand (Level 2)
CO3	Use fundamental principles and the laws of physical optics, crystallography and quantum mechanics in various engineering applications.	Apply (Level 3)
CO4	Examine the behavior of physical systems based on wave dynamics, optical effects and advanced engineering materials.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	1	-	-

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Assessment	
CA-I (a)	Based on practical: Sr. No. 1 to 4
CA-II (b)	Based on practical: Sr. No. 4 to 8

Sr. No.	List of Experiments	Hours
1	**Newton 's rings** - Determination of the radius of curvature of Plano lano-convex lens /wavelength of light	2 Hrs.
2	**Laser** - Determination of the wavelength of He-Ne laser light	2 Hrs.
3	**G.M. Counter** - Determination of operating voltage of G.M. tube	2 Hrs.
4	**Ultrasonic interferometer**-Determination of the velocity of ultrasonic waves in different liquids.	2 Hrs.
5	**Crystal Plane** – Study of planes with the help of models related to Miller Indices.	2 Hrs.
6	**Fiber optics**- To determine the numerical aperture and acceptance angle of an optical fiber	2 Hrs.
7	**Torsional Pendulum:** To determine the elastic constant of the wire(Y) and rigidity modulus(η) of a given metal wire by using the Torsional Pendulum. (Searle's method)	2 Hrs.
8	**Hysteresis Loop**-B - H Curve Experiment	2 Hrs.

Sr. No.	Textbooks
1.	R.K. Gaur and S. L. Gupta, Engineering Physics Dhanpat Rai Publications Pvt. Ltd.-New Delhi.
2.	M.N. Avadhanulu and P.G. Kshirsagar, Engineering Physics, S. Chand and Company LTD.
	Reference Books
1.	Ajoy Ghatak, Optics, MacGraw Hill Education (India) Pvt. Ltd.
2.	Charles Kittel, Introduction to solid state physics. John Willey and Sons
3.	A.J. Dekker, Solid State Physics McMillan India –Limited.
4.	Halliday, Fundamentals of physics Electricity and Magnetism, Wiley India, 2011
5.	Beiser A; Mahajan S, Concept of Modern Physics, Tata McGraw-Hill Publishing Company Limited.
	Web Resources
1.	Applied Optics, NPTEL, https://nptel.ac.in/courses/115107131
2.	Fundamentals of Engineering Physics, https://nptel.ac.in/courses/122103011
3.	Concepts in Magnetism & Superconductivity, NPTEL, https://nptel.ac.in/courses/115105131

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Course Title: Basic Electronics and Electrical Engineering **Course Code: GE252102**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks

Course Prerequisite:

- Basic Laws and Theorems in Physics.
- Basics of Electricity & Magnetism.
- Basic concepts of current, voltage, resistance, power etc.
- Basic knowledge of Algebra & Trigonometry

Course Description: The Basics of Electrical and Electronics Engineering are foundational to understanding modern technology. The course focuses on Study of current, voltage, power, and energy in circuits. Understanding concepts like Ohm's Law, Kirchhoff's laws, series and parallel circuits, etc. Understanding of how materials like silicon and germanium can be used to control the flow of current & Semiconductor's devices are central to electronics. Focuses on systems that use discrete signals, such as logic gates, binary arithmetic. Study the importance of Transducers and instruments in various industries, enabling the measurement, control, and monitoring of physical systems.

Course Objectives:

1. To recall the fundamental concepts related to DC and AC circuits, electrical machines, diodes, digital electronics, transducers and measuring instruments.
2. To explain the principles, operations, and characteristics of electrical and electronic components, circuits, machines, and instruments.
3. To Utilize electrical and electronic principles for working out circuit problems and to simplify digital circuits.
4. To examine electrical circuits & digital circuits using appropriate laws and theorems.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the fundamental concepts related to DC and AC circuits, electrical machines, diodes, digital electronics, transducers and measuring instruments.	Remember (Level 1)
CO2	Explain the principles, operations, and characteristics of electrical and electronic components, circuits, machines, and instruments.	Understand (Level 2)
CO3	Utilize electrical and electronic principles for working out circuit problems and to simplify digital circuits.	Apply (Level 3)
CO4	Examine electrical circuits & digital circuits using appropriate laws and theorems.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	1	-	-

