MALNAD COLLEGE OF ENGINEERING, HASSAN
First Year Scheme 2026-27

I SEMESTER: PHYSICS CYCLE STREAMS :EC/VLSI/EE/CS/CV

Sl. No	Course category	Course Code	Course Title	Offering Dept	Teaching Learning Scheme					Exam Marks			Credits
					L	T	P	TW&SL	TH/S	CIE	SEE	Total	
1.	BSC	MAT6E11/ MAT6S11/ MAT6C11	Mathematics-I for EC/VLSI/EE/CS/CV stream	Mathematics	42	28	0	50	120	50	50	100	04
2.	BSC	PHY6E12 PHY6S12 PHY6C12	Physics for EC/VLSI/EE/CS/CV stream (Integrated Course)	Physics	42	0	28	50	120	50	50	100	04
3.	PSC	CIV6131 BEE6132 PPC6133 EEE6135	Program Specific course (Engg. Mechanics/Basic Electronics/Principles of Programming using C/ Elements of Electrical Engineering)	CV/EC/CS/EE	42	0	0	48	90	50	50	100	03
4.	ESC	ESC614	Engineering Science Course-I	Respective department	42	0	0	48	90	50	50	100	03
5.	ETC	ETC615	Introduction to AI and its use cases (Stream wise)	Respective department	42	0	0	48	90	50	50	100	03
6.	AEC	SKS616	Soft Skills	Humanities	14	0	0	16	30	100	--	100	00
7.	PSC	CIV6131A BEE6132A PPC6133A EEE6135A	Program Specific course Lab (Engg. Mechanics Lab/Basic Electronics Lab /Principles of Programming using C Lab / Elements of Electrical Engineering Lab)	CV/EC/CS/EE	0	0	28	02	30	50	50	100	01
8.	AEC/ SDC	IDT618	Innovation and Design Thinking Lab	Multiple Depts	0	0	28	02	30	50	50	100	01
9.	HSMC	KSK619/ KBK619	Samskrutika Kannada/ Balake Kannada	Humanities	14	0	0	16	30	50	50	100	01

TW&SL-Term Work & Self Learning	**TOTAL**	500	400	900	20

I SEMESTER: CHEMISTRY CYCLE STREAMS : ME/R&AI/CS/CSBS/AI&ML/E&CS

Sl. No	Course category	Course code	Course Title	Offering Dept	Teaching Hours					Exam Marks			Credits
					L	T	P	TW	Total	CIE	SEE	Total	
1	BSC	MAT6M11/ MAT6S11/ MAT6E11	Mathematics-I for ME/R&AI/CS/CSBS/AI&ML/ E&CS stream	Mathematics	42	28	0	50	120	50	50	100	04
2	BSC	CHE6M12/ CHE6S12/ CHE6E12	Chemistry for ME/R&AI/CS/CSBS/AI&ML/ E&CS stream (Integrated Course)	Chemistry	42	0	28	50	120	50	50	100	04
3	ESC	CED613	Computer-Aided Engineering Drawing	ME	28	0	28	34	90	50	50	100	03
4	ESC	ESC614	Engineering Science Course-I	Respective department	42	0	0	48	90	50	50	100	03
5	PLC	PLC615	Programming Language Course (Integrated Course)	CSE & Allied branches	42	0	28	50	120	50	50	100	04
6	AEC	ENG616	Communication skills	Humanities	14	0	0	16	30	50	50	100	01
7	HSMC	ICO617	Indian Constitution	Humanities	14	0	0	16	30	100	--	100	00
8	AEC/ SDC	IDT618	Innovation and Design Thinking Lab	Multiple Depts	0	0	28	02	30	50	50	100	01
TW&SL-Term Work & Self Learning				**TOTAL**						550	450	1000	20

II SEMESTER : PHYSICS CYCLE STREAMS: ME/R&AI/CS/CSBS/AI&ML/E&CS												
Sl. No	**Course category**	**Course Code**	**Course Title**	**Offering Dept**	**Teaching Learning Scheme**					**Exam Marks**			**Credits**
					L	**T**	**P**	**TW&SL**	**TH/S**	**CIE**	**SEE**	**Total**	
1.	BSC	MAT6M21/ MAT6S21/ MAT6E21	Mathematics-II for ME/R&AI/CS/CSBS/AI&ML/E&CS stream	Mathematics	42	28	0	50	120	50	50	100	04
2.	BSC	PHY5M22/ PHY5S22/ PHY5E22	Chemistry for ME/R&AI/CS/CSBS/AI &ML/E&CS stream (Integrated Course)	Physics	42	0	28	50	120	50	50	100	04
3.	PSC	BEE6232/ PPC6233/ EME6234	Program Specific course (Basic Electronics/ Principles of Programming using C/ Elements of Mechanical Engg)	ME/CSE	42	0	0	48	90	50	50	100	03
4.	ESC	ESC624	Engineering Science Course-II	Respective department	42	0	0	48	90	50	50	100	03
5.	ETC	ETC625	Introduction to AI and its use cases (Stream wise)	Respective department	42	0	0	48	90	50	50	100	03
6.	AEC	SKS626	Soft Skills	Humanities	14	0	0	16	30	100	--	100	00
7.	PSC	BEE6232A PPC6233A EME6234A	Program Specific course Lab (Basic Electronics Lab/Principles of Programming using C Lab / Elements of Mechanical Engg. Lab)	CSE/ME	0	0	28	02	30	50	50	100	01
8.	AEC/ SDC	PRJ628	Interdisciplinary Project-Based Learning	Multiple Depts	0	0	28	02	30	50	50	100	01
9.	HSMC	KSK629/ KBK629	Samskrutika Kannada/ Balake Kannada	Humanities	14	0	0	16	30	50	50	100	01
TW&SL-Term Work & Self Learning									**TOTAL**	500	400	900	20

II SEMESTER : CHEMISTRY CYCLE STREAMS: EC/VLSI/EE/CS/CV

Sl. No	Course category	Course code	Course Title	Offering Dept	Teaching Hours					Exam Marks			Credits
					L	T	P	TW	Total	CIE	SEE	Total	
1	BSC	MAT6E21/ MAT6S21/ MAT6C21	Mathematics-II for EC/VLSI/EE/CS/CV Stream	Mathematics	42	28	0	50	120	50	50	100	04
2	BSC	CHE6E22/ CHE6S22/ CHE6C22	Chemistry for EC/VLSI/EE/CS/CV Stream (Integrated Course)	Chemistry	42	0	28	50	120	50	50	100	04
3	ESC	CED623	Computer-Aided Engineering Drawing	ME	28	0	28	34	90	50	50	100	03
4	ESC	ESC624x	Engineering Science Course-II	Respective department	42	0	0	48	90	50	50	100	03
5	PLC	PLC625	Programming Language Course (Integrated Course)	CSE & Allied branches	42	0	28	50	120	50	50	100	04
6	AEC	ENG626	Communication skills	Humanities	14	0	0	16	30	50	50	100	01
7	HSMC	ICO627	Indian Constitution	Humanities	14	0	0	16	30	100	-	100	00
8	AEC/ SDC	PRJ628	Interdisciplinary Project-Based Learning	Multiple Depts	0	0	28	02	30	50	50	100	01
TW&SL-Term Work & Self Learning				**TOTAL**						550	450	1000	20

COURSE CODE LISTFOR I AND II SEMESTER-2026-27

I SEMESTER		
SL NO	**COURSE CODE**	**COURSE TITTLE**
1.	MAT6C11	Mathematics-I for Civil Engineering
2.	MAT6S11	Mathematics-I for Computer Science Engineering Stream
3.	MAT6E11	Mathematics-I for Electrical & Electronics Engineering Stream
4.	MAT6M11	Mathematics-I for Mechanical Engineering Stream
5.	PHY6C12	Physics for Civil Engineering
6.	PHY6S12	Physics for Computer Science Engineering Stream
7.	PHY6E12	Physics for Electronics & Electrical Engineering Stream
8.	CHE6E12	Chemistry for Electrical & Electronics Engineering Stream
9.	CHE6S12	Chemistry for Computer Science and Engineering Stream
10.	CHE6M12	Chemistry for Mechanical Engineering Stream
11.	CIV6131	Engineering Mechanics
12.	BEE6132	Basic Electronics Engineering
13.	PPC6133	Principles of Programming using C
14.	EEE6135	Elements of Electrical Engineering
15.	CIV6131A	Engineering Mechanics Lab
16.	BEE6132A	Basic Electronics Engineering Lab
17.	PPC6133A	Principles of Programming using C Lab
18.	EEE6135A	Elements of Electrical Engineering Lab

19.	CED613	Computer-Aided Engineering Drawing (CAED)
20.	PLC615	Introduction to Python Programming
ESC COURSES		
21.	ESC614A	Introduction to Civil Engineering
22.	ESC614B	Introduction to Electrical Engineering
23.	ESC614C	Introduction to Electronics Engineering
24.	ESC614D	Introduction to Mechanical Engineering
25.	ESC614E	Essentials of Information Technology
ETC COURSES		
26.	ETC615K	Introduction to AI and its use cases for Civil Engineering
27.	ETC615L	Introduction to AI and its use cases for Mechanical Stream
28.	ETC615M	Introduction to AI and its use cases for Electrical & Electronics Engineering
29.	ETC615N	Introduction to AI and its use cases for Electronics Stream
30..	ETC615O	Introduction to AI and its use cases for Computer Science Stream
HUMANITIES COURSES		
31.	SKS616	Soft Skills
32.	ENG616	Communication skills
33.	ICO617	Indian Constitution
34.	IDT618	Innovation and Design Thinking
35.	KSK619	Samskrutika Kannada
36.	KBK619	Balake Kannada

II SEMESTER		
SLNO	**COURSE CODE**	**COURSE TITTLE**
1.	MAT6C21	Mathematics-II for Civil Engineering
2.	MAT6S21	Mathematics-II for Computer Science Engineering Stream
3.	MAT6E21	Mathematics-II for Electrical &Electronics Engineering Stream
4.	MAT6M21	Mathematics-II for Mechanical Engineering Stream
5.	PHY6S22	Physics for Computer Science Engineering Stream
6	PHY6E22	Physics for Electronics &Electrical Engineering Stream
7.	PHY6M22	Physics for Mechanical Engineering Stream
8.	CHE6C22	Chemistry for Civil Engineering
9.	CHE6S22	Chemistry for Computer Science and Engineering Stream
10.	CHE6E22	Chemistry for Electrical &Electronics Engineering Stream
11.	PPC6233	Principles of Programming Using C
12.	EME6234	Elements of Mechanical Engineering
13.	BEE6232	Basic Electronics Engineering
14.	PPC6233A	Principles of Programming Using C Lab
15.	EME6234A	Elements of Mechanical Engineering Lab
16	BEE6232A	Basic Electronics Engineering Lab
17	CED623	Computer-Aided Engineering Drawing
18	PLC625	Introduction to Python Programming

ESC COURSES		
20.	ESC624A	Introduction to Civil Engineering
21.	ESC624B	Introduction to Electrical Engineering
22.	ESC624C	Introduction to Electronics Engineering
23.	ESC624D	Introduction to Mechanical Engineering
24.	ESC624E	Essentials of Information Technology
ETC COURSES		
25.	ETC625K	Introduction to AI and its use cases for Civil Engineering
26.	ETC625L	Introduction to AI and its use cases for Mechanical Stream
27.	ETC625M	Introduction to AI and its use cases for Electrical &Electronics Engineering
28.	ETC625N	Introduction to AI and its use cases for Electronics Stream
29	ETC625O	Introduction to AI and its use cases for Computer Science Stream
HUMANITIES COURSES		
30.	SKS626	Soft Skills
31.	ENG626	Communication skills
32.	ICO627	Indian Constitution
33.	PRJ628	Interdisciplinary Project-Based Learning
34.	KSK629	Samskrutika Kannada
35.	KBK629	Balake Kannada
36.	PRJ628	Interdisciplinary Project-Based Learning

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Scheme Structure and Syllabi for Physics Courses
Academic Year: 2026-27

	I/II SEMESTER											
Sl.No	**Course Category**	**Course Code**	**Course Title**	**Teaching Hours per Semester**					**Weightage of Exam Marks**			**Credits**
				L	**T**	**P**	**TW + SL**	**Total**	**CIE**	**SEE**	**Total**	
1	BSC	PHY6C12/22	Physics for Civil Engineering	42	0	28	50	**120**	50	50	100	**4**
2	BSC	PHY6M12/22	Physics for Mechanical Engineering Stream	42	0	28	50	**120**	50	50	100	**4**
3	BSC	PHY6E12/22	Physics for Electronics and Electrical Engineering Stream	42	0	28	50	**120**	50	50	100	**4**
4	BSC	PHY6S12/22	Physics for Computer Engineering Stream	42	0	28	50	**120**	50	50	100	**4**

L: Lecture, T-Tutorial, P: Practical, TW:Term work (includes assignments, seminars, microprojects, industrial visits, any other student activities, etc.) SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

Equivalent courses:

Previous course Code	**Previous Course Title**	**Equivalent Course Code**	**Equivalent Course Title**
PHY5C12/22	Physics for Civil Engineering	PHY6C12/22	Physics for Civil Engineering
PHY5M12/22	Physics for Mechanical Engineering Stream	PHY6M12/22	Physics for Mechanical Engineering Stream
PHY5E12/22	Physics for Electronics and Electrical Engineering Stream	PHY6E12/22	Physics for Electronics and Electrical Engineering Stream
PHY5S12/22	Physics for Computer Engineering Stream	PHY6S12/22	Physics for Computer Engineering Stream

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Course Title	PHYSICS FOR CIVIL ENGINEERING		
Course Code	PHY6C12/22	(L-T-P) C	(3-0-2)4
Exam	3 hours	Hours/Week	05
SEE	100 marks	Total Hours (L+T+P+TW+SL)	120

Course Objective:

The objective of the course is to make students learn principles and theories of physics in civil engineering field and to develop effective solutions for civil engineering problems.

Course Outcomes:Upon completion of the course, students shall be able to

#	Course Outcomes	Mapping to PO's	Mappin PSO's
1	Interpret fundamental concepts of physics to analyze vibrations, rigid body dynamics, crystallography, photonics, Acoustics and shock waves.	1	
2	Apply theoretical principles to understand and solve problems related to rigid body dynamics, crystal structures, photonic systems, lasers, and Acoustics.	1	
3	Solve problems related to the applications of material science, crystallography, photonics, and Acoustics.	1	
4	Discuss collaboratively in groups to conduct experiments, analyze results, and effectively communicate findings through presentations	1, 8, 9	

MODULE-1	10Hrs.

