DEPARTMENT OF ELECTRICAL ENGINEERING

DEOGIRI INSTITUTE OF ENGINEERING AND MANAGEMENT STUDIES, CHH. SAMBHAJINAGAR

Station Road, Osmanpura, Chh.Sambhjinagar-431005(M.S.)

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NEP Compliant Curriculum W.E.F.2026-27 Electrical Engineering

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DEPARTMENT VISION

To become a center of excellence in Electrical Engineering education by nurturing innovative, ethical, and industry-ready engineers capable of contributing to advancements in Electric Vehicles (EVs), sustainable energy, automation, and emerging technologies for the development of society and industry.

DEPARTMENT MISSION

M1: To provide quality education in Electrical Engineering through strong academic foundations, modern laboratories, practical learning, and outcome-based teaching methodologies.

M2: To establish strong collaboration with industries including automotive, manufacturing, and energy sectors for internships, training, consultancy, and industry-oriented projects to meet local and global industrial requirements.

M3: To promote innovation, research, entrepreneurship, and skill development in emerging areas such as Electric Vehicles (EVs), renewable energy, smart grids, automation, and intelligent electrical systems.

Program Outcomes (PO's)

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Ethics: Apply ethical Principles and commit to professional ethics, human values, diversity and inclusion; adhere to national and international Laws.
PO8	Individual and collaborative teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO9	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO10	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO11	Lifelong learning: Recognize the need for and have the preparation and ability for i) Independent and lifelong learning ii) Adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

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Program Educational Objectives (PEOs)

- PEO1 – Professional Competence

  Graduates will apply strong fundamentals of Electrical Engineering along with modern tools and practical skills to analyze, design, and implement solutions for industrial, societal, and technological challenges.

- PEO2 – Industry Readiness and Employability

  Graduates will demonstrate technical competency, professional ethics, teamwork, and communication skills to succeed in industries such as electric vehicles (EVs), power systems, manufacturing, automation, renewable energy, and allied sectors.

- PEO3 – Innovation, Research, and Entrepreneurship

  Graduates will engage in innovation, research, higher education, and entrepreneurial activities in emerging areas including EV technology, smart grids, intelligent electrical systems, automation, and sustainable energy solutions.

Program Specific Outcomes (PSOs)

- PSO1 – Electrical Systems and Industrial Applications

  Apply the principles of electrical engineering, power systems, electrical machines, power electronics, and control systems to analyse, design, and maintain electrical and industrial systems effectively using modern engineering tools and practices.

- PSO2 – Emerging Technologies and Sustainable Solutions

  Develop and implement innovative solutions in emerging areas such as Electric Vehicles (EVs), renewable energy systems, smart grids, automation, intelligent control, and energy-efficient technologies to address industrial and societal needs sustainably.

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Department of Electrical Engineering

Credit Framework under Four-Year UG Engineering Programme with Multiple Entry and Multiple Exit options:

- The Four-year Bachelor's Multidisciplinary Engineering Degree Programme allows the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per their choices and the feasibility of exploring learning from different institutions.
- The minimum and maximum credit structure for different levels under the Four-year Bachelor's Multidisciplinary Engineering UG Programme with multiple entry and multiple exit options are as given below.

Credit Framework

Levels	Qualification Title	Credit Requirement		Semester	Year
		Minimum	Maximum		
4.5	One Year UG Certificate in Engineering/ Technology	40	44	2	1
5.0	Two Year UG Diploma in Engineering/ Technology	80	88	4	2
5.5	Three-Year Bachelor's Degree in vocation (B. Voc)	120	132	6	3
6.0	(B.E./ B.Tech. or Equivalent) in Engg. / Tech. with Multidisciplinary Minor	160	176	8	4
6.0	4-Year Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg. / Tech.-Honors and Multidisciplinary Minor	180	194	8	4
6.0	4-Year Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg. /Tech.- Honors with Research and Multidisciplinary Minor	180	194	8	4
6.0	4-Year Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg./Tech.- Major Engg. Discipline with Double Minors (Multidisciplinary and Specialization Minors)	180	194	8	4

- There are multiple exit options at each level. Students will be given a specific Qualification mentioned in the table depending on the level at which he/she decides to have an exit. Ex. If a student decides to exit after completion of two years (level 5.0) of the program, he will be given a Diploma in Engineering with specific exit conditions mentioned in the syllabus of the specific branch. He/she can rejoin the program with the multiple entry option at the level next where he/she chose to exit previously. (Students can join at level 5.5 if they completed level 5.0 previously at the time of exit).
- Minimum credit requirements of each level are mentioned in the credit framework table.
- There are 4 distinct options available at level 6.0.

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- The first one is the basic level 6.0 option where a minimum of 160- maximum 176 credits are mandatory, which can be completed as per the Semester-wise Credit distribution structure mentioned in the table given below.

Here, the Bachelor's Engineering Degree in chosen Engg. / Tech. Discipline with a multidisciplinary minor (min.160-max.176 Credits), i.e. "B. Tech in Electrical Engineering" (160-176 credits) enables students to take up five to six or required additional courses of 14 credits in the discipline other than Electrical Engineering distributed over semesters III to VIII. Here, in the case of "B. Tech in Electrical Engineering" (160-176 credits), students are supposed to take up 50% or more courses to complete the 50% or more credits (from the assigned 14 credits) of the Engineering minor. The remaining courses to complete the assigned 14 credits can be covered from other disciplines' minor buckets.

- The remaining three level 6.0 options are the advanced options where the student is allowed to get extra qualification by earning some extra credits (18-20 extra credits). These three options are given below:
- Level 6.0: The Bachelor's Engineering Degree with Honours in chosen Major Engg./ Tech. Discipline i.e. in Electrical Engineering with Honours with Multidisciplinary Minor (180-194 credits) enables students of Electrical Engineering to take up five to six additional courses of 18 to 20 credits in the Electrical Engineering discipline distributed over semesters III to VIII. The decision regarding the mechanism of distribution of these 18-20 credits over semesters III to VIII, which are over and above the min.160-max.176 Credits prescribed for the duration of four years will be taken by Academic Authorities. Students must have a CGPA equal to or greater than 7.5 at the end of second semester to go for this option.
- Level 6.0: The Bachelor's Engineering Degree with Research in i.e. in Electrical Engineering with Research with Multidisciplinary Minor (180-194 credits) enables students of Electrical Engineering to take up a research project of 18 to 20 credits in the Electrical Engineering discipline distributed over semesters VII to VIII. Student must have CGPA equal to or greater than 7.5 at the end of sixth semester to go for this option.
- Level 6.0: The Bachelor's Engineering Degree in chosen Engg./ Tech. Discipline with Double Minor (Multidisciplinary and Specialization Minor, 180-194 credits), i.e. "B. Tech in Electrical Engineering with other selected discipline in Engineering (as MDM) with Specialization Minor in Computer Engineering" (180-194 credits) enables students to take up five-six additional courses of 14 credits in the discipline other than Electrical for completion of multidisciplinary minor) and 18 to 20 extra credits in the Computer Engineering discipline distributed over semesters III to VIII. Here, the other selected discipline in Engineering should be different from Specialization Minor i.e. Computer Engineering. This enables students to take up five-six or required additional courses of 18 to 20 credits in the Computer Engineering discipline distributed over semesters III to VIII, which are over and above the min.160-max.176 Credits. The decision regarding the mechanism of distribution of these 18-20 credits over semesters III to VIII, prescribed for the duration of four years will be taken by Academic Authorities. Students must have a CGPA equal to or greater than 7.5 at the end of second semester to go for this option.