Deogiri Institute of Engg & Management Studies Chhatrapati Sambhajinagar

Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Elementary Concept & DC Circuits** Circuit Components: Active and Passive Components, Basic Concepts: EMF, Current, Ohm 's Law, Ideal & practical voltage & Current sources & Relation between Voltage, Current & Power. DC Circuits: Kirchhoff's Laws (KCL & KVL), Superposition & Thevenin's Theorem	6Hrs
Unit 2	**AC Fundamentals & Transformer** AC Signal Parameters: Waveforms, Average value, RMS Value, Instantaneous power, active power, reactive power and apparent power, power factor. Pure R, L, C. circuit, AC series Circuits: R-L, R- C & R- L-C (Simple problems only). Single Phase Transformer: Faraday's Law of EMI, Len'z Law, Self and Mutual Induction Construction and working, EMF Equation, Losses, Efficiency, Regulation	6Hrs
Unit 3	**Electrical Machines** DC Motors: Construction & Working principle, Types: DC Series & Shunt Motor, Characteristics of DC Motor and Applications. AC Motor: Construction & Working principle of Single-Phase Induction Motor, Types: Capacitor Start I.M., Capacitor Start Capacitor Run I.M. and Applications, Construction & Working principle of Three-Phase Induction Motor and its types. Special Purpose Motors: Stepper Motor, Servo Motor and BLDC & Introduction to Synchronous motor.	6Hrs
Unit 4	**Diodes and its Applications** Basics of Semiconductor: Types of Semiconductors-intrinsic & Extrinsic PN Junction diode: Formation of PN Junction, Biasing of PN Junction diode, V-I characteristics, Principle of avalanche breakdown. Rectifier: Need of Rectifiers, Half Wave, Full Wave Center Tapped & Full Wave Bridge Rectifier. Filters & Voltage Regulation: Capacitor Filter, LC Filter and CLC/π-Filter. Zener Diode as Voltage Regulator, Linear IC Voltage Regulators- 78XX & 79XX, Block diagram of a regulated dc power supply.	6Hrs
Unit 5	**Basics of Digital Electronics** Number Systems: Types of Number systems: Binary, Octal, Decimal & Hexadecimal and their conversions, 1"s and 2"s Complements, Binary Arithmetic (Addition, Subtraction Multiplication & Division). Basic Logic Gates: AND, OR & NOT Universal Gates: NAND & NOR Derived Gates: XOR & XNOR & Boolean Algebra	6Hrs
Unit 6	**Transducers & Instruments** Introduction to Transducers: - Definition and Classification of Transducers, Basic operation of Transducers like RTD, Thermocouple, Thermistor, Displacement Sensor (LVDT), Load cells, Photo Sensor, Piezo-electric sensor, Mass Air Flow Sensor, Flow Meter, Strain gauges. Introduction to Relay, Functional elements of an instrument. Block diagram & working of: Function Generator and Digital Storage Oscilloscope.	6Hrs

Deogiri Institute of Engg & Management Studies Aurangabad

Sr. No.	Textbooks
1.	V. K. Mehta, Rohit Mehta "Principles of Electronics" S. Chand Publications.
2.	B. L. Theraja, Electrical Technology Volume - I, S. Chand.
3.	A.K. Sawhney, Puneet Sawhney "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, New Delhi, 2015
	Reference Books
1.	Millman Halkias: Electronic Devices and Circuits, McGraw-Hill Publication, 2000.
2.	Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition
3.	V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-Hill Publication.
4.	R.P. Jain. "Modern Digital Electronics"
5.	H.S. Kalsi, "Electronic Instrumentation" Tata McGraw-Hill New Delhi,2010
6.	B. L. Theraja, Fundamentals of Electrical Engineering and Electronics, S. Chand, 2006
	Web Resources
1.	Basic Electrical Engineering, NPTEL, https://nptel.ac.in/courses/122106025
2.	Basic Electronics Engineering, NPTEL, https://nptel.ac.in/courses/122106025
3.	Digital Electronics, NPTEL, https://nptel.ac.in/courses/106108099
4.	Instruments & Transducers, NPTEL, https://nptel.ac.in/courses/108102191

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Course Title: Engineering Mechanics **Course Code: NT252105**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks

Course Prerequisite:

- Fundamental of Physics
- Basics of Trigonometry, Geometry and Mathematical Rules and Regulation

Course Description: Engineering Mechanics is the branch of Physics which deals with the study of the effect of force system acting on a particle or a rigid body which may be at rest or in motion with consideration of different laws, principle, theorem and mathematical rules and regulation.

Engineering Mechanics is considered a basic subject for engineering students irrespective of branches, study of this subject helps develop the thinking, analytical ability and imaginative skill of the student.

Engineering Mechanics is the basic subject which supports many other subjects like Strength of Materials, Theory of Machines, Kinetics of Machines, Dynamics of Machines, Fluid Mechanics, Fluid Machines, Machine Design, Tool Design, etc. to apply the engineering concept for manufacturing of various products and projects such as automobile, aircrafts, electric motors, robots, construction of roadways, railways, bridges, dams, power transmission towers, projectile of missiles, satellites and many more.

Course Objectives:

1. To study the resolving forces and moments for a given force system
2. To locate Centre of gravity and Moment of Inertia of plane surfaces
3. To describe fundamental Laws & Conditions of static and dynamic equilibrium for given force system.
4. To compute the different motion characteristics of a body/particle with and without considering force causing motion

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recognize different fundamentals of Engineering Mechanics.	Remember (Level 1)
CO2	Discuss the effect of forces on a rigid body/particle in statics and dynamics, considering C.G. & M.I.	Understand (Level 2)
CO3	Solve problems on rigid bodies/particles subjected to various forces in static and dynamic conditions.	Apply (Level 3)
CO4	Examine beam reactions, frictional effects, truss behavior, and composite areas under equilibrium conditions.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-