Vibrations and Rigid Body Dynamics.

Pre-requisites:Fundamentals of Newtonian Mechanics.

Free vibrations. Damped vibrations-derivation of expressions for displacement of damped harmonic motion. Discussion of types of damped vibrations. Forced vibrations-derivation of expression for amplitude and phase-variation with frequency, Resonance. Condition for amplitude resonance. Consequences of resonance. Spring mass and its applications

Rigid body. Moment of inertia. Torsional pendulum-derivation of expression for time period of oscillation. Mention its uses. Bending of beams- derivation of expression for bending moment of a beam. Cantilever-derivation for depression of loaded end of a single cantilever. Applications of cantilevers.

Self-learning component: Simple Harmonic Vibrations.

Numerical problems *on amplitude and phase of forced vibrations, time-period of oscillation, bending moment and Young's Modulus/depression of a cantilever*.

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MODULE-2	10Hrs.

Acoustics and Ultrasonics.

Pre-requisites:Fundamentals of Sound.

Acoustics; Introduction to acoustics, Types of Acoustics, reverberation and reverberation time, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (No derivation), Eyring's formula (No derivation). Comparison of Eyring's and Sabine's formula, measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its Insulation,

Ultrasonics. Non-destructive testing of materials using ultrasonics. Measurement of velocity of ultrasonic waves and elastic constants in solids and liquids. List of application of ultrasonics, detection of cracks in metal blocks, kill bacteria in liquid, medical field, Determining the depth of the sea.

Self-learning; Production of Ultrasonic waves.

Numerical Problems *on reverberation time, absorption power and absorption coefficient, Sabine's formula, Eyring's formula*.

MODULE-3	10Hrs.

Photonics.

Pre-requisites: Geometrical optics, physical science of light waves

Interaction of radiation with matter. Expression for energy density in terms of Einstein's coefficients. Requisites of a Laser system. Conditions for laser action. Types of laser sources. Ruby laser, CO2 laser, Semiconductor laser. Advantages and disadvantages of above laser sources. Holography. Qualitative discussion of measurement of pollutants (LIDAR),LASER Range Finder, Speed Checker, laser cutting, laserdrilling, laser welding,List of other applications: laser-guided missiles, Bridge Deflection ,Road Profiling.

Self-learning: Characteristics of Laser

Numerical problems *on Boltzmann factor, Energy density, number of photons*.

MODULE-4	10Hrs

Crystallography.

Pre-requisites: States of matter, Classifications of solids

Introduction to crystalline solids. Space lattice, Bravais lattice–unit cell, primitive cell. Lattice parameters. Directions and planes, Miller indices. Expression for interplanar spacing. Coordination number. Atomic packing factors (SC, FCC, BCC). Density of a unit cell. Production of X-ray, Bragg's law and Bragg's spectrometer. XRD-application in material characterization.

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Shock waves: Mach number and Mach Angle, Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube, List of applications of Shock Waves,

Self-learning: 7 basic crystal systems.

Numerical problems *on Miller indices, Interplanar space. Bragg's law, Mach number*

List of experiments (to conduct any 10)

1. Measurement of electrical resistivity and energy gap of a semiconductor using four probe technique.
2. Determination of dielectric constant by charging and discharging of a capacitor.
3. Determination of wavelength of LASER by diffraction technique.
4. Verification of Stefan's law of radiation.
5. Determination of Planck's constant using Light Emitting Diodes.
6. Estimation of frequencies of vibrating string and AC using Sonometer.
7. Determination of resonance frequency and inductance using LCR circuits.
8. Determination of Young's modulus using single cantilever.
9. Determination of moment of inertia of rigid bodies and rigidity modulus of a string using torsion pendulum.
10. Determination of numerical aperture and modes of transmission of optical fiber.
11. Determination of Fermi energy of given material.
12. Determination of Mach number by using Reddy shock tube.
13. Peltier effect

Prescribed Textbooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Engineering physics	R K Gaur and S L Gupta,ISBN: 9788189928223	Eleventh Edition,	Dhan pat Rai Publishing Company (P) Ltd.	2011
2	Solid state physics.	S.O.Pillai, ISBN-10: 9386070928,	Eighth edition,	New Age International Pvt. Ltd,	2018
3	Engineering physics Lab Manual	Faculty of Department of Physics	1	Department of Physics, Malnad College of Engineering, Hassan	2025

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Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Shock waves made simple.	Chin too S Kumar, K Takayama and K P J Reddy:	New	Willey India Pvt. Ltd, Delhi	2014
2	A Textbook of Engineering Physics	M.N. Avadhanulu and P.G. Kshirsagar,	10th revised Ed,	S. Chand. & Company Ltd, New Delhi	2018
3	Lasers and Non Linear Optics	B.B Laud	3rd Ed	New Age International Pvt. Ltd,	2011

Online Courses and Video Lectures:

1. **https://onlinecourses.nptel.ac.in/noc23_ee84/preview**
2. **https://onlinecourses.nptel.ac.in/noc23_cy37/preview**

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**)1 1**
CO1	3										
CO2	3										
CO3	3										
CO4	3							1	1		

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Course Title	PHYSICS FOR MECHANICAL ENGINEERING STREAM		
Course Code	PHY6M12/22	(L-T-P) C	(3-0-2)4
EXAM	3 Hours	Hours/Week	5
SEE	100 marks	Total Hours (L+T+P+TW+SL)	120

Course Objective:

The objective of the course is to make students learn principles and theories of physics in the Mechanical engineering field and to develop effective solutions for engineering problems.

Course Outcomes:

Upon completion of the course, students shall be able to

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Interpret fundamental concepts of physics to analyze vibrations, rigid body dynamics, crystallography, photonics, and thermoelectric phenomena.	1	-
2	Apply theoretical principles to understand and solve problems related to rigid body dynamics, crystal structures, photonic systems, lasers, and thermoelectric materials.	1	-
3	Solve problems related to the applications of material science, crystallography, photonics, and thermoelectric devices in engineering	1	-
4	Work collaboratively in groups to conduct experiments, analyze results, and effectively communicate findings through presentations	1, 8, 9	-

MODULE-1	10 hours

Vibrations and Rigid Body Dynamics

Prerequisites: Basics of Mechanics, Oscillations, and Differential equations.

Simple harmonic vibrations. Free vibrations. Damped vibrations-derivation of expressions for displacement of damped harmonic motion. Discussion of types of damped vibrations. Forced vibrations-derivation of expression for amplitude and phase-variation with frequency. Resonance. Condition for amplitude resonance. Applications of resonance,spring mass and its applications.

Rigid body. Moment of inertia. Torsional pendulum-derivation of expression for time of oscillation. Applications in automotive engineering and robotics (moment of inertia of rotating parts like wheels, axles and design of rotating machinery and structural elements). Bending of beams- derivation of

expression for bending moment of a beam. Cantilever-derivation for depression of loaded end of a single cantilever. Application: Cantilever beams in cranes and wings of airplanes.

Self-learning topics: Fundamentals of Elasticity.

Numerical problems *on Amplitude and phase of forced vibrations, time-period of oscillation, bending moment and Young's Modulus/depression of a cantilever.*

MODULE-2	**10 hours**

Crystallography

Pre-requisites: Basic understanding of Atomic structure, Wave-particle duality, and Geometry

Space lattice, Bravais lattice–unit cell, primitive cell. Lattice parameters. Directions and planes, Miller indices. Expression for interplanar spacing. Coordination number. Atomic packing factors (SC, FCC, BCC). Density of a unit cell. X-rays and their types. Bragg's law. Bragg's X-ray spectrometer for identification of crystal structure. Importance of X-ray diffraction in material characterisation. de Broglie's concept of matter waves. Diffraction of matter waves-Davisson-Germer experiment, application of diffraction of X-rays and electrons inadvent of nanotechnology and material characterization-Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM).

Self-learning topics: 7 basic crystal systems

Numerical problems on de Broglie's equation Miller indices, Interplanar space, Bragg's law.

MODULE-3	**10 hours**

Photonics

Pre-requisites: Fundamentals of electromagnetic waves and geometrical optics.

Interaction of radiation with matter. Expression for energy density in terms of Einstein's coefficients. Requisites of a Laser system. Conditions for laser action. Types of laser sources (to list out Solid, Gas and Semiconductor lasers and to list the contrast between them). CO_2 laser –construction and working. Industrial applications of laser: laser cutting, laser drilling, laser welding and laser assisted ultrasonics of finding defects in materials

Optical fibres. Construction and principle. Ray propagation mechanism. Angle of acceptance and numerical aperture - their relationship with refractive indices of core and clad and condition for ray propagation. Modes of transmission: V-number and number of modes, Types of optical fibres, Merits and demerits of optical fibres. Applications: Optical fiber sensors and industrial endoscopy.

Self-learning topics: Identification of other applications: Bar Code scanner, Laser Printer, Laser Cooling, laser fencing, laser-guided missiles, LASER Range Finder, Road Profiling, Bridge Deflection, Speed Checker.

Numerical problems *on Boltzmann factor, Numerical aperture, V-number and number of modes*.

MODULE-4	**10 hours**

Thermoelectric materials and devices

Pre-requisites: Fundamentals of thermodynamics.

Thermoelectric phenomena. Thermo emf and thermo current, Seebeck effect. Variation of thermo emf with temperature, Peltier effect, Seebeck, Peltier and Thomson coefficients (Mention Expression), laws of thermoelectricity. Experimental demonstration of Peltier effect. Explanation of thermo emf based on Peltier effect. Thermo-electric power. Construction and Working of Thermoelectric generators (General). Construction and working of Thermoelectric coolers (Refrigerators), Construction and working of Exhaust (Automobiles). Applications: Temperature sensors: Resistance Temperature Detector (RTD), Thermistor, Thermocouple, waste heat recovery.

Self-learning topics: Renewable energy sources from heat

Numerical Problems *on thermoelectric coefficients*.

List of experiments (to conduct any 10)

1. .Measurement of electrical resistivity and energy gap of a semiconductor using four probe technique.
2. Determination of dielectric constant by charging and discharging of a capacitor.
3. Determination of wavelength of LASER by diffraction technique.
4. Verification of Stefan's law of radiation.
5. Determination of Planck's constant using Light Emitting Diodes.
6. Estimation of frequencies of vibrating string and AC using Sonometer.
7. Determination of resonance frequency and inductance using LCR circuits.
8. Determination of Young's modulus using single cantilever.
9. Determination of moment of inertia of rigid bodies and rigidity modulus of a string using torsion pendulum.
10. Determination of numerical aperture and modes of transmission of optical fiber.
11. Spring constant
12. Fermi energy of copper
13. Measurement of Mach number using Reddy Shock tube
14. Peltier effect

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Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Engineering physics	R K Gaur and S L Gupta, ISBN: 9788189928223, Dhanpat Rai	second	(P) Ltd. Edition	2011
2	Solid state physics	S O Pillai, physicsISBN-10: 9386070928	Eighth edition	New Age International Pvt. Ltd,	9 January 2018.
3	Engineering physics Lab Manual	Faculty of Department of Physics	1	Department of Physics, Malnad College of Engineering, Hassan	2025

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Fiber Optics	A K Ghatak and K Thyagarajan ISBN-13: 978-0521577854	2	Cambridge University Press India Pvt. Limited	1998
2	NPTEL courses on Engineering physics	E-resources			
3	Heat, Thermodynamics and Statistical Physics	Singal, Agarwal and Prakash ISBN-13-9789350065235	New	Pragati Prakashan, India	2017
4	Heat and thermodynamics	Brijlal N Subramanyam ISBN: 81-219-2813-3 S.	new	Chand and Co. Ltd. New Delhi,	2007

E Books and online course materials:

https://onlinecourses.nptel.ac.in/noc23_ee84/preview

https://onlinecourses.nptel.ac.in/noc23_cy37/preview

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Online Courses and Video Lectures:

https://youtu.be/ASOcMmPCLhU

https://youtu.be/pJm1B-||_OE

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**PO1 1**
CO1	3										
CO2	3										
CO3	3										
CO4	3							1	1		

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Course Title	PHYSICS FOR ELECTRONICS AND ELECTRICAL ENGINEERING STREAM		
Course Code	PHY6E12/22	**(L-T-P) C**	(3-0-2)4
Exam	3hour	**Hours/Week**	05
SEE	**100 marks**	**Total Hours (L+T+P+TW+SL)**	**120**

Course Objective:

Objective of the course is to make students learn principles and theories of physics in electronics and electrical engineering fields and to develop effective solutions for engineering problems.

Course Outcomes: Upon completion of the course students shall be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Interpret theories of materials science, photonics and quantum mechanics	1	-
2	Identify applications of materials science, photonics and quantum mechanics.	1	-
3	Solve problems on materials science, lasers, optical fibers and quantum mechanics.	1	-
4	Realise the concepts, laws and properties of materials, photonics and quantum behaviour of matter through experiments.	1,8,9	

MODULE-1	10Hrs.

Electrical Properties of Solids

Pre-requisites: States of Matter and their properties

Free electron theories: Free electrons in metals. Drift velocity, Mean free path, Mean collision time, Relaxation time. Classical free electron theory-assumptions. Expression for electrical conductivity in metals. Failures of classical free electron theory. Quantum free electron theory–assumptions. Fermi energy. Fermi-Dirac distribution function (Fermi factor). Merits of quantum free electron theory. Effects of impurity and temperature on electrical resistivity of metals. Applications(Qualitative discussion); Designing electrical interconnects, PCBs, conductor materials, optoelectronic components-photodetectors, thermal solutions for electronics-heat sinks.

Semiconductors:Effects of impurity and temperature on electrical resistivity of semiconductors.

Electrical conductivity of a semiconductor (derivation). List of Applications: Diodes, Transistors, Integrated Circuits (ICs), Sensors, and in Electric Motor Control, Smart Grids and Power Monitoring, Electric Vehicles (EVs).

Self-learning topics: Band theory of solids and classification of semiconductors.

Numerical problems *on electron concentration, electrical conductivity, resistivity, Fermi factor, Fermi energy.*

MODULE-2	**10Hrs.**

Dielectrics and Superconductors

Pre-requisites: Distinction between different types of materials.