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GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit:

1Hr. Lecture(L) per week	1 credit
1Hr. Tutorial(T) per week	1 credit
1Hr. Practical(P) per week	0.5 credit
2 Hr. Practical (P) per week	1 credit

B. Total Credits for the completion of B.Tech. in Electrical Engineering
The Total Number of Credits proposed for the four-year B.Tech. Electrical Engineering with 1 multidisciplinary minor (Compulsory) degree is **176** as per the structure given below:

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B.TECH. ELECTRICAL ENGINEERING PROGRAM STRUCTURE (2026-30)

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	08	07	--	--	--	--	--	--	15
Engineering Science Course		07	08	--	--	--	--	--	--	15
Programme Core Course (PCC)	Program Courses	--	02	10	10	10	10	12	--	54
Programme 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. Language Lab, CS, EEE)	Humanities Social Science and Management (HSSM)	02	--	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses (EM)		--	--	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
PBL		01	01	01	01	01	01	01	--	07
Internship/ OJT		--	--	--	--	--	--	--	12	12
Co-curricular Courses (CC) (NSS / YOGA/ Health & Wellness)	Liberal Learning Courses	01	01	--	--	--	--	--	--	02
Open Elective (OE) Other than a particular program		--	--	04	02	02	--	--	--	08
Total Credits (Major)		**20**	**22**	**21**	**21**	**20**	**20**	**20**	**18**	**162**
Multidisciplinary Minor (MDM)	Multidisciplinary Courses	--	-	02	03	03	03	03	--	**14**
(B.E./ B.Tech. or Equivalent) in Engg./ Tech. with Multidisciplinary Minor **• Major + MDM = 162+14 = 176 Credits**									**176**	
Honors and Multidisciplinary Minor		-	-	03	03	04	04	04	-	**18**

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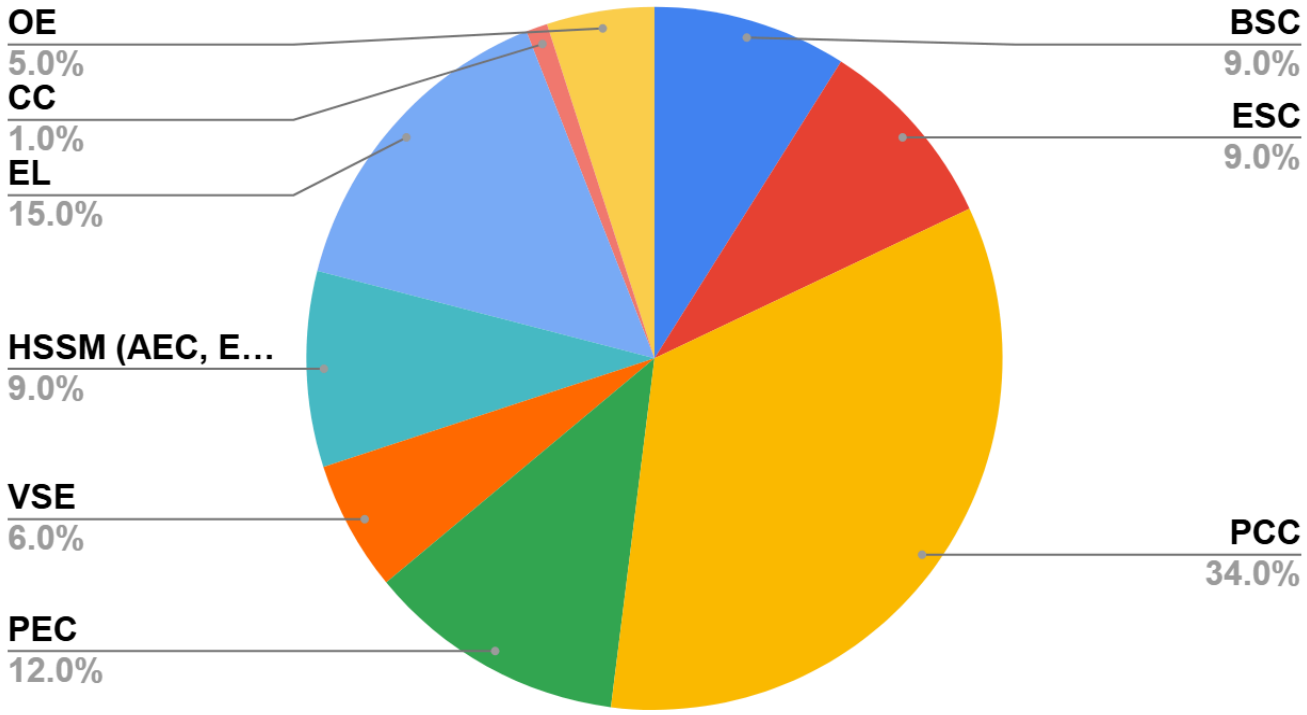
• **4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg./ Tech.- Honors and Multidisciplinary Minor** • **Major + Honors + MDM = 162+18+14 = 194 Credits** • Students with minimum **CGPA of 7.5** without backlog courses at the end of Second semester and should have earned 42 **credits** are 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 Engg. / Tech.- 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)		--	--	03	03	04	04	04	--	**18**
• **4-Years Bachelor's degree (B.E./ B.Tech. or Equivalent) in Engg. / Tech.- Major Engg. 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**

Note:

1. Multiple entry and exit criteria will be in accordance with the AICTE/UGC/DTE/NEP-2020 guidelines.
2. For Audit course (AU), participation is mandatory but not included in Grade calculations.
3. The Honors and Specialization Minor (Double Minor) offered by the program is exclusively for students of that program. Only students with a minimum CGPA of 7.5 and no backlogs at the end of the Second Semester are eligible. Students must maintain a minimum CGPA of 7.5 and remain without backlogs throughout the program. To earn the Honors and Specialization Minor (Double Minor), students must complete all the courses offered by the program.
4. Honors and Specialization Minor (Double Minor) courses shall be offered through the SWAYAM/NPTEL online learning platform. The Board of Studies (BoS) shall identify, approve, and recommend the course based on its relevance to the program curriculum, academic quality, and prevailing industry standards.

B.Tech. in Electrical Engineering		
Course Category	**Credits**	**% Credits**
Basic Science Courses **(BSC)**	15	9%
Engineering Science Courses **(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)**	2	1%
Open Electives **(OE)**	8	5%
Total Credits	**162**	

Course Category wise % Credits



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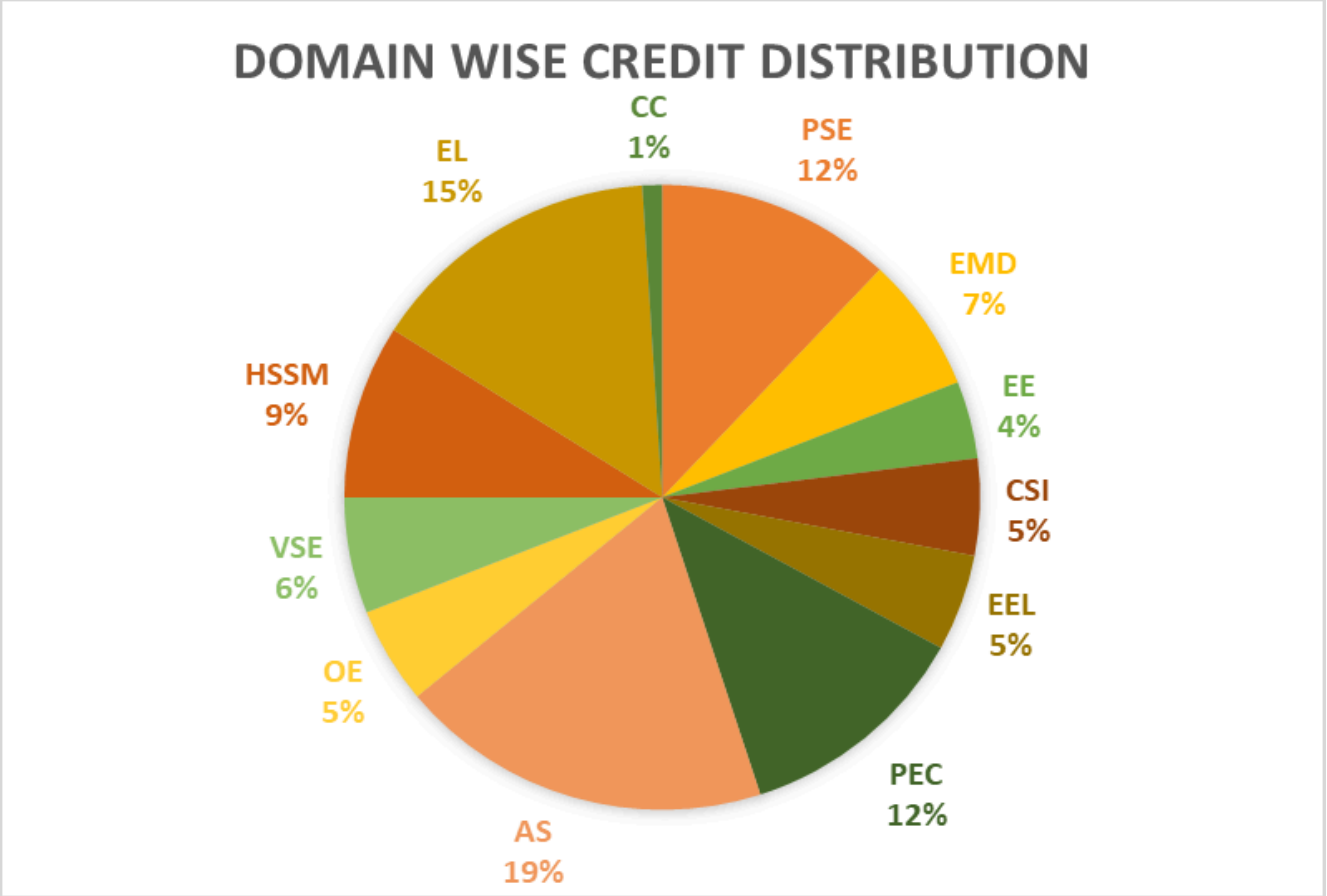
B.Tech. in Electrical Engineering		
Domain	**Credits**	**% Credits**
Power Systems Engineering (**PSE**)	20	12%
Electrical Machines & Drives **(EMD)**	12	7%
Electronics Engineering **(EE)**	6	4%
Control Systems &Instrumentation **(CSI)**	8	5%
EE Lab **(EEL)**	8	5%
Program Elective Courses (**PEC**)	20	12%
Allied Sciences **(AS)**	30	19%
Open Electives (**OE**)	8	5%
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**)	2	1%
Total Credits	**162**	