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Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Introduction to Engineering Mechanics and Force System** Importance of Engineering Mechanics, Definition, Scope and applications, Fundamental Concepts and Different Newton's Laws, Force and Characteristics of Force, Force System and its Classification, Composition of forces, resolution of forces and resultant. Problem on Resultant Force. Principle of Transmissibility, Principle of Superposition, Law of Triangle, Law of Polygon, Law of Parallelogram of Forces and Problem on Same, Moment, Couple and Varignon's Theorem and Problems	6Hrs
Unit 2	**Equilibrium of Rigid Bodies** Definition of Equilibrium and Conditions of Equilibrium 2D and 3D, Free Body Diagram and Procedure for same. Lami's Theorem, Numerical on Rope and Cylinder kind, Types of Loads and types of Support, Numerical on Beam Reaction.	6Hrs
Unit 3	**Truss and Friction** Introduction and Types of Trusses, Assumption for Perfect Truss, Different methods of Analysis of Truss, Numerical on Method of Joints and Method of Section, Introduction to Friction and Mechanism of Same, Limiting Frictional Force and Laws of Friction, Angle of Friction, Angle of Repose and Cone of Friction, Numerical on Block Friction, Numerical on ladder Friction, Numerical on Wedge Friction.	6Hrs
Unit 4	**Center of Gravity and Moment of Inertia** Centroid, Center of Mass and Center of Gravity, Center of Gravity of Flat Plate and Centroid of an Area, Centroid of Triangular Area and Semicircular Area, Numerical on Centroid of Composite Area, Moment of Inertia of Rigid Body, Area moment of Inertia, Mass Moment of Inertia. Perpendicular Axis Theorem, Parallel Axis Theorem, Radius of Gyration, Moment of Inertia of Some Standard Geometrical Shapes, Numerical based on Moment of Inertia of Composite Area	6Hrs
Unit 5	**Kinematic of Particle/ Rigid Body** Introduction to Dynamics and Kinematic, Motion and Types of Motion, Linear Motion and Numerical on Same, Variable Motion and Numerical on Same, Projectile Motion and Numerical on Same, Curvilinear Motion and Numerical on Same, Rotational Motion and Numerical on Same	6Hrs
Unit 6	**Kinetic of Particle/ Rigid Body** Introduction to Kinetics, Impact and Numerical on Same, Impulse, Momentum and Numerical on Same, Work, Energy, Power and Numerical on same, D'Alembert's Principle and Numerical on Same.	6Hrs

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Sr. No.	Textbooks
1.	S. Timoshenko, D. H. Young, Engineering Mechanics, McGraw Hill, 1995.
2.	Tayal A. K., Engineering Mechanics, Umesh Publications, 2010.
3.	Bhavikatti S. S., Rajashekarappa K. G., Engineering Mechanics‖, New Age International Publications, 2nd Edition.
4.	Beer, Johnston, Vector Mechanics for Engineers‖, Vol. 1: Statics and Vol. 2: Dynamics, McGraw Hill Company Publication, 7th edition, 1995.
	Reference Books
1.	Irving H. Shames, Engineering Mechanics Statics and Dynamics, Pearson Educations, Fourth edition, 2003.
2.	McLean, Nelson, Engineering Mechanics Schaum's outline series, McGraw Hill Book Company, N. Delhi, Publication
3.	Singer F. L., Engineering Mechanics -Statics & Dynamics, Harper and Row Pub. York
4.	Junnarkar S.B., and Shah, H.J., Applied Mechanics, Charotar Publication House Anand
	Web Resources
1.	Engineering Mechanics, https://nptel.ac.in/courses/112106286
2.	Engineering Mechanics by K Ramesh, https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLyqSpQzTE6M_MEUdn1izTMB2yZgP1NLfs

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Deogiri Institute of Engg & Management Studies
Chhatrapati Sambhajinagar

Course Title: Applied Engineering **Course Code: NT252201**		**Course Category: PCC**
Teaching Scheme	**Examination Scheme**	
Lectures: 02 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 02	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks

Course Prerequisite:

- Basic Laws of Physics.
- Basic Knowledge of construction materials (cement, steel, concrete, etc)

Course Description: This course provides foundational knowledge of core concepts and applications in Mechanical and Civil Engineering. It introduces students to essential topics such as thermodynamics, automotive systems, jet propulsion, power plants, and construction principles. Emphasis is placed on real-world engineering practices, emerging technologies, and interdisciplinary innovation. Students will gain insights into professional roles, safety standards, and the use of basic civil and mechanical engineering tools and instruments. The course aims to develop practical understanding and prepare students for diverse career paths in engineering.

Course Objectives:

1. To recall the roles, applications, various domains, current trends, different laws of thermodynamics, basics of I.C. engine and workplace safety and different measuring instruments in mechanical engineering.
2. To know the Hydraulic Structures, Types of Dams, Different barrages, Irrigation methods, Water Treatment Plant.
3. To understand different manufacturing processes, design thinking process, I.C. engine, jet propulsion and different power plants.
4. To summarize building materials, components and planning

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the fundamental principles and scope of Mechanical & Civil engineering, properties and uses of building materials and basics of hydraulics.	Remember (Level 1)
CO2	Explain the basics of thermodynamics, components of building and building plan layout, working and components of I.C. Engines, principles of jet propulsion systems and power plants.	Understand (Level 2)
CO3	Illustrate the performance of ideal and actual thermodynamic cycles such as Carnot, Otto, Diesel and Rankine.	Apply (Level 3)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	1	-	-

Deogiri Institute of Engg & Management Studies ★ Chhatrapati Sambhajinagar ★

Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test

Course Contents		
Unit 1	**An Insight into Mechanical Engineering** Introduction to Mechanical Engineering and roles of mechanical engineer, Revolutionary innovations and applications of mechanical engineering in various disciplines, Various domains of mechanical engineering and carrier paths, Current trends and future scope in mechanical engineering, Introduction to new product development (Design Thinking Process) and basic manufacturing processes, Workplace safety.	4Hrs
Unit 2	**Basic Thermodynamics and Automotive Systems** Introduction to thermodynamics, types of systems, Zeroth, first and Second law of thermodynamics with simple examples pertaining to respective branches, Basic terminology of I.C. Engine. Working of 2 and 4 strokes (Petrol and Diesel engine), Automotive system (Engine, transmission, steering system and brake systems), New technology in automobile industry (Electric vehicle, Hydrogen power vehicles working principle and parts)	4Hrs
Unit 3	**Jet Propulsion and Power Plant Engineering** Jet engine working principle and different parts, Aircraft system (Flight control system and landing gear system), Introduction to power plant engineering, working principle, block diagram and components (Steam power plant, nuclear power plant and Gas turbine power Plant)	4Hrs
Unit 4	**Introduction to Civil Engineering and Building Materials** Various Branches, role of civil engineer in various branches, Engineering properties and uses of materials: Soil, bricks, timber, stones, sand, aggregates, cement, steel, bitumen, glass, Mortar, Concrete, FRP, composite materials.	4Hrs
Unit 5	**Building Planning and Its Components** Principles of planning, Component of building and its functions, Foundation and superstructure, plinth, walls, lintels, beams, columns, Slabs, roofs, staircases, floors, doors, windows, sills, Study of Building plans, Ventilation, Typical building layout.	4Hrs
Unit 6	**Introduction to Hydraulics** Basic Introduction of Hydraulic Structures, Types of Dams, Different barrages, Irrigation methods, Water Treatment Plant	4Hrs