Dielectric materials:Classification: polar and nonpolar dielectrics. Relative permittivity (dielectric constant), Polarization and its types. Frequency dependence of polarizability and permittivity. Expression for internal field. Clausius-Mossotti equation. Dielectric loss and loss tangent, Dielectric strength and breakdown. Ferroelectric and Piezoelectric Materials. Applications(Qualitative); Energy storage devices, transformers, PCBs, RF and Microwave Components.

Superconductors: Temperature dependence of electrical resistivity in superconductors. Meissner effect. Critical magnetic field.Critical current. Type I and Type II superconductors. BCS Theory. High temperature superconductors. Applications; Discussion of superconducting magnets, MRI and SQUID, Identification of other applications; LosslessPower Transmission and Distribution, Superconducting Filters and Amplifiers, Quantum Technology, Generators and Maglev Vehicle.

Self-learning topics: Types of Dielectric Materials-Solid, Liquid, and Gaseous Dielectrics.

Numerical problems *on dielectric constant, internal field, Clausius-Mossotti equation, critical currentand critical magnetic field*.

MODULE-3	**10Hrs.**

Photonics

Pre-requisites: Fundamentals of Geometrical optics

LASER: Interaction of radiation with matter. Expression for energy density in terms of Einstein's coefficients. Requisites of a Laser system. Conditions for laser action. Types of laser sources (to list out Solid, Gas and Semiconductor lasers and to list the contrast between them). CO_2 laser –construction and working, Applications:LIDAR-Measurement of pollutants (qualitative), Identification of other applications: laser cutting, laser drilling, laser welding, Mention of Communication Systems, Measurements and Instrumentation, Testing and Inspection, Power Systems, Consumer Electronics Devices, Remote Sensing.

Optical fibers: Construction and principle. Ray propagation mechanism. Angle of acceptance and numerical aperture - their relationship with refractive indices of core and clad and condition for ray propagation. Modes of transmission: V-number and number of modes, Types of optical fibres, Attenuation. Applications: Discussion of Fiber Optic Communication, identification of other applications-Electrical Power Systems, Measurement and Instrumentation. Lighting and Displays, Embedded Sensing in Smart Systems, Electromagnetic Isolation. Merits and demerits of optical fibers.

Self-learning topics:Analog vs Digital Transmission.

Numerical problem*s on energy, Boltzmann factor, V-number, Numerical aperture, and attenuation.*

MODULE-4	**10Hrs**

Quantum Communication

Pre-requisites: Modes of transfer of thermal energy

Black body. Black body radiation spectrum, Wien's law and Rayleigh Jeans law. Planck's law. Dual nature of matter-Louis de Broglie hypothesis of matter waves. Group velocity, phase velocity, particle velocityand their relation with velocity of light (no derivations). Expression for de Broglie wavelength of electron. Characteristics of matter waves. Schrodinger wave equation. Max Born's interpretation of wave function. Application of Schrodinger wave equation to find eigen values and eigen functions for a trapped particle. Discussion of probability density for different quantum states and advent to quantum computing and communication.

Classical bits and Qubits; Definitions of their types; SQUID, Photonic, NMR, Ion trap. Heisenberg's uncertainty principle. Quantum tunneling, Quantum superposition, Quantum entanglement. Quantum Communication- Quantum Teleportation. Features, Challenges, and Future Prospects of quantum communication: Quantum key distribution. Quantum repeater. Quantum internet. Quantum Satellite Communication (Qualitative).

Self-learning Topics:Application of Schrodinger wave equation to find eigen values and eigen functions for a free particle.

Numerical problems *on Louis de Broglie equations, group velocity, phase velocity and Eigenvalue equation.*

SN	**Experiments (to conduct any 10)**
1	Measurement of electrical resistivity and energy gap of a semiconductor using four prob technique

2	To determine the **resistivity (ρ)** and **conductivity (σ)** of a given metallic wire using its resistance, length, and cross-sectional area.
3	Determination of dielectric constant by charging and discharging of a capacitor.
4	Determination of wavelength of LASER by diffraction technique
5	Verification of Stefan's law of radiation
6	Determination of Planck's constant using Light Emitting Diodes
7	Estimation of frequencies of vibrating string and AC using Sonometer
8	Determination of resonance frequency and inductance using LCR circuits.
9	Determination of Young's modulus using single cantilever
10	Determination of moment of inertia of rigid bodies and rigidity modulus of a string using torsion pendulum.
11	Determination of numerical aperture and modes of transmission of optical fiber
12	Determination of quantum circuit under black box using the output (only 5 circuits).
13	I-V Characteristics of zener diode

Prescribed Textbooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Engineering physics	R K Gaur and S L Gupta ISBN: 9788189928223	2022	Dhanpat Rai Publishing Company	2022
2	Solid state physics	S O Pillai ISBN-10: 9386070928	Eighth edition	New Age International Pvt. Ltd	2018
3	Quantum Computation and Quantum Information	Michael A. Nielsen & Isaac L. Chuang	10th Anniversary Edition	Cambridge University Press	2012
4	Engineering physics Lab Manual	Faculty of Department of Physics	1	Department of Physics, Malnad College of	2025

				Engineering, Hassan	

Reference Books:

Sl. No	BookTitle	Authors	Edition	Publisher	Year
1	Modern Physics	Kenneth S. Krane, ISBN-13: 9781118061145,	3	John Wiley & Sons	2012
2	Lasers and non-linear optics	B.B. Laud, ISBN: 9788122430561	3	New Age International Private Limited	2015
3	Fiber Optics	A K Ghatak and K Thyagarajan, *ISBN-13: 978-1-4039-3011-8, ISBN: 1-4039-3011-2*	2	Macmillan/Laxmi Publications (P) Ltd., New Delhi	2006

E Books and online course materials:

1. https://onlinecourses.nptel.ac.in/noc23_ee84/preview
2. https://onlinecourses.nptel.ac.in/noc23_ph36/preview

Online Courses and Video Lectures:

https://www.coursera.org/search?query=engineering%20physics&topic=Physical%20Science%

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1
CO1	3										
CO2	3										
CO3	3										
CO4	3							1	1		

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First year syllabus 2026-2027

Course Title	**PHYSICS FOR COMPUTER ENGINEERING STREAM**		
Course Code	**PHY6S12/22**	**(L-T-P) C**	(3-0-2) 4
Exam	3 hour	**Hours/Week**	05
SEE	**100 marks**	**Total Hours (L+T+P+TW+SL)**	**120**

Course Objective: The objective of the course is to enable students to learn the principles and theories of physics relevant to computer science and allied engineering fields, forming a foundation towards developing effective engineering solutions.

Course Outcomes: Upon completion of the course the students will be able to

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Discuss the working principles of quantum and classical physics, LASERs, optical fibers, and their applications in photonic systems.	1	-
2	Apply principles of photonics, classical and quantum mechanics in deriving relations between physical quantities and properties.	1	-
3	Solve the problems pertaining to photonics, classical and quantum properties of materials.	1	-
4	Analyze principles of classical and quantum physics through experiments.	1,8,9	-

MODULE-1	10 Hrs.

Photonics

Pre-requisites: Fundamentals of geometrical optics.

LASER: Characteristic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State, Requisites of a laser system, Semiconductor Diode Laser, Applications: LIDAR, Bar code scanner, Laser Printer (Qualitative).

Optical Fiber: Principle and Structure, Propagation of Light, Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA, V-number, Modes of Propagation, fractional refractive index, Classification of Optical Fibers, Attenuation and their types, Applications: Fiber Optic Communication and networking, broadband communication and speed of internet.

Self-learning: Acceptance angle and Total Internal Reflection.

Numerical problems *on Boltzmann factor, V-number, Numerical aperture, and attenuation.*

MODULE-2	10 Hrs.

Free Electron Theory and Superconductivity

Pre-requisites: Basics of current electricity.

Free Electron Theory

Free electron concept in metals. Classical free electron theory-assumptions. Drift velocity, mean free path, Mean collision time, Relaxation time. Expression for electrical conductivity in metals, Failures of Classical Free Electron Theory, Assumptions of Quantum Free Electron Theory, Fermi Energy, Fermi Factor, Variation of Fermi Factor with Temperature and Energy. Merits of Quantum Free Electron Theory. Matthiessen's rule and temperature dependent electrical conductivity.

Superconductivity

Introduction to Superconductors, Temperature dependence of resistivity, Meissner's Effect and its experimental demonstration, Critical Field, Temperature dependence of Critical field, Critical Current, Types of Superconductors. BCS theory, High Temperature superconductivity, Josephson Junctions, superconducting magnets, SQUID(Qualitative), Applications in Quantum Computing and magnetic sensors for brain computer interface.

Self-learning: Resistivity and Mobility

Numerical problems *on electrical conductivity, Fermi energy, and critical magnetic field.*

MODULE-3	10 Hrs.

Quantum mechanics for computation

Pre-requisites: Wave–Particle dualism

Black body radiation spectrum, Wien's law and Rayleigh Jeans law, assumptions of quantum theory of radiation, Planck's law. Explanation of dual nature of matter. de Broglie Hypothesis of Matter Waves, de Broglie wavelength and derivation of its expression for electrons, Phase Velocity and Group Velocity, and their relationship with speed of light (no derivation). Wave Function, Time independent Schrödinger wave equation, Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Quantization of Energy States, Waveforms and Probabilities. The application of quantum mechanics in quantum technology - quantum computation, quantum communication, quantum sensors, quantum materials and devices.

Self-learning: Photoelectric Effect and Compton Effect (qualitative)

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Numerical problems *on de Broglie equations, group velocity, phase velocity and Eigenvalue equation***.**	
MODULE-4	10 Hrs.

Elements of Quantum Computing

Pre-requisites: Fundamentals of binary systems, thermodynamics and statistics.

Introduction to quantum computers, difference between classical and quantum computers, features of quantum computers; exponential speedup, parallel computation, reversible computation. Principles of quantum computation; Heisenberg's uncertainty principle, Quantum tunnelling, Quantum entanglement, quantum superposition. Qubits and working principle of their different types; SQUID, Photonic, NMR, Ion trap. Notations of representing states and operations of quantum computation; Dirac bracket notation, Bloch sphere and matrix. Basics of quantum logic gates; single qubit logic gates (X, Y, Z and Hadamard) and multi-qubit logic gates (Controlled X).

Physics-Inspired Machine Learning Systems

Energy minimization principle in physical systems and its application to neural networks; Hopfield network structure, energy function, attractor states, and Hebbian learning rule. Boltzmann distribution and its role in determining state probabilities in neural systems; influence of temperature on energy-based learning. Simulated annealing technique for global optimization, temperature scheduling and acceptance probability. Ising model analogy for binary neurons; local interactions and global stability.

SN	Experiments (to conduct any 10)
1	Measurement of electrical resistivity and energy gap of a semiconductor using four probe technique
2	Determination of quantum circuit under black box using the output (only 5 circuits).
3	Determination of dielectric constant by charging and discharging of a capacitor.
4	Determination of wavelength of LASER by diffraction technique
5	Verification of Stefan's law of radiation
6	Determination of Planck's constant using Light Emitting Diodes
7	Estimation of frequencies of vibrating string and AC using Sonometer
8	Determination of resonance frequency and inductance using LCR circuits.

9	Determination of Young's modulus using single cantilever
10	Determination of moment of inertia of rigid bodies and rigidity modulus of a string using torsion pendulum.
11	Determination of numerical aperture and modes of transmission of optical fiber
12	I-V Characteristics of zener diode

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Engineering physics	R K Gaur and S L Gupta	1	*Dhanpat Rai Publishing* Company (P) Ltd.	2011
2	Solid state physics	S O Pillai	1	New Age International Pvt. Ltd	2018
3	Engineering physics Lab Manual	Faculty of Department of Physics	1	Department of Physics, Malnad College of Engineering, Hassan	2025

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Modern Physics: Kenneth S. Krane	Kenneth S. Krane	3	John Wiley & Sons, Inc.,	2012
2	Fiber Optics	A K Ghatak and K Thyagarajan	1	Cambridge University Press India Pvt. Limited	1998
3	Quantum Computation and Quantum Information	Michael A. Nielsen & Isaac L. Chuang	10thAnniversary Edition	Cambridge University Press	2012
4	Engineering physics Lab Manual	Faculty of Department of Physics	1	Department of Physics, Malnad College of Engineering, Hassan	2025

E Books and online course materials:

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

https://onlinecourses.nptel.ac.in/noc23_ph29/preview

Online Courses and Video Lectures:

https://youtu.be/lZ3bPUKo5zc?si=xH1W4tBalCExwzEw

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO1 1**
CO1	3										
CO2	3										
CO3	3										
CO4	3							1	1		

Teaching -Learning– Evaluation Scheme:

Sl.No	Teaching and Learning Method	No. of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching (Lecture)	3	14	42
2	Tutorials	1	14	14
3	Integrated Lab Component	2	14	28
3	Student Study Hours–Self Learning	1	14	14
4	Term work	-	-	12
5	Evaluation of Learning Process	-	-	10
Total Learning Hours/Semester				**120**

Assessment Plan

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and scaled down to 15 marks	30
Lab conduction and CIE	Conduction and record: Evaluated for 30 marks and scaled down to 12 CIE: Conducted for 20 and scaled down to 08 marks	20
Total		**50**
Semester end examination (SEE) (for 50 marks): Examination to be conducted for 100 marks and scaled down to 50 marks.		

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Autonomous Programmes

BACHELOR OF ENGINEERING

DEPARTMENT OF CHEMISTRY

SYLLABUS

I AND II SEMESTERS

FIRST YEAR

Academic Year 2026-27

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	**CHEMISTRY FOR CIVIL ENGINEERING STREAM**		
Course Code	CHE6C12/22	**(L-T-P)C**	(3-0-2)4
SEE duration	3 hour	**Hours / Week**	05
SEE marks	50	**Total contact hours**	40 theory +10 lab slots

Course Objective: The objective of this course is to build a strong foundation and basic skills in Engineering Chemistry for technological competence in industries.

Course Outcomes:

After the completion of the course, students shall be able to:-

Sl. No.	Course outcomes	Mapping to POs
1.	Describe the terms and chemical process involved in the scientific and engineering application.	PO1, PO2
2.	Illustrate the construction and working of the engineering process using basic concepts of chemistry.	PO1, PO2
3.	Outline the preparation, properties & applications associated with chemical substances in multidisciplinary fields.	PO1, PO2
4.	Apply the various principles and analytical techniques to solve the problems and quantitative analysis of materials in engineering applications.	PO1, PO2

Course Contents:

MODULE –1	**10 Hrs.**

Water and its Treatment

Introduction, sources of water, impurities in water, standards of water for industrial supply. Hardness of water, types of hardness determination of total hardness by EDTA method.