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Department of Electrical Engineering

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	NT261001	BSH	Linear Algebra and Calculus	3	1	--	4	10	10	20	60	100	4
BSC	NT261002	BSH	Applied Science II	3	--	--	3	10	10	20	60	100	3
ESC	GE261101	ME	Engineering Graphics	3	--	--	3	10	10	20	60	100	3
ESC	NT261107	ETC	Basic Electronics	3	--	--	3	10	10	20	60	100	3
#HSSM-AEC	GE261705	BSH	Modern Indian Language: English	2	--	--	2	10	10	20	60#	100	2
BSC	NT261003	BSH	Applied Science II Lab	--	--	2	2	15	15	--	20	50	1
ESC	GE261103	ME	Engineering Graphics Lab	--	--	2	2	15	15	--	20	50	1
SC-SEC	GE261601	BSH	Professional Development I	--	--	2	2	15	15	--	20	50	1
ELC	GE261801	BSH	Do It Yourself I	--	--	2	2	25	25	--	--	AU	AU
ELC	GE261803	BSH	PBL: Design Thinking Lab	--		2	2	15	15	--	20	50	1
LLC	GE261901	BSH	NSS	--	--	2	2	25	25	--	--	50	1
Total				**14**	**1**	**12**	**27**					**750**	**20**

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	NT262004	BSH	Multivariable Calculus	3	--	--	3	10	10	20	60	100	3
BSC	NT262005	BSH	Applied Science I	3	--	--	3	10	10	20	60	100	3
ESC	NT262104	CE	Engineering Mechanics	4	--	--	4	10	10	20	60	100	4
PCC	EE262201	EE	Basic Electrical Engineering	2	--	--	2	10	10	20	60	100	2
#HSSM-IKS	GE262702	BSH	Indian Knowledge System	2	--	--	2	10	10	20	60#	100	2
BSC	NT262006	BSH	Applied Science I Lab	--	--	2	2	15	15	--	20	50	1
ESC	GE262105	ME	Workshop Practices	--	--	2	2	15	15	--	20	50	1
ESC	NT262106	CS	Programming for Problem Solving Lab	--	1	4	5	30	30	–	40	100	3
SC-SEC	GE262602	BSH	Professional Development II	--	--	2	2	15	15	--	20	50	1
ELC	GE262802	EE	Do It Yourself II	--	--	2	2	25	25	--	--	–	AU
ELC	GE262804	BSH	PBL: Engineering Exploration lab	--	--	2	2	15	15	--	20	50	1
LCC	GE262902	BSH	Student Club Activity	--	--	2	2	25	25	--	--	50	1
Total				**14**	**1**	**16**	**31**					**850**	**22**

End-semester Evaluation will be done at department level.

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SEMESTER III

Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	PR	Total	CA-I	CA-II	MSE	ESE	Total	
PCC	EE263202	EE	Network Analysis	3	--	--	3	10	10	20	60	100	3
PCC	EE263203	EE	Power System-I	3	--	--	3	10	10	20	60	100	3
PCC	EE263204	EE	Electrical Measurement& Instrumentation	2	--	--	2	10	10	20	60	100	2
#HSSM-EEMC	EE263703	EE	Financial Management	2	--	--	2	10	10	20	60#	100	2
#HSSM-VEC	EE263704	BSH	Universal Human Values-II	2	--	--	2	10	10	20	60#	100	2
*OE	--	EE	Open Elective I	3	--	--	3	10	10	20	60	100	4
PCC	EE263205	EE	EE Lab-I	--	--	2	2	15	15	--	20	50	1
PCC	EE263206	EE	EE Lab-II			2	2	15	15		20	50	1
SC-SEC	EE262603	EE	Professional Development III	--	--	2	2	15	15	--	20	50	1
ELC	EE262805	EE	PBL-III (Course Level-Problem Based Learning)	--	--	2	2	15	15	--	20	50	1
ELC	EE262806	EE	Do It Yourself III	--	--	2	2	15	15	--	--	30	1
Total for Major				**15**	**-**	**10**	**25**					**830**	**21**
MDM	EE263401	EE	MDM-I	2	-	-	2	15	15	20	50	100	2
Total for Major with Multidisciplinary Minor (Mandatory Credits)													**23**
HMM	EE263202	EE	HMM I	2			2	10	10	20	60	100	2
OR (Students will be allotted either HMM or DM as per defined criteria)													
DM	EE263203	EE	DM I	2			2	10	10	20	60	100	2
Total for Major with MDM+ (HMM/DM)				**21**		**8**	**29**					**1000**	**25**

SEMESTER IV

Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	PR	Total	CA-I	CA-II	MSE	ESE	Total	
PCC	EE264207	EE	D.C. Machines & Transformer	3	--	--	3	10	10	20	60	100	3
PCC	EE264208	EE	Switchgear & Protection	3	--	--	3	10	10	20	60	100	3
PCC	EE264209	EE	Analog & Digital Circuits	3	--	--	3	10	10	20	60	100	3
*OE	_	EE	Open Elective II	2	--	--	2	10	10	20	60	100	2
#HSSM-AEC	EE264705	BSH	Modern Indian LanguageII:Marathi	2	--	--	2	10	10	20	60#	100	2
$HSSM-EEMC	EE264706	EE	Entrepreneurship Development	2	--	--	2	10	10	20	60$	100	2
#HSSM-VEC	EE264707	EE	Environment & Sustainable Engineering	2	--	--	2	10	10	20	60#	100	2
PCC	EE264210	EE	EE Lab-III	--	--	2	2	15	15	--	20	50	1
VSE	EE264604	EE	Professional Development IV	--	--	2	2	15	15	--	20	50	1

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EL	EE264807	EE	PBL: Problem to Project-Based Learning	--	--	2	2	15	15	--	20	50	1
EL	EE264808	EE	Do It Yourself IV	--	--	2	2	15	15	--	20	50	1
Total for major				**17**	**0**	**8**	**25**				**500**	**900**	**21**
MDM	EE264402		MDM-II	2	-	-	2	15	15	20	50	100	2

#End semester Evaluation will be done at department level. $End Semester Evaluation will be done at Department Level by open-Book Examination

SEMESTER V

Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	P R	Total	CA-I	CA-II	MSE	ESE	Tota l	
PCC	EE265211	EE	Power System Analysis	3	--	--	3	10	10	20	60	100	3
PCC	EE265212	EE	A.C. Machines	3	--	--	3	10	10	20	60	100	3
PCC	EE265213	EE	Microprocessor & Microcontroller	3	--	--	3	10	10	20	60	100	3
PEC	**	EE	Program Elective I	3	1	--	4	10	10	20	60	100	4
OE	##		Open Elective III	2	--	--	2	10	10	20	60	100	2
PCC	EE265214	EE	EE Lab-IV	--	--	2	2	15	15	--	20	50	1
VSE	EE265607	EE	Professional Development V	--	--	2	2	15	15	--	20	50	2
EL	EE265808	EE	PBL: Technology PBL	--	--	2	2	25	25	--	20	50	1
EL	EE265808	EE	Do It Yourself IV	--	--	2	2	15	15	--	20	50	1
Total for Major				**14**	**1**	**8**	**23**				**380**	**700**	**20**
MDM	EE265403		MDM-III	3	1	-	4	15	15	20	50	100	4