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Sr. No.	Textbooks
1.	P.K. Nag, Engineering Thermodynamics, Tata Mc-Graw-Hill Publication
2.	Domkundwar and Arora, Engineering Thermodynamics, Dhanpat Rai Publication
3.	Mathur and Sharma, Internal Combustion Engine Dhanpat Rai Publication
4.	G.K. Hiraskar, Basic Civil Engineering, Dhanpat Rai Publications in 2004
5.	Anurag Kandya, Elements of Civil Engineering, Charotar Publishing House Pvt. Limited, 2003
	Reference Books
1.	Jonathan Adam Wickert and Kemper Lewis, An introduction to Mechanical Engineering, Thomson Publication
2.	Jack D. Mattingly, Elements of Gas Turbine Propulsion, Tata Mc-Graw-Hill Publication
3.	P.K. Nag, Power Plant Engineering, Tata Mc-Graw-Hill Publication
4.	Arora S. P. and Bindra S.P.,Building Construction, Dhanpat Rai and Sons, Delhi.
5.	Garg S.K. Water Resources Engineering, Volume I, Khanna Publishers, New Delhi
	Web Resources
1.	Basic Thermodynamics: Classical and Statistical Approaches, NPTEL, https://nptel.ac.in/courses/104106107
2.	Basics of Mechanical Engineering, https://nptel.ac.in/courses/112104526
3.	Introduction to Civil Engineering Profession, NPTEL, https://nptel.ac.in/courses/105106201

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EST. 2009

Course Title: Indian Knowledge System **Course Code: GE252702**		**Course Category: IKS**
Teaching Scheme	**Examination Scheme**	
Lectures: 02 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 02	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks
Course Prerequisite: None		

Course Description:

This course provides a comprehensive overview of the Indian Knowledge System (IKS) by exploring the scientific and technological contributions of ancient and modern India across various domains. It covers the foundations of IKS with a focus on mathematics, astronomy, architecture, metallurgy, textiles, and agriculture. The course aims to foster awareness of India's intellectual heritage and its relevance to contemporary science and engineering. It encourages learners to critically appreciate the interdisciplinary nature and global impact of traditional Indian knowledge.

Course Objectives:

1. To understand the foundational concepts and necessity of the Indian Knowledge System.
2. To identify key historical contributions of Indian scholars in mathematics, astronomy, architecture, metallurgy, textiles, and agriculture.
3. To interpret the scientific principles and techniques underlying traditional Indian practices.
4. To analyze the relevance of IKS in modern scientific and technological contexts.
5. To appreciate the global influence and sustainability of Indian innovations throughout history.

Course Outcomes:

COs	**After completion of the course, Students should be able to**	**Bloom's Level**
CO1	Recall key concepts, terminologies, historical developments, and contributions in Indian Mathematics, Astronomy, Architecture, Metallurgy, Textiles, and Agriculture.	Remember (Level 1)
CO2	Explain the principles, methods, and scientific basis of Indian Knowledge Systems in various domains such as mathematics, astronomy, architecture, metallurgy, textiles, and agriculture.	Understand (Level 2)
CO3	Use traditional Indian scientific and technological methods to address contemporary or theoretical problems in relevant fields.	Apply (Level 3)
CO4	Examine the relevance, strengths, and limitations of Indian Knowledge Systems in addressing contemporary scientific, environmental, technological, and societal challenges.	Analyze (Level 4)

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CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	1	-	-	-	1	-	-	-	-	-	-	-	-
CO4	-	1	-	-	-	1	-	-	-	-	-	-	-	-