Boiler feed water and boiler problems, Boiler scales and sludge's- meaning, formation, disadvantages and prevention, priming and foaming.

Internal treatment of water- phosphate conditioning &calgon treatment.

Desalination- Meaning, purification of water by reverse osmosis.

Potable water- Meaning, Standards of potable water, treatment of water for town supply**.** BOD and COD- definition, experimental determination of COD of the industrial waste water sample.

MODULE –2	10 Hrs.

Chemical Energy Sources and Engineering Materials

Fuels- Definition with examples. Characteristics of an ideal fuel. Calorific value- definition, types - Gross and Net calorific values, units in S.I system. Experimental determination of calorific value of a solid fuel using Bomb Calorimeter. Numerical problems on GCV and NCV.

Chemical processing of Petroleum: Cracking- Definition. Types of cracking- thermal and catalytic cracking. Fluidized catalytic cracking. Reforming of petrol with reactions (Isomerization, cyclisation, aromatization and dehydrogenation). Octane number &Cetane number. Knocking in IC engine. **Prevention of knocking** - Anti knocking agents (TEL & MTBE).

Green fuels: Power alcohol- introduction, advantages and disadvantages. B**iodiesel**- introduction, synthesis, advantages, and disadvantages.

Cement: Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement and testing of cement.

MODULE –3	10 Hrs.

Electrochemistry and Battery Technology

Introduction, electrochemical cells – Definition, Types of electrochemical cells, Construction, working & representation of galvanic cell. Modern sign conventions, single electrode potential, standard electrode potential. E.M.F of a cell, standard E.M.F of a cell, derivation of Nernst's equation.

Concentration cell- Definition with example, derivation of EMF of concentration cells.

Electrodes - Types of electrodes-Metal-metal ion electrode, Metal- metal salt ion electrode, gas-electrode and ion selective electrode.

Secondary reference electrodes – Calomel electrode-construction, working and applications.

Ion selective electrode- construction and working of glass electrode. Determination of pH of a solution using glass electrode. Numerical problems on E, E^0, E_{cell}, E^0_{cell} and concentration cells. Potentiometric estimation of FAS using $K_2Cr_2O_7$ solution.

Battery technology

Batteries- Definition, classification of batteries- primary & secondary batteries.

Secondary batteries - construction, working and industrial applications of Lead- acid battery and Nickel-metal hydride battery.

MODULE – 4	**10 hrs.**

Macromolecules for Engineering Applications

Introduction, definition with examples. **Glass transition temperature (Tg)** - definition, factors affecting Tg and significances of Tg.

Plastics – Compounding of resins in to plastics.

Synthesis, properties and Industrial applications of PMMA and Polyurethane.

Polymer composites- introduction, **fibers**- meaning, synthesis, properties and industrial applications of Kevlar and Polyester.

Adhesives –Meaning, preparation, properties and applications of Epoxy resins & Phenol-formaldehyde resins.

Bio-degradable polymers- Introduction, types of bio-degradable polymers, preparation, properties and applications of polylactic acid (PLA).

Corrosion chemistry

Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration (water line and pitting), factors affecting the nature of corrosion.

Corrosion control-galvanization, anodization and sacrificial anode method.

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Engineering Chemistry	M.M. Uppal	11th Edition	Khanna Publishers	2011

2	A text Book of Engineering Chemistry	P C Jain and Monica Jain	16th Edition	Dhanapatrai Publications	2015
3	A Text Book of Engineering Chemistry	R.V. Gadag and Nitthyananda Shetty	2nd Edition	I.K. International Publishing house	2016
4	Chemistry for Engineering Students	S. Jai Prakash, R. Venugopal, Sivakumaraiah& Pushpa Iyengar	5th Edition	Subash Publications	2014

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Industrial Chemistry	B.K.Sharma	34th Edition	GOEL Publishing House	2014
2	Industrial Electrochemistry	Derek Pletcher & Frank C	2nd Edition	Walsh publisher	1993
3	Corrosion Engineering	M.G. Fontana, N.D. Greene	3rd Edition	McGraw Hill Publications	1996
4	Instrumental Methods of Analysis	Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan	1st Edition	Nirali Prakashan	2003
5	Text Book of Polymer Science	F.W. Billmeyer, John Wiley & Sons	4th Edition	John Wiley & Sons	1999
6	Vogels text book of quantitative inorganic analysis	J. Bassett, R.C. Denny, G.H. Jeffery	4th Edition	ELBS/Longman	1980

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E Books and online course materials:

1. https://nptel.ac.in/courses/105105110 *(Water and Waste Water Engineering - NPTEL)*
2. https://onlinecourses.nptel.ac.in/noc23_ce42/preview *(Water Chemistry - NPTEL)*
3. https://www.kopykitab.com/Engineering-Chemistry *(Kopykitab - Various authors, eBook access)*
4. https://ndl.iitkgp.ac.in/result?q=engineering%20chemistry *(National Digital Library of India - Free access to Engineering Chemistry books)*
5. https://www.pdfdrive.com/engineering-chemistry-books.html *(PDFDrive - Free Engineering Chemistry PDFs)*

Online Courses and Video Lectures:

1. https://www.edx.org/course/chemistry *(Introductory Chemistry - edX platform)*
2. https://www.youtube.com/playlist?list=PLLy_2iUCG87CQhELCytYLzKfBkzU8ovN9 *(NPTEL Engineering Chemistry Video Lectures - YouTube)*

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Lab CIE 2) Activity	20
Total		**50**

Laboratory Plan :

Lab Experiments	Program Details
1	Estimation of total hardness of water by EDTA method.
2	Estimation of CaO in Portland cement.
3	Estimation of iron in TMT bar by biphenyl amine/external indicator

	method.
4	Estimation of Copper present in E-waste.
5	Determination of Chemical Oxygen Demand (COD) of industrial waste water sample.
6	Determination of p^{Ka} of vinegar using p^{H} sensor.
7	Potentiometric estimation of FAS using $K_2Cr_2O_7$
8	Estimation of Copper present in electroplating effluent by optical sensor
9	Conductometric estimation of acid mixture
10	Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

Course Articulation Matrix

Course Outcomes	**Program Outcomes[POs]**													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**3**	**2**												
CO2	**3**	**2**												
CO3	**3**	**2**												
CO4	**2**	**3**												

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	**CHEMISTRY FOR COMPUTER SCIENCE AND ENGINEERING STREAM**		
Course Code	CHE6S12/22	**(L-T-P)C**	(3-0-2)4
SEE duration	3 hour	**Hours / Week**	05
CIE (Theory) marks	30	**CIE(Practicals) /Activity marks**	20
SEE marks	50	**Total contact hours**	40 theory +10 lab slots

Course Objective: The objective of this course is to build a strong foundation and basic skills in Engineering Chemistry for technological competence in industries.

Course Outcomes:

After the completion of the course, students shall be able to:-

Sl. No.	**Course outcomes**	**Mapping to POs**
1.	Describe the terms and chemical process involved in the scientific and engineering application.	PO1, PO2
2.	Illustrate the construction and working of the engineering process using basic concepts of chemistry.	PO1, PO2
3.	Outline the preparation, properties & applications associated with chemical substances in multidisciplinary fields.	PO1, PO2
4.	Apply the various principles and analytical techniques to solve the problems and quantitative analysis of materials in engineering applications.	PO1, PO2

Course Contents:

MODULE –1	**10 Hrs.**

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Macromolecules for Engineering Applications **Introduction,** definition with examples. **Glass transition temperature (Tg)** - definition, factors affecting Tg and significances of Tg.
Plastics – Compounding of resins into plastics. Synthesis, properties and industrial applications of PMMA, Polyurethane & PTFE. **Polymer composites -** introduction. **Fibers**- meaning, synthesis, properties and industrial applications of Kevlar and Polyester. **Adhesives** –Meaning, preparation, properties and applications of Epoxy resins & Phenol-formaldehyde resins. **Bio-degradable polymers-** Introduction, types of bio-degradable polymers, preparation, properties and applications of polylactic acid (PLA). **Elastomers**- Definition, types-natural and synthetic rubber. Preparation of natural rubber from latex, deficiencies of natural rubber, vulcanization of natural rubber. **Synthetic rubbers**- Preparation, properties and industrial applications of SBR rubber, Thiokol, and Silicon rubber**.**

MODULE –2	**10 Hrs.**

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Electrochemistry and Sensors

Electrochemistry

Introduction, electrochemical cells – Definition, Types of electrochemical cells, Construction, working & representation of galvanic cell. Modern sign conventions, single electrode potential, standard electrode potential. E.M.F of a cell, standard E.M.F of a cell, derivation of Nernst's equation.

Concentration cell- Definition with example, derivation of E.M.F of concentration cells.

Electrodes -Types of electrodes-Metal-metal ion electrode, Metal- metal salt ion electrode, gas electrode and ion selective electrode.

Secondary reference electrodes – Calomel electrode- construction, working and applications.

Ion selective electrode- construction and working of the glass electrode. Determination of p^H of a solution using glass electrode. Numerical problems on E, E^0, E_{cell}, E^0_{cell} and concentration cells. Potentiometric estimation of FAS using $K_2Cr_2O_7$ solution.

Sensors: Introduction, working principle and applications of electrochemical sensors - Potentiometric sensors, Amperometric sensors, and Conductometric sensors. Optical sensors.

MODULE –3	**10 Hrs.**

Energy, Storage and Conversion

Batteries- Definition, difference between battery and cell. Classification of batteries- primary & secondary batteries. Battery characteristics.

Secondary batteries - construction, working and industrial applications of Lead- acid battery and Nickel-metal hydride battery.

Modern batteries: Construction, working and industrial applications of Li-ion battery.

Fuel Cells- Introduction, definition, construction, working and industrial applications of H_2-O_2 fuel cell & methanol-oxygen fuel cell. Differences between battery and fuel cell.

Green fuels: Power alcohol-introduction, advantages and disadvantages.

Biodiesel- Introduction, synthesis, advantages, and disadvantages.

E-waste management: Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling, extraction of copper and gold from e-waste.

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MODULE – 4	10 Hrs.

Surface Finishing (PCB preparation)

Introduction, technological importance of metal finishing. Factors affecting the nature of electro deposit - metal ion concentration, current density, complexing agents, organic additives, p^H, temperature & throwing power.

Electroplating – Definition, electroplating process. Methods of cleaning the metal surfaces to be coated. Electroplating of Copper by cyanide bath method and electroplating of gold.

Electroless plating - Definition, distinction between electroplating and electroless plating, advantages of electroless plating. Electroless plating of Nickel and electroless plating of Copper in the manufacture of double-sided PCB.

Corrosion chemistry

Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration (water line and pitting), factors affecting the nature of corrosion.

Corrosion control-galvanization, anodization and sacrificial anode method.

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Engineering Chemistry	M.M. Uppal	11th Edition	Khanna Publishers	2011
2	A text Book of Engineering Chemistry	P C Jain and Monica Jain	16th Edition	Dhanapatrai Publications	2015
3	A Text Book of Engineering Chemistry	R.V. Gadag and Nitthyananda Shetty	2nd Edition	I.K. International Publishing house	2016
4	Chemistry for Engineering Students	S. Jai Prakash, R. Venugopal, Sivakumaraiah&	5th Edition	Subash Publications	2014

		Pushpa Iyengar			

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Industrial Chemistry	B.K.Sharma	34th Edition	GOEL Publishing House	2014
2	Industrial Electrochemistry	Derek Pletcher & Frank C	2nd Edition	Walsh publisher	1993
3	Corrosion Engineering	M.G. Fontana, N.D. Greene	3rd Edition	McGraw Hill Publications	1996
4	Instrumental Methods of Analysis	Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan	1st Edition	Nirali Prakashan	2003
5	Text Book of Polymer Science	F.W. Billmeyer, John Wiley & Sons	4th Edition	John Wiley & Sons	1999
6	Vogels text book of quantitative inorganic analysis	J. Bassett, R.C. Denny, G.H. Jeffery	4th Edition	ELBS/Longman	1980

E Books and online course materials:

1. https://nptel.ac.in/courses/105105110 *(Water and Waste Water Engineering - NPTEL)*
2. https://onlinecourses.nptel.ac.in/noc23_ce42/preview *(Water Chemistry - NPTEL)*
3. https://www.kopykitab.com/Engineering-Chemistry *(Kopykitab - Various authors, eBook access)*
4. https://ndl.iitkgp.ac.in/result?q=engineering%20chemistry *(National Digital Library of India - Free access to Engineering Chemistry books)*
5. https://www.pdfdrive.com/engineering-chemistry-books.html *(PDFDrive - Free Engineering Chemistry PDFs)*

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Online Courses and Video Lectures:

1. https://www.edx.org/course/chemistry *(Introductory Chemistry - edX platform)*
2. https://www.youtube.com/playlist?list=PLLy_2iUCG87CQhELCytYLzKfBkzU8ovN9 *(NPTEL Engineering Chemistry Video Lectures - YouTube)*

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 3) Lab CIE 4) Activity	20
Total		**50**

Laboratory Plan :

Lab Experiments	Program Details
1	Estimation of total hardness of water by EDTA method.
2	Estimation of CaO in Portland cement.
3	Estimation of iron in TMT bar by biphenyl amine/external indicator method.
4	Estimation of Copper present in E-waste.
5	Determination of Chemical Oxygen Demand (COD) of industrial waste water sample.
6	Determination of p^{Ka} of vinegar using p^{H} sensor.
7	Potentiometric estimation of FAS using $K_2Cr_2O_7$
8	Estimation of Copper present in electroplating effluent by optical sensor

9	Conductometric estimation of acid mixture
10	Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

Course Articulation Matrix

Course Outcomes	**Program Outcomes[POs]**													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**3**	**2**												
CO2	**3**	**2**												
CO3	**3**	**2**												
CO4	**2**	**3**												

Course Title	**CHEMISTRY FOR ELECTRICAL AND ELECTRONICS ENGINEERING STREAM**		
Course Code	CHE6E12/22	**(L-T-P)C**	(3-0-2)4
SEE duration	3 hour	**Hours / Week**	05
SEE marks	50	**Total contact hours**	40 theory +10 lab slots

Course Objective: The objective of this course is to build a strong foundation and basic skills in Engineering Chemistry for technological competence in industries.