SEMESTER VI

Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	PR	Tota l	CA-I	CA-II	MSE	ESE	Total	
PCC	EE266215	EE	Power Electronics	3	--	--	3	10	10	20	60	100	3
PCC	EE266216	EE	Electrical Machine Design	3	--	--	3	10	10	20	60	100	3
PCC	EE266217	EE	Control System Engineering	3	--	--	3	10	10	20	60	100	3
PEC	***	EE	Program Elective II	3	--	--	3	10	10	20	60	100	3
PEC	****	EE	Program Elective III	3	--	--	3	10	10	20	60	100	3
PCC	EE266218	EE	EE Lab-V	--	--	2	2	15	15	--	20	50	1
VSE	EE266606	EE	Professional Development VI	--	--	2	2	15	15	--	20	50	2
EL	EE266811	EE	Do It Yourself VI	--	--	2	2	15	15	--	20	50	1
EL	EE266812	EE	PBL VI: Multidisciplinary Project	--	--	2	2	25	25	--	--	50	1
CI	EE264208	BSE	Constitution of India	2	--	-	2	25	25	--	--	50	Audit
Total for Major				**17**	**0**	**08**	**25**					**750**	**20**
MDM	EE266404		MDM-IV	2	-	-	2	15	15	20	50	100	2

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SEMESTER VII													
Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	PR	Total	CA-I	CA-II	MSE	ESE	Total	
PCC	EE267219	EE	High Voltage Engineering	3	--	--	3	10	10	20	60	100	3
PCC	EE267220	EE	Power System Operation & Control	3	--	--	3	10	10	20	60	100	3
PCC	EE267221	EE	Electrical Drives	3	--	--	3	10	10	20	60	100	3
PEC	*****	EE	Program Elective-IV	3	--	--	4	10	10	20	60	100	4
VSE	EE267607	EE	Electrical Vehicle	2	--	--	2	10	10	20	60	100	2
PCC	EE267222	EE	EE Lab-VI	--	--	2	2	15	15	--	20	50	1
PCC	EE267223	EE	EE Lab-VII	--	--	2	2	15	15	--	20	50	1
PCC	EE267224	EE	EE Lab-VIII	--	--	2	2	15	15	--	20	50	1
EL	EE267813	EE	Do it Yourself VII	--	--	2	2	15	15	--	20	50	1
EL	EE267814	EE	PBLVII: (Senior Design Major Project)	--	--	2	2	15	15	--	20	50	1
Total for Major				**14**	**2**	**10**	**25**					**750**	**20**
MDM	EE267405		MDM-V	3	1	-	4	15	15	20	50	100	4

SEMESTER VIII														
Category	Course Code	BOS	Name of the Course	Teaching Scheme					Evaluation Scheme					Credits
				L	T	PR	O	Total	CA-I	CA-II	MSE	ESE	Total	
PEC	$	EE	Program Elective V	-	-	-	--	--	20	20	--	60	100	3
PEC	$$	EE	Program Elective VI	-	-	-	--	--	20	20	--	60	100	3
ELC	EE268815		Internship / OJT	-	-	-	24	24	50	50	-	100	200	12
Total for Major				**0**	**0**	**0**	**26**	**24**	**90**	**90**	**0**	**220**	**400**	**18**
HRMM	EE268416		HRMM-II	-	-	-	20	20	25	25	-	50	100	10
Total for Major with MDM +(honour / DM/ Research)				**0**	**0**	**0**	**56**	**56**					**500**	**28**

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MSPM'S
Deogiri Institute of Engineering and Management Studies,
Chhatrapati Sambhajinagar
(An Autonomous Institute)
Department of Electrical Engineering

Program Elective Courses (PEC)

Semester	Program	No. of Credits		Power Systems	Electrical Machines & Drive	AI in EE
SEM V	Program Elective I	4	Course Code	EE265301	EE265302	EE265303
			BOS	EE	EE	EE
			Course	Advanced Renewable Energy Sources	Industrial Automation	ML for Electrical Engineering
SEM VI	Program Elective II	3	Course Code	EE266304	EE266305	EE256306
			BOS	EE	EE	EE
			Course	Smart Grid Technology	Electric Vehicles	AI Application in Power System
	Program Elective III	3	Course Code	EE266307	EE266308	EE266309
			BOS	EE	EE	EE
			Course	Power Quality & Mitigation	Special purpose Electrical Machines	Restructured Power Systems
SEM VII	Program Elective IV	4	Course Code	EE267310	EE267311	EE267312
			BOS	EE	EE	EE
			Course	HVDC & FACTS	Fault Diagnosis of Electrical Machines	AIML in Power System
SEM VIII (ONLINE)	Program Elective V	3	Course Code	EE268313	EE268314	ET268315
			BOS	EE	EE	EE
			Course	SWAYAM	MOOC	NPTEL Course
	Program Elective VI	3	Course Code	EE268316	EE268317	EE268318
			BOS	EE	EE	EE
			Course	SWAYAM	MOOC	NPTEL Course

Open Electives (OE) (Offered by Electrical Engg to other program students)

Semester		No. of Credits				
SEM III	Open Elective I	4	Course Code	OE263546	OE263547	OE263548
			BOS	EE	EE	EE
			Course	Fundamentals of Electrical Machines	Industrial Electrical Systems	Estimation & Costing & Tendering
SEM IV	Open Elective II	2	Course Code	OE264549	OE264550	OE264551
			BOS	EE	EE	EE
			Course	Electrical Safety	EV Technology	Energy Storage System
SEM V	Open Elective III	2	Course Code	OE265552	OE265553	OE265554
			BOS	EE	EE	EE
			Course	Mechatronics	Energy management & Distributed Generation	I.E Rules & Acts

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MSPM'S
Deogiri Institute of Engineering and Management Studies,
Chhatrapati Sambhajinagar
(An Autonomous Institute)
Department of Electrical Engineering

*Multidisciplinary Minors (MDM)
(Offered by Electrical Engg to other program students)

Semester	MDM	Code	BOS	Minor	No. of Credits
SEM III	MDM I	EE263401	EE	Energy Storage System	02
SEM IV	MDM II	EE264402	EE	Electrical Vehicle	03
SEM V	MDM III	EE265403	EE	Renewable Energy Technology	03
SEM VI	MDM IV	EE266404	EE	Energy Economics & Marketing	03
SEM VII	MDM V	EE267405	EE	Energy Conservation & Management	03

Honors

Semester	Hon	Code	BOS	Minor	No. of Credits
SEM III	Hon I	EE263401	EE	Advanced Power System Protection	03
SEM IV	Hon II	EE263402	EE	Computer Aided Power System Analysis	03
SEM V	Hon III	EE263403	EE	Extra High Voltage AC Transmission	04
SEM VI	Hon IV	EE263404	EE	Analysis and Modeling of Electrical Machines	04
SEM VII	Hon V	EE263405	EE	Advanced Power Electronics	04

Specialization (Double Minor)

Semester	No. Of Credits		Smart Grid	EV & Energy Storage	Industrial Automation & Control
SEM III	03	Course Code	EE263217	EE263217	EE263217
		BOS	EE	EE	EE
		Course	Smart Grid Technology	Fundamentals of Electric Vehicles	Industrial Automation (PLC & SCADA)
SEM IV	03	Course Code	EE263220	EE263220	EE263220
		BOS	EE	EE	EE
		Course	Digital Protection of Power System	Power Electronics & Electric Drives	Control & Instrumentation
SEM V	04	Course Code	EE263223	EE263223	EE263223
		BOS	EE	EE	EE
		Course	SCADA & Energy Management System	Battery Management System	Mechatronics
SEM VI	04	Course Code	EE263226	EE263226	EE263226
		BOS	EE	EE	EE
		Course	Distributed Generation & Microgrid	EV Charging Infrastructure	Industrial IoT
SEM VII	04	Course Code	EE263229	EE263229	EE263229
		BOS	EE	EE	EE
		Course	AI in Power System	Energy Storage Systems	Industrial Drives

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SEMESTER-I		
Course Title: Linear Algebra and Calculus		
Course Code: NT261001	**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													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**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	**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

Course Title: Applied Science II		
Course Code: NT261002	**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: Student should be able to**	**Bloom's Level**
CO1	Recall the basic concepts of water treatment, fuels, electrochemical energy sources, polymers, corrosion, lubricants, and pollution control.	Remember (Level 1)
CO2	Describe the principles and processes involved in water softening, coal analysis, polymer preparation, corrosion mechanisms, lubricants, and pollution control.	Understand (Level 2)
CO3	Interpret the concepts and processes involved in water treatment, fuels and electrochemical energy sources, high polymers, corrosion, lubricants, and environmental chemistry.	Understand (Level 2)
CO4	Calculate the total hardness of water based on the compounds responsible for water hardness.	Apply (Level 3)
CO5	Apply fundamental principles of chemistry to perform experiments related to volumetric analysis, physical property measurements, corrosion, and polymers for skill development.	Apply (Level 3)
CO6	Examine experimental data and interpret the results to draw appropriate conclusions related to engineering chemistry concepts.	Analyze (Level 4)

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	3	-	-	-	-	-	-	-	-	-	-	-

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 Hours
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 Hours
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 Hours
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 Hours
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 Hours
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 Hours

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.	O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
3.	V. R. Gowarikar, Polymer Science, New Age International Publication.