Assessment	
CA-1 (a)	Subjective Test / Open-book test / etc.
CA-2 (b)	Model Making / Assignment / Presentation / etc.
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Indian Mathematics** Necessity of Indian Knowledge System, Defining Indian Knowledge System, Contributions of Indian Mathematicians, Historical Evidence and features of Indian Numerical Number System, The Idea of Zero and Infinity, Decimal System, Representation of Large Numbers, Global Spread and Adoption of Indian Numericals, Arithmetic (Square of a Number, Square Root, Series and Propagation), Geometry (Simple Constructions from Sulba-Sutras, e.g., Right Angle Triangle, The Value of Pi), Trigonometry and Algebra in IKS, Modern Indian Contributions to Mathematics	4 Hrs
Unit 2	**Indian Astronomy** Historical Development of Indian Astronomy, Astronomy for Timekeeping, Solar and Lunar Motions, The Celestial Coordinate System, Various Regional Indian Calendar Systems, Planetary Model of Aryabhata and Nilakantha, Astronomical Instruments, Various Royal Endeavors for Astronomy (e.g., Jaisingh's Jantar Mantar), Modern Indian Contributions to Astronomy	4 Hrs
Unit 3	**Indian Architecture and Town Planning** Sthapatya-Veda and Vastu-Shastra, Historical Features of Indian Town Planning, Water Management and Drainage Systems, Town Town Planning of Harappan Cities, Temple Architecture, Features and Examples of Cave, Rock Cut, Nagara, Dravida, Kalinga, Vesara, Deccan, Rajput, Mughal, Indo-Saracenic Architecture Styles, Modern Indian Contributions to Architecture and Town Planning	4 Hrs
Unit 4	**Indian Metallurgy** Ancient Mining and Ore Extraction Technologies, Mining and Manufacture of Zinc, Copper and its Alloys, Silver, Gold, Mercury and Lead, Iron Extraction from Biotite, Steel Manufacturing, Global Influence of Wootz Steel, Wax Casting, Modern Indian Contributions to Metallurgy	4 Hrs
Unit 5	**Indian Textile** Textile Traditions in Ancient India, The Variety and Diversity of Indian Textiles, Types of Fabrics and Materials, Cotton and Silk, Weaving Techniques and Looms, Dyeing Process and Natural Colors, Major Textile Centers, Significance of Indian Textile in Historical Global Trade, Fall of Indian Textile in Colonial Era, Modern Indian Contributions to Textile	4 Hrs

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Unit 6	**Indian Agriculture** Importance of Agriculture in Ancient India, Traditional Crops (Grains, Fruits, Vegetables Spices), Significance of Indian Agricultural Products in Historical Global Trade, Significance of Agriculture and Irrigation for the Indian Kings, The Ery System of South India, Traditional Farming Techniques (Land Preparation, Sowing Techniques, Weeding and Pest Management, Harvesting and Storage), Irrigation Techniques and Rainwater Harvesting, Modern Indian Contributions to Agriculture	4 Hrs

Sr. No.	Textbooks
1.	D. M. Bose, S. N. Sen and B. V. Subbarayappa, Eds., A Concise History of Science in India, 2nd Ed., Universities Press, Hyderabad, 2010.
2.	B. Mahadevan, Nagendra Pavana, Vinayak Rajat Bhat, Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning, 2022
3.	Kapil Kapoor, Awadhesh Kumar Singh, Indian Knowledge Systems, D.K. Print World Ltd; First Edition (15 October 2005)
4.	Bhag Chand Chauhan, IKS: The Knowledge system of Bharata, Garuda Prakashan (13 March 2023)
5.	Science in India: A Historical Perspective by B V Subbarayappa, Rupa & Co (2013)
	Reference Books
1.	G. G. Joseph, Indian Mathematics Engaging the World from Ancient to Modern Times, World Scientific, London, 2016
2.	History of Astronomy: A Handbook, Edited by K. Ramasubramanian, Aniket Sule, andbMayank Vahia, SandHI, IIT Bombay, and T.I.F.R. Mumbai, 2016.
3.	History of Science in India Volume-1, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al. National Academy of Sciences, India and The Ramkrishna Mission Institute of Culture, Kolkata (2014).
4.	Christopher Tadgell, History of Architecture in India, Architecture Design and Technology Press (1990)
5.	Bindia Thapar, Introduction to Indian Architecture, Periplus Asian Architecture Series
	Web Resources
1.	Indian Knowledge System Division, Ministry of Education, Government of India, https://iksindia.org/lectures-and-videos.php

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EST. 2009

Deogiri Institute of Engg & Management Studies ★ Chhatrapati Sambhajinagar ★

Course Title: Workshop Practices **Course Code: NT252106**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester II)	ESE	20 Marks

Course Prerequisite:

- Students should possess basic understanding of engineering drawings; common materials used in fabrication and construction.
- Familiarity with measurement tools and hand tools.
- Awareness of safety practices in workshop environments, and foundational knowledge in manual operations like marking, cutting, and assembly.

Course Description: This course is designed to equip first-year engineering students from non-circuit branches with foundational skills in workshop practices essential for real-world engineering applications. Emphasis is placed on safety protocols, correct use of personal protective equipment (PPE), and the handling of common tools and materials. Through hands-on experience in fitting, carpentry, sheet metal, and plumbing operations, students will learn to measure, mark, cut, assemble, and evaluate basic engineering components. The course builds practical competence and fosters an understanding of how mechanical and civil structures are fabricated and assembled in industrial and construction environments.

Course Objectives:

1. To inculcate safety consciousness through knowledge and demonstration of Personal Protective Equipment (PPE) and workshop hazard protocols.
2. To train students in accurate measurement, marking, and metalworking skills using standard fitting tools.
3. To develop competency in fundamental carpentry skills required for basic construction joints.
4. To impart sheet metal fabrication techniques essential for creating basic utility components.
5. To introduce practical plumbing operations including cutting, threading, and layout for basic pipework systems.

Course Outcomes:

COs	**After completion of the course:** **Students should be able to**	**Bloom's Level**
CO1	Recall standard workshop safety practices, including proper use of PPE, first aid procedures, fire safety measures, signage, and safe handling and storage of tools and materials.	Remember (Level 1)
CO2	Explain the objectives, basic principles, and standard procedures of common workshop operations involving measuring, marking, cutting, joining, forming, and finishing of materials.	Understand (Level 2)
CO3	Apply fundamental fabrication skills to produce simple components or assemblies using appropriate tools, equipment, and basic manufacturing processes.	Apply (Level 3)

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CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	–	–	–	1	1	–	–	1	2	–	–	–	–
CO2	3	2	–	–	2	–	–	–	–	1	–	–	–	–
CO3	3	2	2	–	3	–	–	–	–	2	–	–	–	–

Assessment	
CA-I (a)	Based on 02 Practical's from 01 to 05
CA-II (b)	Based on 03 Practical's from 01 to 05

Sr. No.	List of Experiments	Hours
1	Familiarization with PPE, first aid protocols, fire safety, signage and safe handling/storage of tools.	2 Hrs.
2	To prepare a precise rectangular piece from mild steel using standard fitting tools.	4 Hrs.
3	To make a half-lap wood joint, commonly used in structural frames.	4 Hrs.
4	To fabricate a basic utility item such as a toolbox or duct cover.	4 Hrs.
5	To cut and thread pipes for joining in fluid systems.	4 Hrs.