Course Outcomes:

After the completion of the course, students shall be able to:-

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Sl. No.	Course outcomes	Mapping to POs
1.	Describe the terms and chemical process involved in the scientific and engineering application.	PO1, PO2
2.	Illustrate the construction and working of the engineering process using basic concepts of chemistry.	PO1, PO2
3.	Outline the preparation, properties & applications associated with chemical substances in multidisciplinary fields.	PO1, PO2
4.	Apply the various principles and analytical techniques to solve the problems and quantitative analysis of materials in engineering applications.	PO1, PO2

Course Contents:

MODULE –1	10 Hrs

Electrochemistry and Analytical Techniques

Electrochemistry- Introduction, electrochemical cells – Definition, Types of electrochemical cells, Construction, working & representation of galvanic cell. Modern sign conventions, single electrode potential, standard electrode potential.E.M.F of a cell, standard E.M.F of a cell.

Derivation of Nernst's equation. **Concentration cell-** Definition with example, derivation of EMF of concentration cells.

Electrodes - Types of electrodes-Metal-metal ion electrode, Metal-metal salt ion electrode, gas-electrode and ion selective electrode.

Secondary reference electrode – Calomel electrode - construction, working and applications.

Ion selective electrode- construction and working of the glass electrode. Determination of p^H of a solution using glass electrode. Numerical problems on E, E^0, E_{cell}, E^0_{cell} and concentration cells.

Analytical techniques: Introduction, principle and instrumentation: Colorimetric sensors – estimation of copper, Potentiometric sensors – estimation of iron and Conductometric sensors – estimation of weak acid.

MODULE –2

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Energy, Storage and Conversion

Batteries- Definition, difference between battery and cell. Classification of batteries – primary & secondary batteries. Battery characteristics.

Secondary batteries - construction, working and industrial applications of Lead- acid battery and Nickel-metal hydride battery.

Modern batteries: Construction, working and industrial applications of Li-ion battery.

Fuel Cells- Introduction, definition, construction, working and industrial applications of H_2-O_2 fuel cell & methanol-oxygen fuel cell. Differences between battery and fuel cells.

Green fuels:Power alcohol-Introduction, advantages and disadvantages. **Biodiesel**-Introduction, synthesis, advantages, and disadvantages.

E-waste management: Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling, extraction of copper and gold from e-waste.

MODULE –3	**10 Hrs**

Macromolecules for Engineering Applications

Introduction, definition with examples. **Glass transition temperature (Tg)** - definition, factors affecting Tg and significances of Tg.

Plastics – Compounding of resins into plastics. Synthesis, properties and industrial applications of PMMA, Polyurethane & PTFE.

Polymer composites- introduction**, Fibers**- meaning, synthesis, properties and industrial applications of Kevlar and Polyester.

Adhesives –Meaning, Preparation, properties and applications of Epoxy resins & Phenol-formaldehyde resins.

Bio-degradable polymers- Introduction, types of bio-degradable polymers, preparation, properties and applications of polylactic acid (PLA).

Elastomers- Definition, types-natural and synthetic rubber. Preparation of natural rubber from latex, deficiencies of natural rubber, vulcanization of natural rubber.

Synthetic rubbers- Preparation, properties and industrial applications of SBR rubber, Thiokol,and Silicon rubber**.**

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MODULE – 4	10 Hrs

Surface Finishing

Introduction, technological importance of metal finishing. Factors affecting the nature of electro deposit - metal ion concentration, current density, complexing agents, organic additives, p^H, temperature & throwing power.

Electroplating – Definition, electroplating process. Methods of cleaning the metal surfaces to be coated. Electroplating of Copper by cyanide bath method and electroplating of Gold.

Electroless plating - Definition, distinction between electroplating and electroless plating. Advantages of electroless plating. Electroless plating of Nickel.

Corrosion chemistry

Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration (water line and pitting), factors affecting the nature of corrosion.

Corrosion control-galvanization, anodization and sacrificial anode method.

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Engineering Chemistry	M.M. Uppal	11th Edition	Khanna Publishers	2011
2	A text Book of Engineering Chemistry	P C Jain and Monica Jain	16th Edition	Dhanapatrai Publications	2015
3	A Text Book of Engineering Chemistry	R.V. Gadag and Nitthyananda Shetty	2nd Edition	I.K. International Publishing house	2016
4	Chemistry for Engineering Students	S. Jai Prakash, R. Venugopal, Sivakumaraiah& Pushpa Iyengar	5th Edition	Subash Publications	2014

MALNAD COLEGE OF ENGINEERING, HASSAN
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Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Industrial Chemistry	B.K.Sharma	34th Edition	GOEL Publishing House	2014
2	Industrial Electrochemistry	Derek Pletcher & Frank C	2nd Edition	Walsh publisher	1993
3	Corrosion Engineering	M.G. Fontana, N.D. Greene	3rd Edition	McGraw Hill Publications	1996
4	Instrumental Methods of Analysis	Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan	1st Edition	Nirali Prakashan	2003
5	Text Book of Polymer Science	F.W. Billmeyer, John Wiley & Sons	4th Edition	John Wiley & Sons	1999
6	Vogels text book of quantitative inorganic analysis	J. Bassett, R.C. Denny, G.H. Jeffery	4th Edition	ELBS/Longman	1980

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2. https://onlinecourses.nptel.ac.in/noc23_ce42/preview *(Water Chemistry - NPTEL)*
3. https://www.kopykitab.com/Engineering-Chemistry *(Kopykitab - Various authors, eBook access)*
4. https://ndl.iitkgp.ac.in/result?q=engineering%20chemistry *(National Digital Library of India - Free access to Engineering Chemistry books)*
5. https://www.pdfdrive.com/engineering-chemistry-books.html *(PDFDrive - Free Engineering Chemistry PDFs)*

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Online Courses and Video Lectures:

1. https://www.edx.org/course/chemistry *(Introductory Chemistry - edX platform)*
2. https://www.youtube.com/playlist?list=PLLy_2iUCG87CQhELCytYLzKfBkzU8ovN9 *(NPTEL Engineering Chemistry Video Lectures - YouTube)*

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 5) Lab CIE 6) Activity	20
Total		**50**

Laboratory Plan :

Lab Experiments	Program Details
1	Estimation of total hardness of water by EDTA method.
2	Estimation of CaO in Portland cement.
3	Estimation of iron in TMT bar by biphenyl amine/external indicator method.
4	Estimation of Copper present in E-waste.
5	Determination of Chemical Oxygen Demand (COD) of industrial waste water sample.
6	Determination of p^{Ka} of vinegar using p^{H} sensor.
7	Potentiometric estimation of FAS using $K_2Cr_2O_7$
8	Estimation of Copper present in electroplating effluent by optical sensor
9	Conductometric estimation of acid mixture

10	Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

Course Articulation Matrix

Course Outcomes	**Program Outcomes[POs]**													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**3**	**2**												
CO2	**3**	**2**												
CO3	**3**	**2**												
CO4	**2**	**3**												

Course Title	**CHEMISTRY FOR MECHANICAL ENGINEERING STREAM**		
Course Code	CHE6M12/22	**(L-T-P)C**	(3-0-2)4
SEE duration	3 hour	**Hours / Week**	05
SEE marks	50	**Total contact hours**	40 theory +10 lab slots

Course Objective: The objective of this course is to build a strong foundation and basic skills in Engineering Chemistry for technological competence in industries.

Course Outcomes:

After the completion of the course, students shall be able to:-

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Sl. No.	Course outcomes	Mapping to POs
1.	Describe the terms and chemical process involved in the scientific and engineering application.	PO1, PO2
2.	Illustrate the construction and working of the engineering process using basic concepts of chemistry.	PO1, PO2
3.	Outline the preparation, properties & applications associated with chemical substances in multidisciplinary fields.	PO1, PO2
4.	Apply the various principles and analytical techniques to solve the problems and quantitative analysis of materials in engineering applications.	PO1, PO2

Course Contents:

MODULE –1	10 Hrs.

Chemical Energy Sources and Engineering materials

Fuels- Definition with examples. Characteristics of an ideal fuel. Calorific value- definition, types - Gross and Net calorific values, units in S.I system. Experimental determination of calorific value of a solid fuel using Bomb Calorimeter. Numerical problems on GCV and NCV.

Chemical processing of Petroleum: Cracking- Definition. Types of cracking- thermal and catalytic cracking. Fluidized catalytic cracking. Reforming of petrol with reactions (Isomerisation, cyclisation, aromatisation and dehydrogenation). Octane number & Cetane number. Knocking in IC engine. **Prevention of knocking** - anti knocking agents (TEL & MTBE).

Green fuels: Power alcohol- introduction, advantages and disadvantages. **Biodiesel**- introduction, synthesis, advantages and disadvantages.

Alloys: Introduction, classification, composition, properties and applications of Stainless Steel, Solders, Brass and Alnico.

MODULE –2	10 Hrs

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Water and its Treatment

Introduction, sources of water, impurities in water, standards of water for industrial supply. Hardness of water, types of hardness determination of total hardness by EDTA method.

Boiler feed water and boiler problems, Boiler scales and sludges- meaning, formation, disadvantages and prevention, priming and foaming.

External treatment of boiler feed water- Hot Lime -Soda process and Ion exchange method.

Internal treatment of water- phosphate conditioning & Calgon treatment.

Desalination- Meaning, purification of water by reverse osmosis.

Potable water- Meaning, Standards of potable water, treatment of water for town supply**.**

BOD and COD- definition, experimental determination of COD of the industrial waste water sample.

MODULE –3	**10 Hrs**

Electrochemistry and Battery Technology

Introduction, electrochemical cells – Definition, Types of electrochemical cells, Construction, working & representation of galvanic cell. Modern sign conventions, single electrode potential, standard electrode potential. E.M.F of a cell, standard E.M.F of a cell, derivation of Nernst equation.

Concentration cell- Definition with example, derivation of EMF of concentration cells.

Electrodes - Types of electrodes-Metal-metal ion electrode, Metal- metal salt ion electrode, gas-electrode and ion selective electrode.

Secondary reference electrodes – calomel electrode-construction, working and applications.

Ion-selective electrode- construction and working of glass electrode. Determination of pH of a solution using glass electrode. Numerical problems on E, E^0, E_{cell}, E^0_{cell} and concentration cells.

Potentiometric estimation of FAS using $K_2Cr_2O_7$ solution.

Battery technology

Batteries- Definition, Classification of batteries- primary & secondary batteries.

Secondary batteries - construction, working and industrial applications of Lead- acid battery and Nickel -metal hydride battery.

Modern battery- construction, working and industrial applications of Li-ion batteries.

Fuel Cells- Introduction, definition, construction, working and industrial applications of H_2-O_2 fuel cell & Methanol-O_2 fuel cell.

MODULE –4	**10 Hrs**

Macromolecules for Engineering applications

Introduction, definition with examples. **Glass transition temperature (Tg)** - definition, factors affecting Tg and significances of Tg.

Plastics – Compounding of resins in to plastics. Synthesis, properties and Industrial applications of PMMA and Polyurethane.

Polymer composites- introduction, **fibers**- meaning, synthesis, properties and industrial applications of Kevlar and polyester.

Adhesives –Meaning, Preparation, properties and applications of Epoxy resins & Phenol-formaldehyde resins.

Bio-degradable polymers- Introduction, types of bio-degradable polymers, preparation, properties and applications of polylactic acid (PLA).

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Corrosion chemistry

Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration(water line and pitting), factors affecting the nature of corrosion.

Corrosion control-galvanization, anodization and sacrificial anode method.

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2	A text Book of Engineering Chemistry	P C Jain and Monica Jain	16th Edition	Dhanapatrai Publications	2015
3	A Text Book of Engineering Chemistry	R.V. Gadag and Nitthyananda Shetty	2nd Edition	I.K. International Publishing house	2016
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5	Text Book of Polymer Science	F.W. Billmeyer, John Wiley & Sons	4th Edition	John Wiley & Sons	1999
6	Vogels text book of quantitative inorganic analysis	J. Bassett, R.C. Denny, G.H. Jeffery	4th Edition	ELBS/Longman	1980

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2. https://onlinecourses.nptel.ac.in/noc23_ce42/preview *(Water Chemistry - NPTEL)*
3. https://www.kopykitab.com/Engineering-Chemistry *(Kopykitab - Various authors, eBook access)*
4. https://ndl.iitkgp.ac.in/result?q=engineering%20chemistry *(National Digital Library of India - Free access to Engineering Chemistry books)*
5. https://www.pdfdrive.com/engineering-chemistry-books.html *(PDFDrive - Free Engineering Chemistry PDFs)*

Online Courses and Video Lectures:

1. https://www.edx.org/course/chemistry *(Introductory Chemistry - edX platform)*
2. https://www.youtube.com/playlist?list=PLLy_2iUCG87CQhELCytYLzKfBkzU8ovN9 *(NPTEL Engineering Chemistry Video Lectures - YouTube)*

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Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 7) Lab CIE 8) Activity	20
Total		**50**

Laboratory Plan :

Lab Experiments	Program Details
1	Estimation of total hardness of water by EDTA method.
2	Estimation of CaO in Portland cement.
3	Estimation of iron in TMT bar by biphenyl amine/external indicator method.
4	Estimation of Copper present in E-waste.
5	Determination of Chemical Oxygen Demand (COD) of industrial waste water sample.
6	Determination of p^{Ka} of vinegar using p^{H} sensor.
7	Potentiometric estimation of FAS using $K_2Cr_2O_7$
8	Estimation of Copper present in electroplating effluent by optical sensor
9	Conductometric estimation of acid mixture
10	Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

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First year syllabus 2026-2027

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**3**	**2**												
CO2	**3**	**2**												
CO3	**3**	**2**												
CO4	**2**	**3**												

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Course Title	Mathematics-I for Computer Science Engineering stream		
Course Code	MAT6S11	(L-T-P)	(3-1-0)4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective: To help students understand and apply numerical methods, calculus, and Laplace transforms to solve engineering problems and real-life applications.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods, and Laplace transforms to solve mathematical and engineering problems.	PO1	-
CO2	Analyze polar curves, partial differentiation, numerical techniques, and Laplace transform methods to model and solve engineering problems of moderate complexity.	PO2	-
CO3	Develop mathematical models to analyze and solve real-life engineering and analytical problems using appropriate mathematical techniques.	PO2, PO3	-

MODULE - 1	8 Hrs.

Polar coordinates: Introduction to polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Curvature – Path Smoothing in AI/ML, Curvature and Radius of Curvature -Applications in Robotics.

Self-Study: Radius of curvature in Cartesian form, Derivative of arc length.

MODULE - 2	11 Hrs.