Course Title: Engineering Graphics		
Course Code: GE261101	**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 technical language was then termed as Engineering Drawing.

Course Objectives:

1. To know and understand the concepts of Points,Lines,Planes,Solids,and Projection 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 will be able to:**	**Bloom's Level**
CO1	Familiarize the geometrical fundamental concepts, BIS standard, drafting tools and theory of projection for construction of different geometries and engineering objects.	Remember (Level 1)
CO2	Interpret the importance of reference planes while drawing the front view and top view in the projection of points, and lines.	Understand (Level 2)
CO3	Demonstrate projection of planes, solids, and development of surfaces using standard engineering drawing principles.	Understand (Level 2)
CO4	Apply the principles of orthographic and isometric projection to create and interpret engineering drawings for accurate visualization and representation of three-dimensional objects.	Apply (Level 3)
CO5	Apply BIS standards, type of lines, dimensioning techniques, and drafting tools to draw the projections of points, lines, planes, solids, and develop the surfaces using standard drawing conventions.	Apply (Level 3)
CO6	Analyze the multi-views to identify hidden and visible features and spatial relationship.	Analyze (Level 4)

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2	3								1				
CO3	3	1							1				
CO4	3	1							1				
CO5	3	1							1				
CO6	3	1							1				

Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignment
CA-2 (b)	Subjective Test/Course Project/Assignment
MSE (c)	Subjective Test
ESE (d)	End Semester Exam
Practical (e)	Oral Exam

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 and SP-46, Drawing Instruments, Sheet Layout, Lettering, Types of Lines, Aligned and Unidirectional Method of Dimensioning, Drawing of a Polygon: General Method; Arc Method; Inscribed Circle Method; Pentagon by the Special Methods; Diagonal Method; and Inscribed Circle Method.	6 Hrs
Unit 2	**Projection of Points & Orthographic Projection** Principle of Projection, Quadrant System, Reference Planes, and Reference Line. Point 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 Method of Projection.	6 Hrs
Unit 3	**Projection of Straight Lines** Various Positions of Straight Line with Respect to Reference Planes, Line Inclined to One Plane and Inclined to Both the Reference Planes (First Quadrant Only), Traces of Lines.	6 Hrs
Unit 4	**Projection of Planes** Types of Planes: Simple Plane; Composite Plane, Various Positions of Planes with Respect to Reference Planes, Planes Inclined to One Reference Plane; Planes Inclined to Both Reference Planes. (Apparent Angle Concept)	6 Hrs
Unit 5	**Projection of Solids and Development of Surfaces** Types of Solids: Cone, Cylinder, Pyramid, and Prisms, Various Positions of Solids, Projection of Solid with Axis Inclined to One Reference Plane only. Introduction to Development of Surfaces, Method of Development- Parallel Line, Radial Line, Triangulation, and Approximate Method, Development of Cylinder, Cone, Pyramid, and Prism.	6 Hrs
Unit 6	**Isometric Projection** Isometric Projection, Isometric Axis, Isometric Lines, Isometric Planes, Isometric Scale and the Different between Isometric Drawing / View and Isometric Projection.	6 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

Course Title: Basic Electronics		
Course Code: NT261107	**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 Laws and Theorems in Physics.
- ➢ Basics of Electricity & Magnetism.
- ➢ Basic concepts of current, voltage, resistance, power etc.
- ➢ Basic knowledge of Algebra & Trigonometry

Course Description: This course provides a fundamental understanding of electronic devices, circuits, and measurement systems essential for Electrical Engineering students. It introduces semiconductor materials, PN junction diodes, rectifier and voltage regulator circuits, bipolar junction transistors, and special semiconductor devices used in modern electronic applications. The course also covers transducers, electronic measuring instruments, and the basics of digital electronics, including number systems, logic gates, and combinational circuits. Through theoretical study students develop the knowledge and skills required to analyse, test, and apply electronic circuits in electrical, instrumentation, automation, and control engineering applications.

Course Objectives:

1. To recall the basic concepts of semiconductors, PN junction diodes, transistors, number systems, logic gates, transducers, and electronic instruments.
2. To explain the operation, characteristics, and applications of diodes, rectifiers, filters, voltage regulators, BJTs, special semiconductor devices, digital circuits, and transducers.
3. To utilize the principles of electronic devices and circuits to analyze transistor biasing circuits, and simple logic circuits.
4. To examine the performance of transistor amplifiers and digital logic circuits using appropriate Laws & Theorems

Course Outcomes:		
COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall the basic concepts of semiconductors, PN junction diodes, transistors, number systems, logic gates, transducers, and electronic instruments.	Remember (Level 1)
CO2	Explain the operation, characteristics, and applications of diodes, rectifiers, filters, voltage regulators, BJTs, special semiconductor devices, digital circuits, and transducers.	Understand (Level 2)
CO3	Utilize the principles of electronic devices and circuits to analyze transistor biasing circuits, and simple logic circuits.	Apply (Level 3)
CO4	Examine the performance of transistor amplifiers and digital logic circuits using appropriate Laws & Theorems	Analyze (Level 4)

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

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	**Semiconductor Basics and Diodes** Atomic Structure and Energy Bands, Conductors, Insulators, and Semiconductors, Intrinsic and Extrinsic Semiconductors, Mechanism in current flow: drift and diffusion, P-type and N-type Semiconductors, PN Junction Diode, V-I Characteristics of PN Junction Diode, diode breakdown and current equation, Applications of Diodes.	6 Hrs
Unit 2	**Diode Applications and Power Supplies** Rectifiers: Half wave, full wave center tapped and bridge rectifier, Rectifier Performance Parameters comparison, Filters: Capacitor, LC Filter, CLC/π-filter, Zener Diode as Voltage Regulator, Linear IC Voltage Regulators- 78XX & 79XX, Block diagram Block Diagram of Regulated Power Supply.	6 Hrs
Unit 3	**Bipolar Junction Transistor (BJT)** Bipolar Junction Transistors: PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration, DC load line analysis, stability factor, Biasing Techniques, Transistor as an amplifier.	6 Hrs
Unit 4	**Special Semiconductor Devices and Applications** Introduction to special semiconductor devices, construction, working principle, symbols, and applications of semiconductor devices: Light Emitting Diode (LED), Zener Diode, Photodiode, Solar Cell, Varactor Diode, Tunnel Diode, Unijunction Transistor (UJT), Opto-coupler, LCD, and Seven Segment Display.	6 Hrs
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, Basic Logic Gates: AND, OR & NOT Universal Gates: NAND & NOR Derived Gates: XOR & XNOR & Boolean Algebra.	6 Hrs
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, Strain gauges and Introduction to Relay. Functional elements of an instrument, Block diagram & working of: Function Generator and Digital Storage Oscilloscope.	6 Hrs

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

Course Title: Modern Indian Language : English		
Course Code: GE261705	**Course Category: HSSM-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 communication
3. To apply correct grammar, pronunciation, and vocabulary in spoken and written English
4. 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													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	2	2	-	-
CO2	-	-	-	-	-	-	-	2	1	2	2	-	-
CO3	-	-	-	-	-	-	-	2	2	3	3	-	-
CO4	-	-	-	-	-	-	-	2	2	3	3	-	-

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

Course Title: Applied Science II Lab		
Course Code: NT261003	**Course Category: BSC**	
Teaching Scheme	**Examination Scheme**	
Practical's/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: Course outcomes of laboratory are mentioned in theory course outcome.