Sr. No.	Textbooks
1.	S. K. Hajra Choudhury, A. K. Hajra Choudhury, Elements of Workshop Technology Vol. I & II, Media Promoters & Publishers Pvt. Ltd.
2.	R. K. Rajput, Workshop Technology, Laxmi Publications.
3.	P. N. Rao, Manufacturing Processes Vol. I, Tata McGraw-Hill Education
4.	W. A. J. Chapman, Workshop Technology, CBS Publishers
5.	Santiram Kal, Basic Electronics: Devices, Circuits, and Applications, PHI Learning
	Reference Books
1.	P. N. Rao, Manufacturing Technology: Foundry, Forming, and Welding
2.	K. Venkat Reddy, Workshop Practice Manual, BS Publications
3.	P. C. Sharma, Production Technology (Manufacturing Processes), S. Chand Publications
4.	K. C. John, Mechanical Workshop Practice, PHI Learning
5.	B. S. Raghuwanshi, Workshop Practice, Dhanpat Rai & Sons
	Web Resources
1.	Free IIT-level video lectures on workshop practices and manufacturing processes, NPTEL – Manufacturing Processes I & II
2.	MIT OpenCourseWare – Manufacturing Processes, High-quality lectures and lab demonstrations
3.	Mechstuff – Engineering Workshop Practices, Blog-style resources with diagrams and practical tips.
4.	SparkFun Soldering Tutorials, Beginner-friendly soldering and PCB tutorials

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Course Title: Sports **Course Code: GE252902**		**Course Category: CC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: 01	CA-II	25 Marks
Semester: First Year (Semester II)	ESE	-
Course Prerequisite: None		
Course Description: This activity-based course introduces students to the world of Indian traditional and international sports, along with holistic wellness practices. Through a blend of interactive lectures, group discussions, expert talks, and hands-on sessions, students will gain practical exposure to the physical, mental, and emotional benefits of sports, yoga, nutrition, hygiene, and mindfulness. The course aims to foster discipline, teamwork, health awareness, and stress management, essential for overall well-being and student success.		
Course Objectives: 1. To gain exposure to Indian traditional and global sports, their history, rules, and cultural significance. 2. To understand the role of physical activity, nutrition, and hygiene in promoting personal health. 3. To practice yoga, pranayama, and meditation techniques for stress relief and mental well-being. 4. To develop and apply healthy routines, coping strategies, and teamwork through group activities and self-reflection.		

Course Outcomes:		
COs	**After completion of the course, students should be able to**	**Bloom's Level**
CO1	Recall key facts about traditional and international sports, health, hygiene, and wellness practices.	Remember (Level 1)
CO2	Explain the significance of physical activities, nutrition, hygiene, yoga, and mental health practices in leading a balanced life.	Understand (Level 2)
CO3	Apply knowledge of sports, health, hygiene, nutrition, yoga, and mindfulness to adopt and maintain healthy habits and routines in daily life.	Apply (Level 3)
CO4	Design a personalized wellness plan incorporating sports, nutrition, yoga, and mental health practices.	Create (Level 6)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	2	-	-	-	-	-	-	-	-

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Assessment	
CA-I (a)	Based on evaluation and participation in the first five activities.
CA-II (b)	Based on evaluation and participation in the subsequent five activities.

Sr. No.	List of Experiments	Hours
1	**Introduction to Indian Traditional Sports** Students will learn about the history, rules, and significance of traditional Indian games such as Kabaddi, Kho-Kho, Mallakhamb, and Indian Martial Arts through a lecture and discussion.	2 Hrs
2	**Introduction to International Sports** Students will learn about the history, rules, and significance of international sports such as Cricket, Football, Tennis, and Asian Martial Arts through a lecture and discussion	2 Hrs
3	**Indian and International Sports Events** Students will participate in a classroom discussion focused on major Indian and international sports events such as the Olympics, Commonwealth Games, Asian Games, Khelo India, and leagues like the IPL and Pro Kabaddi.	2 Hrs
4	**Health and Hygiene** Students will attend an interactive lecture on the fundamentals of personal health and hygiene, which will cover topics such as the importance of daily hygiene practices, disease prevention, hand and oral hygiene, sleep hygiene, and menstrual hygiene.	2 Hrs
5	**Nutrition** Students will attend an interactive lecture followed by a hands-on task where students create a 7-day personal diet plan suitable for their academic and physical routines.	2 Hrs
6	**Yoga: Theory and Scientific Benefits** Students will learn about various yoga postures, breathing techniques, and their benefits through a combination of lecture and yoga video analysis.	2 Hrs
7	**Meditation and Mindfulness for Stress Relief** A classroom session on the science of meditation, its impact on the nervous system, and a short-guided practice with discussion.	2 Hrs
8	**Mental Health Awareness in Student Life** Students will attend a lecture on common mental health issues like stress and anxiety, followed by a group discussion on coping strategies and campus support. The session will include real-life examples and end with a short, guided relaxation.	2 Hrs
9	**Expert Talk: Insights from a Sports or Yoga Professional** An invited expert (sports coach, yoga trainer, or professional athlete) will interact with students, sharing practical insights on sports training, discipline, fitness, or the benefits of yoga in daily life.	2 Hrs
10	**Expert Talk: Health, Hygiene, Nutrition, or Mental Wellness** A healthcare professional (doctor, nutritionist, or mental health expert) will deliver a talk on topics like personal hygiene, balanced diet, managing stress, or mental well-being.	2 Hrs
11	**Group Yoga and Pranayama Session** Students will participate in a guided outdoor yoga session including Surya Namaskar, basic asanas, and pranayama breathing.	2 Hrs