Introduction to series expansion: Concepts of Differentiation, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Introduction to Partial derivative, Physical and geometrical interpretation of partial differentiation, Evaluation of Jacobians, Extreme values for a function of two variables.

Applications - Optimization of Loss Function in Machine Learning, Variable Transformation for Data Scaling

Self-Study: Lagrange's method of undermined multipliers, Composite function, Properties of Jacobians

MODULE - 3	11 Hrs.

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Newton Raphson method, Finite differences - Definition of forward and backward differences - Newton's interpolation formulae, Newton's Divided Difference formula.

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule and Weddle's rule.

Applications- Estimating vehicles passing through a Toll Booth, Energy consumption in a smart home, Estimating Rain water Collected.

Self-Study: Bisection method, Lagrange's interpolation formulae and Inverse Lagrange's interpolation formula, Secant method, Weddle's rule.

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MODULE - 4	12 Hrs.
Laplace Transforms: Importance of Laplace transform in engineering applications, Laplace transform of standard functions properties, Laplace transform of standard functions, Laplace transform- unit-step functions. **Inverse Laplace Transforms**: Definition and general properties, Computation of the inverse by the method of partial fraction and completing square method, solution of differential equations. **Applications:** Network Signal Processing, Robotics Control System. **Self-Study:** Laplace Transforms - periodic functions, Unit-impulse function.	
NOTE 1. Proofs are not required for any theorems and properties. 2. There should not be any questions from self-study part in Semester End Examination	

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr. B. S. Grewal	44th	Khanna	2021
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2018
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Numerical methods,	R. K. Jain and S. R. K. Jain & S. R. K. Iyengar,	6th edition	New age International p.v.t. Publishers,	2014
2.	A textbook of Engineering Mathematics	N.P. Bali and Manish Goyal	Reprint	Laxmi Publications	2010

EBooks and online course materials:

- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:

- **https://www.courseera.org/**
- **https://nptel.ac.in/courses/**

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Teaching - Learning - Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning (ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**

Activity Based Learning (29)		
Problem Solving Assignment	Problem selection	4
	Formulate the methodology	6
	Solving the problem	6
	Report writing and submission	6
	Preparation of slide and Presentation	7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1) Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1 and 2)	3
Activity component	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		2	1										

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First year syllabus 2026-2027

Course Title	Mathematics-I for Electrical and Electronics Engineering Stream		
Course Code	MAT6E11	(L-T-P) / C	(3-1-0) /4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+ 36ABL = 120

Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods, and statistics to solve basic mathematical problems.	PO1	-
CO2	Apply polar curves, partial differentiation, numerical techniques, and probability concepts to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyze and solve engineering application problems involving antenna radiation, current flow, ion concentration, and experimental data analysis using appropriate mathematical techniques.	PO2, PO3	-

MODULE - 1	8 Hrs.

Polar coordinates: Introduction to polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Antenna Radiation Pattern (Polar Curve), Current Flow Path (Curvature).

Self Study: Radius of curvature in Cartesian form, Derivative of arc length.

MODULE - 2	11 Hrs.

Introduction to series expansion: Concepts of Differentiation, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, Evaluation of Jacobians, Extreme values for a functions of two variables.

Applications: Application of total derivative- controlling sag in a uniformly loaded beam.

Self Study: Lagrange's method of undermined multipliers, Composite function, Properties on Jacobians.

MODULE - 3	11 Hrs.

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Newton Raphson method, Finite differences and Interpolation - Definition of forward and backward differences, Interpolation, Newton's forward and backward interpolation formulae , Newton's Divided Difference formula.

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule and Weddle's rule.

Applications - Application of root finding- ion concentration.

Self-Study: Bisection method, Lagrange's interpolation formulae and Inverse Lagrange's interpolation formula, Secant method.	
MODULE - 4	**12 Hrs.**
Statistics: Curve fitting- Linear, Quadratic. **Random Variable:** Introduction to Random variables, Discrete random variables, Binomial distribution and Poisson distribution. **Application -** Experimental data analysis for probability applications in Electrical and Electronics Engineering: current load and component failure. **Self-Study -** Probability and set notations, independent events.	
NOTE 1. Proofs are not required for any theorems and properties. 2. There should not be any questions from self study part in semester End Examination.	

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr. B. S. Grewal	44th	Khanna	2016
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2004
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Numerical methods,	R. K. Jain and S. R. K. Jain & S. R. K. Iyengar,	6th edition,	New age International p.v.t. Publishers,	2014
2.	A textbook of Engineering Mathematics	N.P. Bali and Manish Goyal	Reprint	Laxmi Publications	2010

EBooks and online course materials:

- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:

- https://www.courseera.org/_
- https://nptel.ac.in/courses/___

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning(ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity Based Learning (29)				Hours
Problem Solving Assignment		Problem Selection		4
		Formulate the methodology		6
		Solving the problem		6
		Report Writing & Submission		6
		Preparation of slide and presentation		7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Activity Based Learning	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1and 2)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	**3**												
CO2		**3**											
		2	**1**										

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	Mathematics-I for Civil Engineering		
Course Code	MAT6C11	(L-T-P)/C	(3-1-0)4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective: Enable students to apply numerical methods to solve mathematical and engineering problems, analyze linear systems, and model real-life situations using appropriate mathematical techniques.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods, and linear algebra to solve basic mathematical problems.	PO1	-
CO2	Apply polar curves, partial differentiation, numerical techniques, and linear algebra concepts to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyze and solve engineering application problems : Vehicle Dynamics on a Superelevated Curved Road, Stiffness of a beam, Soil Settlement Under a Foundation-Foundation Differential Settlement Analysis, discharge of the Stream, Rocket Launch Optimization and Traffic flow problems, Stretching of an elastic membrane, to determine the growth of a population model using appropriate mathematical techniques.	PO2, PO3	

MODULE - 1	8 Hrs.

Polar coordinates: Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Vehicle Dynamics on a Super elevated Curved Road, Stiffness of a beam

Self-Study: Radius of curvature in Cartesian form, Derivative of arc length,

MODULE - 2	11 Hrs.

DIFFERENTIAL CALCULUS: Definition of differentiability, Statement of Taylor's theorem, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, Evaluation of Jacobians, Extreme values for a functions of two variables.

Applications: Soil Settlement Under a Foundation-Foundation Differential Settlement Analysis

Self-Study: Lagrange's method of undermined multipliers, composite function, properties on Jacobians.

MODULE - 3	11 Hrs.

MALNAD COLEGE OF ENGINEERING, HASSAN
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Numerical Methods: Numerical Solution of algebraic & transcendental equations by Newton Raphson method, Finite differences- Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Newton divided difference formulae.

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Weddle's rule.

Applications -- discharge of the Stream, Rocket Launch Optimization

Self-Study: Secant method, Bisection method, Lagrange's interpolation formulae, Inverse Lagrange's interpolation formula.

MODULE - 4	**12 Hrs.**

Linear Algebra: Elementary row transformation of a matrix, Rank of the matrix, Consistency and solution of system of linear equations -Gauss Elimination method, Guass seidal method, Eigen values and Eigen vectors , Rayleigh power method .

Application - Traffic flow problems, to determine the growth of a population model.

Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Stretching of an elastic membrane.

Note:

- Proofs are not required for any theorems and properties.
- There should not be any questions from self study part in semester End Examination.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8	Wiley India P.v.t. Ltd	2018
3	Linear Algebra and its Applications	Gilbert Strang	4	Cengage Publications	2022

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2	Linear Algebra and its Applications	David C Lay	4	Pearson Publications	2018

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://ocw.mit.edu/courses/res-18-001-calculus-fall-2023/pages/textbook/
3. https://nptel.ac.in/courses/111106135
4. https://nptel.ac.in/courses/111105160

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/learn/introduction-to-calculus
3. https://nptel.ac.in/courses/111104092

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial component	2	14	28
3	Student Study Hours–Self Learning	1	14	14
4	Activity Based Learning	-	-	29
5	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity based learning(29)				
Problem Solving Assignment		Problem selection		4
		Formulate the methodology		6
		Solving the problem		6
		Report writing and submission		6
		Preparation of slide and presentation		7

Proposed Assessment Plan (for 50marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted • Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1and 2)	3
Activity	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		2	1										

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	**Mathematics-I for Mechanical Engineering Stream**		
Course Code	MAT6M11	**(L-T-P)/C**	(3-1-0)/4
Exam	3hours	**Hours / Week**	06
SEE	50 Marks	**Total Hours**	42L+14SL+28T+36ABL=120

Course Objective: To train the students to acquire knowledge in calculus and numerical methods, analysing linear systems, so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	**POs**	**PSOs**
CO1	Apply the concepts of polar coordinates, series expansion, numerical methods and linear algebra to solve mathematical problems.	PO1	-
CO2	Analyse polar curves, partial differentiation, numerical techniques, and algebraic techniques to solve engineering problems of moderate complexity.	PO2	-
CO3	Develop mathematical models to analyse and solve real-life engineering and analytical problems using appropriate mathematical techniques.	PO2, PO3	

MODULE - 1	**8 Hrs.**

Polar coordinates: Introduction to polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Curvature and Radius of curvature in polar form.

Applications: Vehicle Dynamics on a Super elevated Curved Road, Design of a Smooth Pipe Junction.

Self-Study: Radius of curvature in Cartesian form, Derivative of arc length.

MODULE - 2	**11 Hrs.**

Introduction to series expansion: Concepts of Differentiation, Taylor's series and Maclaurin's series expansion for function of one variable.

Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, Evaluation of Jacobians, Extreme values for a function of two variables.

Applications - Mechanical Design Application - Optimization of Material for an Open-Top Box, Designing a Cylindrical Oil Tank with Minimum Material

Self-Study: Lagrange's method of undermined multipliers, Composite function, Properties of Jacobians.

MODULE - 3	**11 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Newton Raphson method, Finite differences- Interpolation- Definition of forward and backward differences - Newton's interpolation formulae, Newton's Divided Difference formula.

Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Weddle's rule.

Applications - Discharge of the Stream, Pressure Distribution on a Curved Turbine Blade

Self-Study: Bisection method, Lagrange's interpolation formulae and Inverse Lagrange's interpolation formula, Secant method.

MALNAD COLEGE OF ENGINEERING, HASSAN
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MODULE - 4	12 Hrs.

Linear Algebra: Elementary row transformation of a matrix, Rank of the matrix, Consistency of system of linear equations. Solution of system of linear equations - Gauss elimination method, Gauss-Seidel method. Linear dependent and independent vectors using rank concept.

Application - Traffic flow problem, Application of mathematical and statistical models for forecasting rainfall using historical weather data.

Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Stretching of an elastic membrane.

Note:

1. Proofs are not required for any theorems and properties.
2. There should not be any questions from self-study part in semester End Examination.

Prescribed Text Books:

Sl .No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8 (Wiley student edition)	Wiley India P.v.t. Ltd	2018
3.	Linear Algebra and its Applications	Gilbert Strang	4	Cengage Publications	2022

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2.	Linear Algebra and its Applications	David C Lay	4	Pearson Publications	2018
3.	Engineering Mathematics	B. S. Grewal	2	Khanna Publishers	2024

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://ocw.mit.edu/courses/res-18-001-calculus-fall-2023/pages/textbook/
3. https://nptel.ac.in/courses/111106135
4. https://nptel.ac.in/courses/111105160

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/learn/introduction-to-calculus

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Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning (ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**

Activity Based Learning (29)		
Problem Solving Assignment	Problem selection	4
	Formulate the methodology	6
	Solving the problem	6
	Report writing and submission	6
	Preparation of slide and presentation	7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1) Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1 and 2)	3
Activity component	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		2	1										

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	ENGINEERING MECHANICS		
Course Code	CIV6131	(L-T-P) C	(3-0-0) 3
CIE	30+20	Hours/Week	03Hours
SEE	50	Total Hours	42L+48ABL=90

Course Objective:

- To develop students ability to analyze the problems involving forces, moments with their applications.
- To make students to learn the effect of friction on different planes
- To develop the student's ability to find out the Centre of gravity and moment of inertia and their applications.

Course Outcomes:

#	Course Outcomes	Mapping to PO's	Mapping toPSO's
1	Compute the resultant of coplanar concurrent and non-concurrent force system	1,2	-
2	Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces	1,2	-
3	Analyze the frictional resistance offered by different planes and locate the centroid.	1,2	-
4	Compute the moment of inertia of sections and analyze the bodies in motion	1,2	-

MODULE-1 **11Hrs.**

Resultant of coplanar force system:
Basic dimensions and units, Idealizations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

MODULE-2 **11 Hrs.**

Equilibrium of coplanar force system:
Equilibrium of coplanar concurrent force system, Lami's theorem(no sphere numerical), Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples.

MODULE-3 **10 Hrs.**

Friction:
Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction Numerical examples.

Centroid of Plane areas:
Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built-up sections, Numerical examples.

MODULE-4 **10 Hrs.**

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Moment of inertia of plane areas:

Introduction, moment of inertia of plane lamina, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration,Moment of inertia of composite areas and simple built-up sections, Numerical examples.

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	A Textbook of Applied Mechanics Dynamics and Statics	I B Prasad	19th Edition,	Khanna Publishers. New Delhi. ISBN No. 978-81-7409-068-1	2016.
2	Basic Civil Engineering and Engineering Mechanics,	M.N. Shesha Prakash and Ganesh B. Mogaveer.	3rd Edition	PHI learning private limited	2014

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	EngineeringMechanics	Bhavikatti SS	7th Edition	New Age International	2019
2	Elements of Civil Engineering and Engineering Mechanics	Bansal R. K., RakeshRanjanBeohar and Ahmad Ali Khan		Laxmi Publications	2017

E Books and online course materials:

1. Mechanics of Materials - Engineer4Free: The #1 Source for Free Engineering Tutorials
2. Engineering Mechanics: Download Subject Notes & Free PDF for AE/JE Exam

Online Courses and Video Lectures:

1. Introduction to Engineering Mechanics | Coursera
2. NPTEL :: Mechanical Engineering - NOC:Engineering Mechanics

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First year syllabus 2026-2027

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
3	Term Work and Self-Learning	-	-	**48**
Total Learning Hours/Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	15+15=30
Activity Details	Details of activities to be conducted 1) Pragmatic theory application 2) Kinaesthetic Learning	 10 10
Total		**50**

Activity Based Learning (48 Hours)

ABL1 : Activity1		**Hours**
1.	Pragmatic theory application	24
	<u>Methodology</u> Groups of say 4 to 5 peers will be formed and they are supposed to do the 2 pragmatic application and prepare the report for the same. <u>Topic-</u> 1. Identify the different types of tension and compression members. 2. Visit the construction site and prepare a report on different components of the building. 3. Relate the types of loads and supports with practical examples.	
ABL2 : Activity2		**Hours**
2.	Kinaesthetic Learning	
	<u>Methodology</u> Kinaesthetic learning is based on the idea of student's concept and requiring students to do, make and create. Groups of say 4 to 5 peers will be formed and they will be giving their idea for the specific topic assigned and create relevant sketch or model for the same with demonstration. <u>Action</u> • The models will be assessed and considered for the continuous assessment.	24
Total		**48**

MALNAD COLEGE OF ENGINEERING, HASSAN
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Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3												
CO2	2	3												
CO3	2	3												
CO4	2	3												

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	ENGINEERING MECHANICS LAB		
Course Code	26CIV6131A	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	03
SEE	50	Total Hours	28PL+2TW&SL=30

Course Objective:
To develop students practical skills in testing and evaluating construction materials and applying fundamental principles of engineering mechanics and structural analysis using laboratory experiments and software tools.