Assessment	
CA-I (a)	Based on practical: Sr. No. 1 to 4
CA-II (b)	Based on practical: Sr. No. 5 to 8

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

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.

Course Title: Engineering Graphics Lab		
Course Code: GE261103	**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

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

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

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

Course Title: Professional Development I		
Course Code: GE261601	**Course Category: SC-SEC**	
Teaching Scheme	**Examination Scheme**	
Practical/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													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	2	2	3	2	-	-
CO2	-	-	-	-	-	-	-	2	2	3	2	-	-
CO3	-	-	-	-	-	-	-	1	3	3	2	-	-
CO4	-	-	-	-	-	-	-	1	3	3	3	-	-

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

Course Title: Do It Yourself I		
Course Code: GE261801	**Course Category: ELC**	
Teaching Scheme	**Examination Scheme**	
Practical/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: AU	CA-II	25 Marks
Semester: First Year (Semester I)	ESE	-

Course Prerequisite: None. An open mind and willingness to work individually and in a diverse team is essential.

Course Description: This hands-on, introductory laboratory course exposes engineering students to the core ecosystems of modern engineering: Digital Fabrication, Robotics & Automation, Artificial Intelligence, and Internet of Things (IoT). Students transition from passive consumers of technology to active creators by learning to safely navigate real-world laboratory tools, software environments, and physical hardware. Through micro-projects,troubleshooting tasks, and an intensive capstone tinkering challenge,students develop cross-disciplinary engineering design thinking, spatial visualization, and technical collaborative skills vital for succeeding in advanced core engineering streams.

Course Objectives:

1. Develop hands-on skills in digital fabrication and rapid prototyping using modern MakerSpace technologies.
2. Develop and assemble basic electronic circuits and design simple PCB layouts.
3. Build and program basic robotic and IoT-based systems for real-world applications.
4. Apply fundamental Artificial Intelligence and computer vision techniques to practical problems.
5. Integrate multidisciplinary technologies to develop functional prototypes through a hands-on, problem-solving approach.

COs	After completion of the course: Students should be able to	Bloom's Level
CO1	**Describe and Demonstrate** safety practices in a rapid prototyping laboratory to ensure safe working conditions.	Understand (Level 1)
CO2	**Develop** simple components using CAD, slicing,and digital fabrication technique for rapid prototyping.	Apply (Level 3)
CO3	**Execute** spatial digitization, reverse engineering, and subtractive manufacturing operations for product replication.	Apply (Level 3)
CO4	**Examine and Perform** basic programming, sensor interfacing, robotics, IoT, artificial intelligence, and computer vision applications.	Analyze (Level 4)
CO5	**Synthesize** multidisciplinary hardware, electronics, and digital technologies to develop functional prototypes within defined constraints.	Create (Level 6)

CO-PO Mapping

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

Assessment	
CA-I (a)	Performance and Evaluation of Activities
CA-II (b)	Performance and Evaluation of Activities
ESE (c)	Practical exam: **Level 1 Certification**

Sr. No.	List of Experiments/Activities	Hours
1.	To familiarize with Maker Space facilities and safety practices.	2 Hrs
2.	To create a basic 3D-printed component by using FDM Single Nozzle 3D Printer	2 Hrs
3.	To fabricate a component using laser engraving machine.	2 Hrs
4.	To scan and reverse engineer a physical component with 3D Scanner	2 Hrs
5.	To explore VR-based CAD applications.	2 Hrs
6.	To build and program a mobile robot using robotic kit	2 Hrs
7.	To interact with a humanoid robot and understand the functionality	2 Hrs
8.	To develop a basic AI classification model with AI-teachable machine	2 Hrs
9.	To perform basic image processing using OpenCV.	2 Hrs
10.	To develop an IoT-based weather monitoring system.	2 Hrs
11.	To develop an IoT-based home automation system.	2 Hrs
12.	To assemble electronic circuits using soldering techniques.	2 Hrs
13.	To design a basic PCB layout using a software	2 Hrs

Sr.No.	Textbooks
1.	Randy H. Shih, Parametric Modeling with Autodesk Fusion 360, SDC Publications (2021).
2.	Chee Kai Chua **and** Kah Fai Leong, 3D Printing **and** Additive Manufacturing: Principles **and** Applications, World Scientific Publishing (2017).
3.	Edward Ashford Lee and Sanjit Arunkumar Seshia, Introduction to Embedded Systems: A Cyber-Physical Systems Approach, MIT Press (2022).
	Reference Books
1.	Mark Geddes, Arduino Project Handbook: 25 Practical Projects for Beginners, No Starch Press (2016).
2.	Joseph Howse and Joe Minichino, Learning OpenCV 4 Computer Vision with Python 3, Packt Publishing (2019).
3.	Arshdeep Bahgaand Vijay Madisetti, Internet of Things: A Hands-On Approach, Universities Press (2014).

	Web Resources
1.	Inkscape Open-Source Vector Learning Portal — Tutorials for Scalable Vector Graphics (.svg) Creation. URL: https://inkscape.org/learn/
2.	Fundamentals of Additive Manufacturing Technologies, IIT Guwahati, Prof. Sajan Kapil. https://nptel.ac.in/courses/112103306
3.	Introduction to 3D Printing with Metals by Prof. Chinedum Chi Okwudire, University of Michigan,https://www.coursera.org/learn/introduction-to-3d-printing-with-metalsmodules.
4.	Wokwi Online Hardware Simulator — Cloud-Based Emulation Platform for Wiring and Debugging ESP32, Arduino, and Sensor Configurations Before Physical Assembly.https://wokwi.com/
5.	Blynk IoT Platform Documentation — API Integration Architectures for Mobile-To-Hardware Automation Widgets. URL: https://docs.blynk.io/

Course Title: PBL: Design Thinking Lab		
Course Code: GE261803	**Course Category: ELC**	
Teaching Scheme	**Examination Scheme**	
Practical/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														
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	-	-

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 Black swan, 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

Course Title: NSS		
Course Code: GE261901	**Course Category: LLC**	
Teaching Scheme	**Examination Scheme**	
Practical/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester II)	ESE	20 Marks

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: Students 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													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	2	1	-	1	1	1	-	-
CO2	-	-	-	-	-	2	2	-	1	1	1	-	-

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

SEMESTER-II		
Course Title: Multivariable Calculus		
Course Code: NT262004	**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													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**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.

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.	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

Course Title: Applied Science I		
Course Code: NT262005	**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)	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 principles of physics behind the development of engineering materials.

Course Outcomes:		
COs	**After completion of the course: Student 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	Describe the properties of functional materials and the essentials of nuclear physics used in engineering systems.	Understand (Level 2)
CO4	Use fundamental principles and the laws of physical optics, crystallography and quantum mechanics in various engineering applications.	Apply (Level 3)
CO5	Apply fundamental principles of physics to perform experiments on optics, nuclear physics and material science for skill development through hands-on practice.	Apply (Level 3)
CO6	Examine the experimental behavior of physical systems based on wave dynamics and optical effects.	Analyze (Level 4)

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	3	-	-	-	-	-	-	-	-	-	-	-

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 Hours
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 fibre:** Structure, Principle, Acceptance angle, Acceptance cone, Numerical aperture, applications of fibber optics. Numerical.	6 Hours
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 Hours
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 Hours
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 Hours

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 Hours

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.	Introduction to Quantum mechanics, https://nptel.ac.in/courses/115104096
3.	Concepts in Magnetism and Superconductivity, NPTEL, https://nptel.ac.in/courses/115105131

Course Title: Engineering Mechanics		
Course Code: NT262104	**Course Category: ESC**	
Teaching Scheme	**Examination Scheme**	
Lectures:04hrs/week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 04	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 and 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: Student should be able to**	**Bloom's Level**
CO1	Recognize different fundamentals of Engineering Mechanics.	Remember (Level 1)
CO2	Discuss effect of forces on rigid body/particle in statics and dynamics considering C.G.&M.I.	Understand (Level 2)
CO3	Solve problems on rigid bodies/particle 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													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-

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	6 Hrs
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.	6 Hrs
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 and Numerical on Wedge Friction.	6 Hrs
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	6 Hrs
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	6 Hrs
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.	6 Hrs

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

Course Title: Basic Electrical Engineering		
Course Code: EE262201	**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 Physics concepts (Electricity, Magnetism, Energy, and Force)
- ➢ Fundamental understanding of units, measurements, and scientific calculations

Course Description: This course introduces the fundamental concepts and principles of Electrical Engineering. It covers electrical quantities, circuit elements, network analysis techniques, electromagnetic principles, electrical machines, and basic electrical drives. Students will develop the ability to analyze DC and AC circuits, understand the operation of electrical devices and machines, and apply engineering principles to solve practical electrical problems. The course provides the foundation for advanced studies in power systems, control systems, electrical machines, power electronics, electrical drives and emerging electrical technologies.