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12	**Guided Meditation Session** Students will participate in a guided meditation session led by an instructor, which will include basic breathing exercises, body awareness, and mindfulness techniques to help reduce stress and improve focus.	2 Hrs

NOTE: Any **ten activities** from the syllabus are to be conducted as part of the course.

Text/Reference Books	
1.	Health and Physical Education, NCERT (Classes IX–XII)
2	BKS Iyengar, Yoga: The Path to Holistic Health: The Definitive Step-by-Step Guide, DK

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Course Title: PBL: Engineering Exploration Lab **Course Code: GE252803**		**Course Category: EL**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester II)	ESE	20 Marks
Course Prerequisite: None. An open mind and willingness to work in diverse teams is essential.		
Course Description: This course introduces students to the fundamentals of platform-based development using Arduino microcontrollers, basic electronics, sensor-actuator interfacing, and simple mechanical mechanisms. Through a hands-on, project-based approach, students explore embedded systems, basic programming logic, and circuit building while integrating sensors and actuators with wireless communication modules. Additionally, the course familiarizes students with real-world mechanical linkages and their applications. By the end of the course, students will be able to build and troubleshoot simple, intelligent physical systems by combining electronics, programming, and mechanical design elements.		
Course Objectives: 1. To understand the basics of embedded systems and microcontrollers. 2. To develop skills in Arduino programming and circuit interfacing. 3. To integrate sensors, actuators, and communication modules in simple projects. 4. To foster creativity, problem-solving, and teamwork through practical engineering challenges.		

Course Outcomes:		
COs	**After completion of the course: Student should be able to**	**Bloom's Level**
CO1	Recall and identify basic components of embedded systems and Arduino hardware platforms.	Remember (Level 1)
CO2	Explain the functionality of Arduino software platforms and basic electronic components.	Understand (Level 2)
CO3	Construct and test simple Arduino circuits using LEDs, switches, and sensors.	Apply (Level 3)
CO4	Analyze and troubleshoot embedded system circuits and Arduino programs for faults.	Analyze (Level 4)
CO5	Design and develop a complete embedded system integrating sensors, actuators, and communication modules for a specific application.	Create (Level 6)

CO-PO Mapping:

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	-	-	2	3	1	-	-	2	2	-	3	-	-
CO2	2	2	-	1	3	-	-	-	2	2	-	3	-	-
CO3	2	2	2	-	3	-	-	-	3	2	-	3	-	-
CO4	2	2	3	1	3	-	-	-	3	2	-	3	-	-
CO5	3	3	3	2	3	-	-	-	3	3	-	3	-	-

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Assessment	
CA-I (a)	Design and implement a basic embedded system application using Arduino by interfacing multiple analog and digital sensors. Display and analyze the sensor outputs using the Serial Monitor.
CA-II (b)	Design and implement an embedded system using Arduino that takes multiple sensors inputs and provides different types of outputs, with the final results displayed on an LCD.

Sr. No.	List of Experiments/Activities	Hours
1.	Introduction to Digital I/O and Arduino IDE Basics.	2 Hrs
2.	To control the LED Brightness Using PWM Output.	2 Hrs
3.	Read Sensor Values and control outputs based on conditions using temperature sensor, relay and fan, LED.	2 Hrs
4.	Servo Motor Positioning Using Analog Input.	2 Hrs
5.	Distance Measurement and Feedback System Using Ultrasonic Sensor and Buzzer.	2 Hrs
6.	Displaying Real-Time Sensor Data on 16x2 LCD Display.	2 Hrs
7.	Wireless Data Transmission from Mobile to Arduino Using HC-05 Bluetooth Module.	2 Hrs
8.	Sensor Data Logging in EEPROM Memory of Arduino.	02
9.	Motor Control Using L298N Motor Driver and Arduino.	02
10.	Building an IoT-Based Weather Station Using Node MCU.	02
11.	To design a four-bar linkage mechanism and control the speed.	02

Sr. No.	Textbooks
1.	FOSSEE Team-IIT Bombay, Microcontroller Programming with Arduino and Python, Shroff Publisher, 1st Edition, 2024.
	Reference Books
1.	John Boxall, Arduino Workshop-A Hands-on Introduction with 65 Projects, No Starch Press, 2nd Edition**.**
2.	Tony Neal, Arduino - An A-to-Z Introduction to Arduino for Complete Newbies", Notion Press, 1st Edition.
	Web Resources
1.	Arduino Playlist by Arduino, https://www.youtube.com/c/arduino

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Course Title: Professional Development II **Course Code: GE252602**		**Course Category: VSE**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester II)	ESE	20 Marks

Course Prerequisite:

- Completion or familiarity with Professional Development I
- Basic proficiency in English and willingness to develop professional skills further.

Course Description: This course advances students' professional competencies by focusing on leadership, teamwork, time and goal management, and advanced communication techniques. The practical activities foster self-awareness, effective collaboration, critical thinking, and written communication skills essential for academic and career success.