Course Outcomes:

#	Course Outcomes	Mapping to PO's	Mapping toPSO's
1	Determine and interpret the physical and grading properties of cement, aggregates, soil, and other common building materials through appropriate laboratory tests.	1,2	-
2	Apply principles of equilibrium and structural analysis to analyze force systems and beams under different support and loading conditions using analytical and software-based methods.	1,2	-

Laboratory Plan:

PART A

Lab Program	Program Details
1	Specific Gravity of Cement
2	Fineness of cement
3	Specific Gravity of - Fine aggregates
4	Sieve analysis of Fine aggregate
5	Specific Gravity of Coarse aggregates.
6	Sieve analysis of Fine aggregate
7	Specific Gravity of Soil
8	Sieve analysis of Soil
9	Graphical representation of the gradation curve of Sieve analysis of Fine aggregate
10	Visual identification of building materials: Bricks, Stones, Tiles, M-Sand, Bitumen, Fly-Ash, Mineral Admixtures GGBS, Steel Bars of Various Sizes

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PART B

Sl. No.	Open-Ended Experiment
1	Evaluate and recommend the most suitable fine aggregate from different sources based on specific gravity for a selected concrete application.
2	Assess and recommend the most suitable coarse aggregate from different sources based on specific gravity for structural concrete.
3	Analysis of Lami's Theorem.
4	Develop and compare force polygons for different concurrent force systems and verify the condition of equilibrium experimentally.
5	Determination of Reaction of the simple support beam using Software.
6	Determination of Reaction in the Fixed beam using Software.
7	Determination of Reaction in the cantilever beam using Software.
8	Determination of Reaction in the beam with hinged support using Software.
9	Determination of reaction in beams using Software with different type of loading.
10	Study the effect of magnitude, position, and type of loading on beam reactions and deflection using structural analysis software.

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	A Textbook of Applied Mechanics Dynamics and Statics	I B Prasad	19th Edition,	Khanna Publishers. New Delhi. ISBN No. 978-81-7409-068-1	2016
2	Basic Civil Engineering and Engineering Mechanics,	Bansal R. K., RakeshRanjanBeoharand Ahmad Ali Khan	-	LaxmiPublications	2015

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Engineering Mechanics	Bhavikatti SS	7th Edition	New Age International	2019
2	Basic Civil Engineering and Engineering Mechanics	Bansal R. K., RakeshRanjanBeoharand Ahmad Ali Khan		Laxmi Publications	2017

MALNAD COLEGE OF ENGINEERING, HASSAN
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E Books and online course materials:

1. https://openstax.org/subjects/science?utm_source.com
2. https://eerc01-iiith.vlabs.ac.in/?utm_source.com

Online Courses and Video Lectures:

1. https://nptel.ac.in/courses/112/103/112103108/?utm_source.com
2. https://www.coursera.org/learn/mechanics-of-materials-fundamentals?utm_source.com

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Integrated Lab Component	-	-	-
3	Term Work and Self-Learning	-	-	-
4	Activity Based Learning (ABL1&ABL2)	-	-	-
5	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				**30**

Scheme of Evaluation (Laboratory Courses)

Assessment	Marks
Continuous Evaluation in every lab session by the Course Coordinator	10
Record Writing	20
Laboratory CIE conducted by the Course Coordinator	20
SEE	50
Total	**100**

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Integrated Lab Component	-	-	-
3	Student Study Hours–Self Learning	-	-	-
4	Tutorial Component	-	-	-
5	Activity Based Learning (ABL1&ABL2)	-	-	-
6	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				**30**

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Articulation Matrix

Course Outcomes	Program Outcomes													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3												
CO2	3	3												
CO3	3	3												

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	BASIC ELECTRONICS		
Course Code	BEE6132	(L-T-P) C	(3-0-2)4
Exam	3hours	Hours/Week	3hours
SEE	100	Total Hours	42L+28P+50ABL=120

Course Objective: The objective of the course is to equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.

Course Outcomes::{with mapping shown against the Program Outcomes (POs)} Upon completion of the course, the student shall be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Develop the basic knowledge on construction, operation and characteristics of semiconductor devices.	1,2	2,1
2	Apply the acquired knowledge to construct small scale circuits consisting of semiconductor devices.	1,2, 5, 9	2,1
3	Develop competence knowledge to construct basic digital circuit by making use of basic gate and concepts of communication Systems	1, 2, 5, 9	2,1
4	Analyzing the basic analog device and its applications in electronics.	1, 2, 5, 9	2,1

MODULE-1	11 Hours

Bipolar Junction Transistors: Introduction, PNP and NPN Transistor, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics.

DC Loadline and Biaspoint: Self bias, fixed bias and voltage divider bias.

Field Effect Transistor: Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, Depletion Enhancement MOSFETs.

MODULE-2	11 Hours

Operational Amplifiers: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, slew rate, Bandwidth, input offset voltage, input bias Current and Input offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp. Inverting amplifier and non-inverting amplifier,

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, RC Phase Shift Oscillator, Colpitts's andHartley oscillator, Crystal oscillator, Multivibrators, Single-stage Astable multivibrator (using transistor only). (OnlyConcepts, working, and waveforms.No mathematical derivations).

MODULE-3	10 Hours

Boolean Algebra and Logic Circuits: Basic definitions, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical Forms and its conversions, Digital Logic Gates, Realization using Universal gates.Karnaugh Maps-2, 3 and 4 variables K-map.

MODULE-4	10 Hours

MALNAD COLEGE OF ENGINEERING, HASSAN
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Realization of Single Variable Entered Mapping (VEM) (Excluding don't care condition),

Combinational logic: Design procedure for Combinational logic, Adders-Half adder, Full adder, Half Subtractor, Full subtractor, 2:1 MUX, 1:2 DEMUX, 4:2 Encoder, 2:4 Decoder.

Optoelectronic Devices: Photo diode, Photo transistor, Solar cells, LED, Laser diode, OLED.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Electronic Devices and Circuits	**David. A. Bell**	5th	Oxford University Press.	2008
2.	Basic Electronics: Devices, Circuits and IT Fundamentals	**Santiram Kal**	1st	PHI	2009

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Op-amps and linear integrated circuits	**Ramakant A. Gayakwad**	4th	Prentice Hall	2000
2.	Electronic communication systems	**George Kennedy**	6th	McGraw Hill India.	2017
3.	BasicElectronics	DPKothari,IJNagrath,	2nd	McGrawHillEducation(India),PrivateLimited	2018

Online Courses and Video Lectures:

- https://nptel.ac.in/courses/122106025
- https://nptel.ac.in/courses/108105132
- https://nptel.ac.in/courses/117104072

Teaching-Learning–Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	3	14	42
2.	Activity Based Learning (ABL1&ABL2)	-	-	38
3.	Evaluation of Learning Process	-	-	10
Total Learning Hours/Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted Activity1- Analog and digital Circuits design and simulation using open Source Simulator.	10

	Activity2- Assignment/Quiz	10
Total		**50**

Activity Based learning 1 (48 hours) :

Sl. No	List
1.	For a mobile charger design a zener voltage regulator that takes ripple DC voltage produced by bridge rectifier circuit and delivers a DC regulated supply of 5 V, 5 mA across load resistor.
2.	Construct an audio amplifier which takes 20 mV audio signal and delivers 2 V output signal to a loudspeaker inside a radio system.
3.	Design an inverting amplifier to have a voltage gain of 50 and the output voltage amplitude is to be2.5 V.
4.	A direct-coupled non inverting amplifier with a ± 25 mV input is to produce a ± 5 V output. Design the circuit with suitable resistance values.
5.	Design a bridge full wave rectifier circuit to produce 12 Vun regulated DC voltage using a capacitor filter used in an electric vehicle charger circuit.
6.	The difference of two input signals is to be amplified by a factor of 20. Design the circuit with suitable resistance values.
7.	Design a three-input inverting summing amplifier circuit and show how it can be converted into an averaging circuit.
8.	Realization of Boolean expressions using basic gates.
9.	Realization of half/full adder circuit

Course Articulation Matrix:

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO1 1**	**PSO 1**	**PSO 2**
CO1	3	2										2	1
CO2	3	2			2				1			2	1
CO3	3	2			2				1			2	1
CO4	3	2			2				1			2	1

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Course Title	BASIC ELECTRONICS ENGINEERING LAB		
Course Code	BEE6132A	**(L-T-P) C**	(0-0-2) 1
CIE	50	**Hours/Week**	02
SEE	50	**Total Hours**	28PL+2TW&SL=30

Course Objective:
The objective of the course is to equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.

Course Outcomes:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Acquire the knowledge of electronics components and instruments to be used in conduction of electronic circuits.	1,2,5	-
2	Apply the knowledge of electronics instruments and rig up electronic circuits to verify its output practically and theoretically	1,2,5	-

Laboratory Plan:

PART A

Lab Program	Program Details
1	Introduction to electronics components and instruments
2	Half wave and Full wave rectifiers
3	Voltage divider bias using BJT
4	Single stage amplifier
5	Inverting and Non inverting amplifiers using Op-amp
6	Summer and subtractor circuits using Op-amp.

PART B

Sl. No.	Open-Ended Experiment
1	Design and simulate self bias circuit using P spice
2	Design and simulate two stage RC coupled amplifier
3	Design and simulate Astable multi vibrator using 555 timer
4	Design and simulate VI characteristics of a diode
5	Design and simulate VI characteristics of a JFET
6	Design and simulate VI characteristics of a MOSFET

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Electronic Devices and Circuits	**David. A. Bell**	5th	Oxford University Press.	2008

	2	Basic Electronics: Devices, Circuits and IT Fundamentals	**SantiramKal**	1st	PHI	2009

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Op-amps and linear integrated circuits	**Ramakant A. Gayakwad**	4th	Prentice Hall	2000
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Online Courses and Video Lectures:

- https://nptel.ac.in/courses/122106025
- https://nptel.ac.in/courses/108105132
- https://nptel.ac.in/courses/117104072

Teaching -Learning– Evaluation Scheme:

Teaching-Learning–Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Lab Conduction	2	14	28
2	Evaluation	-	-	02
Total Learning Hours/Semester				30
ABL: Lab based learning 2 (28Hrs)				

Sl. No	Experiment Title	hours
1.	Introduction to electronics components and instruments	4
2.	Half wave and Full wave rectifiers	5
3.	Voltage divider bias using BJT	4
4.	Single stage amplifier	5
5.	Inverting and Non inverting amplifiers using Op-amp	5
6.	Summer and subtractor circuits using Op-amp.	5
Total		**28**

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Course Articulation Matrix

Course Outcomes	Program Outcomes													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3			2									
CO2	2	3			2									

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Course Title	PRINCIPLES OF PROGRAMMING USING C		
Course Code	PPC6133/6233	(L-T-P) C	(3-0-0) 3
Exam	03 Hours	Hours/Week	03
CIE	50 Marks	Total Hours	90
SEE	50 Marks		

Course Objective: To provide fundamental programming concepts essential to develop program for a given problem.

Course Outcomes: Upon Completion of the course, students shall be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Apply the programming constructs of C-programming to write simple programs.	1	-
2.	Analyze the given C programs for its correctness and write output.	2	-
3.	Design and implement C programs using appropriate programming techniques.	3	-
4.	Work effectively in teams to solve real world problems using modern tools and effective communication.	5,8,9	-

MODULE-1 **11 Hrs.**

Introduction: Importance of C, Basic structure of C program, executing a C program, Charactersset, C tokens, Variables, Data types, Operators, Expressions**,** Evaluation of expressions, Operatorprecedence and associativity, Type conversion, Managing Input and Output Operations.

MODULE-2 **11 Hrs.**

Decision making and Branching: Simple if, if..else, nested if and else if…ladder statements.Switch statement, The ?: operator.

Decision making and Looping: Loops in C, Jumps in Loops, programming examples, Nested loops.

MODULE-3 **10 Hrs.**

Arrays: One-dimensional Arrays, Two-dimensional Arrays, Character Arrays**,** Arithmetic operation on characters, String handling functions.

MODULE-4 **10 Hrs.**

User-defined Functions: Elements of User defined function, Category of functions, Parameters passing in functions: call by value and call by reference.

Structures: Defining a structure, Declaring a structure variable, Accessing structure members, Structure initialization, Operations on individual members, Arrays of structure

Pointers: Understanding pointers, Accessing the address of a variable, Declaring pointer variables, Initialization of pointer variables, Accessing a variable through its pointers, Pointer expressions, Pointers increments and scale factor, Pointers and arrays.

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Programming in ANSI C	Balagurusamy E	9th Edition	Tata Mc Graw Hill	2024.