Course Objectives:

1. To introduce the fundamental concepts, electrical quantities, laws, and principles governing electrical engineering systems.
2. To develop the ability to analyze and solve DC and AC electrical circuits using network analysis techniques.
3. To understand the operating principles and characteristics of electromagnetic devices, electrical machines, and basic electrical drives.
4. To build a strong foundation for applying electrical engineering concepts in practical applications and advanced studies in power systems, control systems, power electronics, and emerging electrical technologies.

Course Outcomes:		
COs	**After completion of the course: Student Will be able to**	**Bloom's Level**
CO1	Define the basic concepts of DC, AC, and magnetic circuits.	Remember (Level 1)
CO2	Explain the operating principles of electrical circuits and electromagnetic systems.	Understand (Level 2)
CO3	Apply electrical laws and principles to analyze DC and AC machines.	Apply (Level 3)
CO4	Analyze the operation and selection of electrical drives for engineering applications.	Analyze (Level 4)

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

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

Course Contents		
Unit 1	**DC Circuits** Electrical Circuit: - Circuit Elements Resistance, Inductance & Capacitance, Kirchhoff's Laws, Voltage Source (Definition, Characteristics of Practical Source, and Equivalent Current Source), and Star-Delta Transformation (simple Numerical on Star-delta)	4 Hrs.
Unit 2	**AC Circuits** AC Signal Parameters: Waveforms, Average value, RMS Value, Instantaneous value, Form Factor, Peak Factor, active power, reactive power and apparent power, power factor. Pure Resistive Circuit, Pure Inductive Circuit and Pure Capacitive Circuit with voltage-current relationships and phasor diagrams, Principle of Generation of Single Phase & Three Phase Voltages, Power in Balanced Three Phase AC System, Series AC Circuits: R-L Circuit, R-C Circuit and R-L-C Circuit, Impedance, Reactance, Phase Angle, Polar and Rectangular form and Power Factor.	4 Hrs.
Unit 3	**Magnetic Circuit** Introduction to Magnetic Circuits: Magnetic Flux, Flux Density, Magnetic Field Strength, Permeability and Reluctance, Comparison between Electric and Magnetic Circuits. Magnetic Circuit Laws: Hopkinson's Law, Series and Parallel Magnetic Circuits, Leakage Flux and Fringing. B-H Characteristics, Hysteresis Loop, Magnetic Saturation, Retentivity and Coercivity. Electromagnetic Induction: Faraday's Laws, Lenz's Law, Self and Mutual Induction. (Simple Numerical on above)	4 Hrs.
Unit 4	**DC Machines** Introduction to DC machines and classification, Constructional details: yoke, poles, armature, commutator, brushes, and field winding, Principle of operation of DC generator and DC motor, EMF equation of DC generator and torque equation of DC motor, Back EMF and significance in DC motors, Types of DC machines: Separately excited, shunt & series.	4 Hrs.
Unit 5	**AC Machines** Introduction to AC machines and classification (Alternators, Induction Motors, Synchronous Machines), Constructional features of AC machines: stator, rotor, air gap, and windings, Principle of operation of rotating magnetic field, working principle of three-phase induction motor, Concept and working of synchronous machine (generator and motor), Slip and its significance in induction motors, Comparison between DC and AC machines	4 Hrs.
Unit 6	**Introduction to Electrical Drives** Introduction to Electrical Drives, Parts of Electrical Drives (Electrical Motors and Sources), Types of Electrical Drives, Choice of Electrical Drives and Applications of electrical drive systems, Advantages of Electrical Drives	4 Hrs.

Sr. No.	Text Books
1.	D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, McGraw Hill Education, 4th Edition, 2019.
2.	V. K. Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, S. Chand Publishing, Reprint Edition, 2020.
3.	G. K. Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, 2nd Edition, 2001.
4.	Ashfaq Husain, Basic Electrical Engineering, Dhanpat Rai Publications, 3rd Edition, 2018.
	Reference Books
1.	Rajendra Prasad, Fundamentals of Electrical Engineering, PHI Learning Pvt. Ltd., 3rd Edition, 2014.
2.	Edward Hughes, Hughes Electrical and Electronic Technology, Pearson Education, 12th Edition, 2016.
3.	S. K. Bhattacharya, Basic Electrical and Electronics Engineering, Pearson Education, 2nd Edition, 2017.
	Web Resources
1.	NPTEL, electrical engineering courses Video lectures from IITs on Basic Electrical Engineering, Electrical Machines, Circuits, and Drives. https://nptel.ac.in
2.	MIT Open Courseware- Circuits and Electronics Free course material covering electrical fundamentals and circuit analysis Courses https://ocw.mit.edu

Course Title: Indian Knowledge System		
Course Code: GE262702	**Course Category: HSSM-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)

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

Assessment	
CA-1 (a)	Subjective Test / Open-book test / etc.
CA-2 (b)	Model Making / Assignment / Presentation / etc.
MSE (c)	Subjective Test
ESE (d)	End semester Evaluation will be done at department level.

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.
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

Course Title: Applied Science I Lab		
Course Code: NT262006	**Course Category: BSC**	
Teaching Scheme	**Examination Scheme**	
Practical's/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester)	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: Course outcomes of laboratory are mentioned in theory course outcome.

Assessment	
CA-I (a)	Based on practical: Sr. No. 1 to 4
CA-II (b)	Based on practical: Sr. No. 5 to 8

Sr. No.	List of Experiments	Hours
1	Newton ‗s rings - Determination of radius of curvature of Plano convex lens /wavelength of light	2 Hours
2	Laser - Determination of wavelength of He-Ne laser light	2 Hours
3	G.M. Counter - Determination of operating voltage of G.M. tube	2 Hours
4	Ultrasonic interferometer-Determination of velocity of ultrasonic waves in different liquids.	2 Hours
5	Crystal Plane – Study of planes with the help of models related Miller Indices.	2 Hours
6	Fiber optics- To determine the numerical aperture and acceptance angle of an optical fiber	2 Hours
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 Hours
8	Hysteresis Loop-B - H Curve Experiment	2 Hours

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.

Sr. No.	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.	Introduction to Quantum mechanics, https://nptel.ac.in/courses/115104096
3.	Concepts in Magnetism and Superconductivity, NPTEL, https://nptel.ac.in/courses/115105131

Course Title: Workshop Practices		
Course Code: GE262105	**Course Category: ESC**	
Teaching Scheme	**Examination Scheme**	
Practical/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 fundamental knowledge of basic science and mathematics from secondary education.
- ➢ Basic understanding of tools, safety protocols, and workshop processes.
- ➢ Basic understanding of measurement, marking, material handling, and elementary fabrication.

Course Description: This course introduces first-year engineering students of circuit branches (CSE, AI/ML, E&TC) to interdisciplinary workshop practices integrating electronics, mechanical fabrication, and safety. Students will gain hands-on experience in handling tools, following safety protocols, and fabricating support systems like racks, casings, and stands using fitting, carpentry, and sheet metal techniques. The course also includes foundational soldering skills necessary for circuit prototyping, enabling students to bridge physical hardware with digital systems.

Course Objectives:

1. To inculcate awareness of workshop safety norms, including PPE, ESD protection, and safe handling practices.
2. To train students in measuring, marking, and assembling metal brackets and peripheral mounting frames.
3. To develop carpentry skills for fabricating ergonomic stands and enclosures used in IT labs and smart systems.
4. To introduce sheet metal operations for constructing functional CPU or device casings.
5. To impart soldering techniques through the creation of basic circuits and hands-on hardware integration.