Course Objectives:

1. To help students recall essential terms, concepts, and components of leadership, time management, teamwork, and professional communication.
2. To help students understand key concepts of personal effectiveness, leadership, and communication in professional settings.
3. To enable students to apply practical skills in teamwork, time management, goal setting, and professional communication.
4. To encourage students to create structured and effective oral and written communication tailored to professional needs.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall key terminology, concepts, and components related to leadership, time management, teamwork, and professional communication.	Remember (Level 1)
CO2	Explain fundamental principles of leadership, time management, teamwork, and effective communication.	Understand (Level 2)
CO3	Apply essential professional skills such as role playing, presentation, email writing, and rapid reading in real-life scenarios.	Apply (Level 3)
CO4	Create structured written and spoken communication outputs such as essays, emails, and presentations for professional contexts.	Create (Level 6)

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CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	2	2	3	-	1	-	-
CO2	-	-	-	-	-	-	-	2	2	3	-	2	-	-
CO3	-	-	-	-	-	-	-	1	3	3	-	2	-	-
CO4	-	-	-	-	-	-	-	1	3	3	-	3	-	-

Assessment	
CA-I (a)	Based on Activities: Sr. No. 01 to 05
CA-II (b)	Based on Activities: Sr. No. 06 to 10

Sr. No.	List of Activities	Hours
1	SWOT Analysis	2 Hrs
2	Goal Setting	2 Hrs
3	Time Management	2 Hrs
4	Leadership Skills	2 Hrs
5	Teamwork	2 Hrs
6	Role Playing	2 Hrs
7	Presentation Techniques	2 Hrs
8	Email Writing	2 Hrs
9	Essay Writing	2 Hrs
10	Rapid Reading Session	2 Hrs

Sr. No.	Textbooks
1.	Mohd. Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill
2	Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press
	Reference Books
1.	Krishna Mohan & Meera Banerji, Developing Communication Skills, Macmillan India
2.	Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press
	Web Resources
1.	https://www.coursera.org/specializations/professional-skills-for-the-workplace
2.	https://www.coursera.org/learn/emotional-intelligence-in-leadership-1
3.	https://www.coursera.org/learn/managing-professional-work-teams

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Course Title: Do It Yourself II **Course Code: GE252804**		**Course Category: EL**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: AU	CA-II	25 Marks
Semester: First Year (Semester II)	ESE	-

Course Prerequisite:

- Fundamental understanding of Electricity, Current, Voltage.
- Basic concepts in Electronics & Electrical Engineering.

Course Description: This laboratory course provides hands-on experience with basic electrical and electronic components, domestic wiring systems, safety devices like circuit breakers, and mini projects using sensors, logic gates, and Arduino. It helps in building foundational skills for real-world applications in electronics and electrical systems.

Course Objectives:

1. To identify and understand the function of basic electronic components.
2. To familiarize students with domestic wiring and safety mechanisms.
3. To introduce basic digital electronics applications using logic gates.
4. To design and simulate basic electrical/electronic projects.
5. To implement mini-projects using Arduino and sensors.

Course Outcomes:

COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Identify the use of basic electronic and electrical components	Remember (Level 1)
CO2	Explain the working principles of electrical and electronic components in domestic wiring systems, sensor-controlled automation, and basic motor operations.	Understand (Level 2)
CO3	Demonstrate the domestic equipment wiring and construct sensor-based automation systems.	Apply (Level 3)
CO4	Analyze operational principles of sensor-based automation devices and Arduino controllers to evaluate their effectiveness & troubleshoot performance issues.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	1	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	1	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	1	-	-

Assessment	
CA-I (a)	Based on Activities Sr. No. 01 to 08
CA-II (b)	Based on Activities Sr. No. 09 to 16

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Sr. No.	List of Activities	Hours
1	Identification of electrical and electronic components.	1 Hr.
2	Measurement and testing of various electronic components using multimeter	1 Hr.
3	Domestic Equipment Wiring system.	1 Hr.
4	Verification of KCL & KVL Theorem	1 Hr.
5	Circuit breaker application in fault detection and protection.	1 Hr.
6	To study the characteristics of a Full-wave rectifier & Bridge Rectifier	1 Hr.
7	Solar/ Electricity operated charger for mobiles.	1 Hr.
8	Study Zener Diode as a Voltage Regulator	1 Hr.
9	Security alarm and doorbell using Logic Gates.	1 Hr.
10	Plot The forward and reverse V-I characteristic of a PN junction diode	1 Hr.
11	Automatic Rain Sensitive Windshield Wiper.	1 Hr.
12	Study of V-I Characteristics of BJT	1 Hr.
13	Staircase wiring using IR Sensor.	1 Hr.
14	Study of BJT as an amplifier	1 Hr.
15	Water Tank Level Controller Using Arduino.	1 Hr.
16	Study of Single-Phase capacitor start capacitor run Induction Motor.	1 Hr.

Sr.No.	Reference Books
1	Basic Electrical Engineering by D.P. Kothari & I.J. Nagrath.
2	Principles of Electronics by V.K. Mehta
	Web Resources
1.	Basic Electrical Engineering, https://www.youtube.com/watch?v=XrHtU713vJA&list=PL3qvHcrYGy1v2kJX4SSsurE3_GdVe0ZD5
2	Arduini Basics: https://www.youtube.com/watch?v=JnJIKX5J0Cc&list=PLwWF-ICTWmB7-b9bsE3UcQzz-7ipI5tbR
3	Basic Electrical Circuits, https://nptel.ac.in/courses/117106108

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