Course Outcomes:		
COs	**After completion of the course: Students should be able to**	**Bloom's Level**
CO1	Recall fundamental workshop safety guidelines, correct use of personal protective equipment (PPE), basic first aid awareness, and safe handling and storage of tools and materials.	Remember (Level 1)
CO2	Explain the objectives, principles, and standard procedures of basic workshop processes such as measuring, cutting, joining, assembling, and finishing.	Understand (Level 2)
CO3	Apply foundational fabrication and assembly skills to create simple functional products or structures using appropriate tools, equipment, and techniques.	Apply (Level 3)

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	2	–	–	–	2	–	–	–	1	2	–	–	–
CO2	3	2	–	–	2	–	–	–	–	1	–	–	–
CO3	3	2	2	1	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	Introduction to safety rules, PPE (gloves, goggles, anti-static wristbands), first aid awareness, and correct storage/handling of tools and hardware.	2 Hrs.
2	To fabricate support brackets or racks for peripherals using metalwork techniques.	4 Hrs.
3	To construct a stable and ergonomic stand for laptops or desktop units using carpentry tools.	4 Hrs.
4	To fabricate an enclosure for electronic circuits such as CPUs or switches.	4 Hrs.
5	To understand and practice basic soldering techniques by assembling a simple circuit.	4 Hrs.

Sr. No.	Textbooks
1.	S. K. Hajra Choudhury, A. K. Hajra Choudhury, Nirjhar Roy, Workshop Technology Vol. I, Media Promoters & Publishers Pvt. Ltd.
2.	S. K. Hajra Choudhury, A. K. Hajra Choudhury, Elements of Workshop Technology Vol. I & II, Media Promoters & Publishers Pvt. Ltd.
3.	R. K. Rajput, Workshop Technology, Laxmi Publications.
4.	P. N. Rao, Manufacturing Processes Vol. I, Tata McGraw-Hill Education
5.	W. A. J. Chapman, Workshop Technology, CBS Publishers
6.	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

Course Title: Programming for Problem Solving Lab		
Course Code: NT262106	**Course Category: ESC**	
Teaching Scheme	**Examination Scheme**	
Practical/Sessions: 04 Hours/Week	CA-I	30 Marks
Tutorial:01 Hours/Week	CA-II	30 Marks
Credits: 03	MES	---
Semester: First Year (Semester II)	ESE	40 Marks

Course Prerequisite:

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

Course Description: This course provides a comprehensive introduction to programming using the C language. It aims to develop problem-solving skills essential for engineering students through the design of algorithms and their implementation in C. The course begins with foundational programming concepts and progressively covers control structures, functions, arrays, strings, pointers, structures, and file handling. Emphasis is placed on writing efficient code, understanding memory management, and applying structured programming techniques.

Course Objectives:

1. To introduce fundamental programming concepts such as algorithms, flowcharts, and C program structure.
2. To develop the ability to use control flow statements, functions, and recursion for problem-solving in C.
3. To enable students to work with arrays, strings, pointers, and structures for handling data efficiently.
4. To impart skills in file handling techniques for data storage, retrieval, and error handling in C
5. To apply C programming constructs to solve computational problems through practical lab sessions.

Course Outcomes:		
COs	**After completion of the course: Student should be able to**	**Bloom's Level**
CO1	Recall basic concepts of programming in C language.	Remember (Level 1)
CO2	Explain C programming elements and file-handling concepts	Understand (Level 2)
CO3	Use the C programming elements to develop efficient C programs and perform input/output operations in file.	Apply (Level 3)
CO4	Analyze program logic, memory usage, and file operations in C to ensure correctness and optimize performance.	Analyze (Level 4)

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**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. 05 to 08

Sr. No.	List of Experiments	Hours
1	Write a C program to declare and initialize variables of different data types and display their sizes.	2 Hrs.
2	Implement arithmetic, relational, and logical operations in C programs and display the results.	2 Hrs.
3	Write a program to demonstrate the use of conditional expressions and explain the order of evaluation.	2 Hrs.
4	Create a C program to perform bitwise operations on integer variables and print the results.	2 Hrs.
5	Develop a C program to demonstrate the use of assignment operators and evaluate expressions involving them.	2 Hrs.
6	Write a C program to implement various control flow statements such as if-else, switch-case, and loops, to solve a given problem.	2 Hrs.
7	Create a function in C to calculate the factorial of a given number and display the result.	2 Hrs.
8	Write a program to find the sum of digits of a number using recursion.	2 Hrs.

Sr. No.	Textbooks
1.	Herbert Schildit, C the Complete Reference, McGraw-Hill Publication, 2000
	Reference Books
1.	Yashwant Kanitkar, Let Us C, PHI
2.	Balguruswamy, Programming in C, PHI.
	Web Resources
1.	Problem Solving through Programming in C, https://nptel.ac.in/courses/106105171

Course Title: Professional Development II		
Course Code: GE262602	**Course Category: SC-SEC**	
Teaching Scheme	**Examination Scheme**	
Practical/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)

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	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	Presentation Techniques	2 Hrs.
7	Email Writing	2 Hrs.
8	Rapid Reading Session	2 Hrs.
9	Introduction to Phonemic Symbols	2 Hrs.
10	Practice & Exercise on Articulation of Speech sound	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

Course Title: Do It Yourself II		
Course Code: GE262802	**Course Category: ELC**	
Teaching Scheme	**Examination Scheme**	
Practical/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: AU	CA-II	25 Marks
Semester: First Year (Semester II)	ESE	AU
Course Prerequisite: Do It Yourself – I.		
DIY II is program specific and will be conducted with multidisciplinary approach in the MAKERSPACE Lab.		

Course Title: PBL: Engineering Exploration Lab		
Course Code: GE262804	**Course Category: ELC**	
Teaching Scheme	**Examination Scheme**	
Practical/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: Students 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													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**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	-	-

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 a potentiometer.	2 Hrs.
3	Automatic Night Lamp Using LDR	2 Hrs.
4	Read Sensor Values and control outputs based on conditions using the temperature sensor LM35.	2 Hrs.
5	Distance Measurement Using Ultrasonic Sensor	2 Hrs.
6	Analog Position Tracker Using Arduino and Servo.	2 Hrs.
7	Displaying Real-Time Sensor Data on 16x2 LCD Display.	2 Hrs.
8	DC Motor Control Using L298N Motor Driver	2 Hrs.
9	Home Automation System Using Relay	2 Hrs.
10	Controlling LED Using HC-05 Bluetooth Module	2 Hrs.
11	Building an IoT-Based Weather Station Using NodeMCU	2 Hrs.

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

Course Title: Students Club Activities		
Course Code: GE262902	**Course Category: LLC**	
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: Active Membership in Any Institute-Approved Student Club		
Course Description: This co-curricular course provides a professional platform for students to foster leadership, teamwork, and specialized domain skills through active engagement in Institute-approved student clubs. Designed as a flexible workplace simulation, the curriculum accommodates diverse student roles by focusing on the core competencies of organizing and/or participating in campus-wide technical, cultural, or social initiatives. Students learn to navigate peer-to-peer collaboration, manage timelines, and achieve targeted outcomes, turning active extracurricular involvement into verifiable workplace readiness and project management experience.		
Course Objectives: 1. To instruct students in the governance, compliance guidelines, and operational frameworks of managed student organizations. 2. To train students in the practical workflows of event planning, resource optimization, task execution, or technical skill application. 3. To facilitate hands-on experience in cross-functional collaboration, communication, and risk mitigation through live club initiatives. 4. To establish professional documentation habits through the evaluation of outcomes, logbooks, and structured activity reporting.		

Course Outcomes:		
COs	**After completion of the course: Students will be able to**	**Bloom's Level**
CO1	**Interpret** the institutional governance, compliance workflows, and safety frameworks required by the Student Affairs Department to run or join campus initiatives.	Understand (Level 2)
CO2	**Apply** specialized domain-specific skills (whether technical, creative, or social) to deliver structured project milestones or performances within a club ecosystem.	Apply (Level 3)
CO3	**Collaborate** within professional peer hierarchies, managing shared resources, event timelines, and stakeholder communication to execute club objectives.	Apply (Level 3)
CO4	**Formulate** comprehensive, data-driven post-activity portfolios including financial logs, attendance metrics, and official reports	Create (Level 6)

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

Assessment	
CA-I (a)	Organization and/or participation in the Club Activities
CA-II (b)	Organization and/or participation in the Club Activities

Students Club Activities
Students are expected to maintain active membership in at least one Institute-approved student club, engaging in initiatives that can range from regular weekly sessions to major one-off events. These club activities can span diverse domains, including technical workshops, cultural performances, and social responsibility campaigns. To ensure academic and administrative compliance, all events must be formally approved by the Student Affairs Department and secure all other necessary institutional permissions before execution. Throughout the semester, students must successfully organize and/or participate in these scheduled club activities to develop real-world leadership and teamwork skills. To receive academic credit for the course, students are required to submit verifiable proof of their involvement when requested. This documentation may include official event reports, attendance records, completion certificates, or activity logbooks, providing clear evidence of their direct contributions.