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Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	The C Programming Language	Brian W. Kernighan and Dennis M. Ritchie	2nd Edition	PHI	2018
2	Programming Techniques through C	M. G. Venkateshmurthy	-	Pearson Education	2014

E Books and online course materials:

1. C Tutorial (w3schools.com) (https://www.w3schools.com/c/
2. C Programming Language Tutorial | GeeksforGeeks (https://www.geeksforgeeks.org/c-programming-language/)

Online Courses and Video Lectures:

1. Best C Programming Courses & Certificates [2025] | Coursera Learn Online (**https://www.coursera.org/courses? query=c%20programming**)
2. Introduction To Programming In C - Course (nptel.ac.in) **(https://onlinecourses.nptel.ac.in/noc22_cs40 /preview)**

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 50 marks & reduced to 15 marks	15
	CIE2	Conducted for 50 marks & reduced to 15 marks	15
Activity		Mini project using scratch tool,codechef	20
Total			50

Teaching - Learning – Evaluation Scheme				
Sl. No	Teaching - Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching	3	14	42
2	Student study hours-self learning	-	-	-
3	Activity Based Learning	-	14	38
4	Evaluation of Learning Process	-	-	10
Total Learning Hours / Semester				90

Course Articulation Matrix

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

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Course Title	PRINCIPLES OF PROGRAMMING USING C LAB		
Course Code	PPC6L17/PPC6L27	(L-T-P)C	(0-0-2) 1
Exam	3 Hrs.	Hours/Week	2 Hrs
CIE	50 Marks	Total Hours	28P+2E=30
SEE	50 Marks		

Course Objective: Design, develop and document programs in C to perform numerical computation and string manipulations.

Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Design a C program using appropriate programming constructs and techniques to solve real life scenario.	3, 5	-
2	Debug and execute the C-program effectively and record the same.	8, 9, 11	-

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				30
ABL1:Lab based learning(28 Hrs)				

Sl.No	Part-A Program details
1.	A **weather monitoring station** records temperature in **degrees Celsius (°C)**, but many international visitors understand temperature only in **degrees Fahrenheit (°F)**. As a software developer, you have been assigned to develop a C program that converts Celsius to Fahrenheit so the weather information can be displayed in both units.
2.	A **supermarket** wants to automate the billing process. As a C programmer, you are assigned to develop a program that calculates the total bill, applies discounts, and computes the final payable amount. To ensure accurate calculations, you must correctly use **arithmetic operators, relational operators, logical operators, assignment operators, expressions, operator precedence, and associativity**.
3.	A **college examination cell** needs a simple application to process students' examination results. Based on the marks entered, the system should determine whether a student has **passed or failed**, assign the appropriate **grade**, and identify **distinction** students. You are required to develop this application using **decision-making and branching statements**.
4.	A **shopping mall** has introduced an automated parking system. The parking fee depends on the number of hours a vehicle is parked. The system should continuously process multiple vehicles until the operator chooses to stop. You are required to develop this application using **decision-making and looping statements**.

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5.	A **college department** wants to analyze the marks of students in a programming course. Instead of processing one student's marks at a time, the system should store the marks of all students in an array and perform various analyses. You are required to develop a program using **one-dimensional arrays**.
6.	A **college library** maintains a list of book titles. The librarian wants a simple application to store book names and search for a particular title entered by a user. you are required to develop the application using **character arrays (strings)** and string handling functions.
7.	A **company's HR department** wants to automate employee salary calculations. To improve code readability and re-usability, the application should be divided into **user-defined functions**, where each function performs a specific task such as accepting employee details, calculating the salary, and displaying the salary report.
8.	A **hospital** wants to maintain patient records efficiently. Each patient's information, such as Patient ID, Name, Age, Disease, and Consultation Fee, should be stored using a **structure**. To improve memory access and data handling, the program should use **pointers** to access and manipulate the structure members.
9.	A **college library** maintains a collection of books for students and faculty. The librarian wants a simple application to manage book records and quickly check whether a requested book is available in the library.you are required to develop a program using an **array of structures** to store book details and search for a specific book requested by the user.
10.	A **college examination cell** wants to automate the calculation of students' **Internal Assessment (IA) marks**. Each student's record consists of **Name, USN, CIE1, CIE2, CIE3, Activity 1, and Activity 2** marks. According to the college's assessment policy, the **best two CIE marks** are considered along with the **Activity 1 and Activity 2** marks to calculate the **Total Internal Marks**. you are required to develop a program using **structures** to store student details and compute the total internal marks.
Sl.No	**Part-B** **Open-ended Programs**
1.	A travel agency wants to help tourists understand travel distances in different units. Develop a C program to convert the distance from **kilometers to miles** and display the converted distance.
2.	A company wants to calculate the net salary of an employee. Develop a C program that accepts the basic salary, calculates allowances and deductions, and displays the net salary using appropriate **operators and expressions**.
3.	A driving school wants to check whether a person is eligible to apply for a driving license based on their age. Develop a C program that accepts the person's age and displays an appropriate message using **decision-making statements**.
4.	A teacher wants to calculate the total marks of multiple students. Develop a C program that accepts the marks of students one by one, calculates the total, and continues until all student records have been processed using **looping statements**.
5.	A cricket coach wants to analyze the scores of a player in several matches. Develop a C program to store the scores in a **one-dimensional array** and display the highest score, lowest score, and average score.
6.	A college wants to maintain student names for record keeping. Develop a C program to accept a student's name as a string and perform appropriate **string operations**.
7.	A calculator application is required to perform basic arithmetic operations. Develop a C program using **user-defined functions** to implement the required operations and display the results.
8.	Develop a C program using structures to store and display the details of an employee.
9.	Develop a C program using an **array of structures** to store the details of **N employees** and display the employee with the highest salary.

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Proposed Assessment Plan (for 50 marks of CIE):

Assessment	Marks
Continuous Evaluation in every lab session by the course coordinator	30
Laboratory CIE conducted by the course coordinator	20
Total	**50**

Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Programming in ANSI C	Balagurusamy E	9th Edition	Tata Mc Graw Hill	2024.

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2
CO1	-	-	2	-	2	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	3	-	3	-	-

Course Title	Elements of Mechanical Engineering		
Course Code	EME6234	LTPC	3-0-0-3
Exam	03 Hours	Hours / Week	3
SEE	50 Marks	Total hours	42L+48 ABL=90

Course objectives:

To introduce fresh entrants of mechanical engineering course to the principles and fundamentals of Mechanical Engineering.

CourseOutcomes(COs){withmappingshownagainstthe**ProgramOutcomes(POs)**}

Upon completion of the course, students shall be able to:

COs	Outcomes	POs	PSOs
1.	describe the basic concepts of thermodynamics,properties of steam,working principle of internal combustion engines and electric/hybrid vehicles.	1, 2,4,5,6,8,9	-
2.	identify various engineering materials and explain the concepts of belt and gear drives	1, 2,4,5,6,8, 9	-
3.	demonstrate the working and operations of machine tools, metal joining and angular measurement of a given specimen using appropriate device.	1, 2,4,5,6,8, 9	
4.	discuss the role of computer systems in manufacturing, their contribution to automation, and the applications of 3D printing and Outline the performance of robots in mechanical engineering.	1, 2,4,5,6,8, 9	-

COURSECONTENTS:

Module– I	10Hrs.
Concepts of Thermodynamics: Work, Energy, Heat, Modes of Heat transfer: Conduction, Convection and Radiation.**Steam:** Steam formation, Types of steam, Steam properties and applications of steam, Simple numerical problems.**Heat engines and Heat pumps**: Introduction to Heat engines and Heat pumps. **IC Engines**: Components and working principles, 4-stroke petrol and diesel engines, Applications of IC Engines, (No Numerical) **Electric vehicles and Hybrid vehicles**: Working principles, Advantages and disadvantages, Components - Batteries, Chargers, Power devices, Drives and Transmission, Classification, Electric and Hybrid vehicle components,	
Module– II	**10Hrs**
Engineering Materials: Definition,Classification of Engineering Materials.**Composite materials**: Introduction, Constituents of a composite, Classification, Types of Matrix and Reinforcement materials, Advantages, Disadvantages and Applications of composite materials in Aerospace and Automobile industries. **Power Transmission:Belt drives**: Introduction, Open and Cross belt drives,Flat belts and V belts, Velocity ratio, Simple numerical problems.**Gear Drives:** Types of Gears-spur gears, bevel gears, helical gears, worm gear sets, and rack and pinion, Velocity ratio, Gear Trains - Simple and Compound gear trains and Simple numerical problems.	
Module– III	**10Hrs.**
Machine Tools: Lathe: Working principle, Specifications, Operations performed – Turning, Facing, Taper turning by swiveling the compound rest, Thread cutting and Knurling. **Drilling Machine**: Working principle, Specifications, Operations performed – Drilling, Reaming, Boring, Counterboring, Countersinking, and Tapping. **Milling machine**: Working principle, Specifications, Operations performed – Plane milling, End milling, Slot milling, Angular milling. (Sketches of machine tools not required. Sketches to be used only for explaining the operations). **Joining Processes**: Introduction, Temporary and Permanent joining methods: Working principle of Soldering, Brazing and Electric Arc welding, Advantages, Limitations and Applications.	

Module– IV	10Hrs.
Introduction to Advanced Manufacturing Systems: Introduction, Components of CNC, advantages and applications of CNC. **Automation:** Types - Fixed, programmable, and flexible automation, merits and demerits of automation, and Applications. **Introduction to Robotics:** Nomenclature of an Industrial Robot - Polar Cylindrical, Cartesian coordinate, and Spherical robot, Advantages, disadvantages, and applications. **Additive manufacturing**: Introduction, Basic principles (Steps in additive manufacturing), Additive manufacturing processes –.Classification with example	

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Elements of Mechanical Engineering	K R Gopala Krishna	38	Subhash Publications	2018
2	Elements of Workshop Technology (Vol. 1 and 2)	HazraChoudhry and Nirzar Roy	17	Media Promoters and Publishers Pvt. Ltd.	2015

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	An Introduction to Mechanical Engineering	Jonathan Wickert	2nd	Cengage Learning	2006
2	Elements of Mechanical Engineering	K P Roy, S K H Choudhry, A K H Choudhry, Roy	7th	Media promoters and publishers	2014
3	Electric and Hybrid vehicles Khanna Publications	A. K. Babu	2nd	Khanna Publications	2022
4	Introduction to Mechatronics	AppuuKuttan K K	1st	Oxford University Press	2007

Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/112104526
- https://nptel.ac.in/courses/112104616
- https://nptel.ac.in/courses/112104769
- https://venturebeat.com/ai/how-ai-is-impacting-the-automotive-world/
- https://www.vlcsolutions.com/blog/artificial-intelligence-in-manufacturing/
- https://skill-lync.com/blogs/technical-blogs/design-applications-of-machine-learning-and-ai-in mechanical-engineering
- https://caeassistant.com/blog/ai-in-mechanical-engineering-video/
- https://www.neuralconcept.com/post/how-is-ai-used-in-mechanical-engineering
- https://www.youtube.com/watch?v=MKiiXubKaGM
- https://www.youtube.com/watch?v=_canCYWZPsc
- https://www.youtube.com/watch?v=lQ-MYnyxh7M
- https://openoregon.pressbooks.pub/manufacturingprocesses45/chapter/chapter-unit-1-the engine-lathe/
- https://www.millerwelds.com/resources/article-library/the-fundamentals-of-welding process-equipment-and-applications
- https://www.youtube.com/watch?v=sbbwJ5p6irc
- https://www.youtube.com/watch?v=TlhGTSDfQxc

Teaching-Learning–Evaluation Scheme:

Sl. No	Teaching and Learning Method	No.of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching& Learning	03	14	42
2	Activity Based Learning(ABL)	-	-	48
			Total	**90**

Proposed Assessment Plan (for50marksof CIE):

Tool	**Remarks**	**Marks**
CIE	Two CIE' sconducted for 50markseachandreduced to 15 marks	30
ABL	Activities based on Metal Joining, Machining, Measurements and Properties of Fuels for different given Materials/Fuels	20
Total		**50**

Activity Based Learning (44Hours)

TYPICAL OPEN-ENDED EXPERIMENTS: Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.Students to prepare the report and present the same on the activities listed below.	Hours
1. Comparative study of flash point and fire point of various fuels / oils using the open cup method 2. Comparative study of flash point and fire point of various fuels / oils using the closed cup method 3. Comparative study on viscosity of different base fuels. 4. Investigation of the effect of additives on the viscosity of base fuels. 5. Selection and justification of appropriate joining techniques for given applications 6. Fabrication of a sheet metal part with simple geometry and soldering. 7. Maketheengineeringpartswithgivenspecificationsusing3Dprinting techniques. 8. Comparative study of facing, plain turning and step turning operations by using a lathe and CNC machine	44

Rubrics for Activity Based Learning:
(Lab component and ABL -To be conducted for 50 marks and the marks obtained shall be reduced to 20)

Performance Indicators	**Excellent**	**Good**	**Satisfactory**	**Needs Improvement**	**Poor**
Technical Skills & Procedure (PO1 & PO5) (10)	Performs operations flawlessly, correct sequence, excellent tool use. (9-10)	Minor errors, generally correct sequence and tool use. (7-8)	Performs task with some errors; needs occasional help. (5-6)	Many errors, requires frequent guidance. (3-4)	Cannot perform task without continuous supervision. (0-2)
Safety Compliance (PO6) (5)	Strictly follows all safety protocols, proper PPE usage at all times. (5)	Follows safety rules, occasional minor lapses. (4)	Mostly safe, some reminders needed. (3)	Frequent safety violations. (2)	Unsafe behavior ignores safety rules. (0-1)
Interaction with the Group (PO8) (5)	Naturally leads, encourages, and includes all group members. Facilitates communication and ensures tasks are distributed fairly. Respects all opinions. (5)	Cooperates well with group members. Communicates clearly, shares the workload, and is a reliable and positive team member. (4)	Works alongside others but with limited communication or collaboration. Tends to work in isolation or contributes unevenly to the group effort. (3)	Fails to cooperate with the group. Is dismissive of others' ideas or causes friction and disagreement within the team. (2)	Refuses to work with the group or actively disrupts the group's ability to complete the experiment. (1)
Lab Report (PO9) (10)	Report is exceptionally well organized, detailed, and insightful. All data and analysis are accurate. Submitted on time. (9-10)	Report is complete, well organized, and accurate. All required sections are present and data is correctly reported. Submitted on time. (7-8)	Report has minor errors in data or analysis, or is missing some minor components. Organization could be clearer. (5-6)	Report is incomplete, contains significant errors, is poorly organized, or is submitted late without a valid reason. (3-4)	Fails to submit a report or the submitted work is of completely unacceptable quality and lacks critical information. (0-2)
Execution (PO3 & PO5) (10)	Executes operations accurately with correct parameters; smooth, safe handling of equipment. (9-10)	Minor execution errors; mostly correct handling of tools/ machines. (7-8)	Acceptable performance with some parameter or handling errors. (5-6)	Multiple execution errors; needs frequent correction. (3-4)	Unable to perform operation independently. (0-2)
Result and Discussion (PO4) (5)	Presents accurate results; clearly compares with standards; insightful discussion of deviations and causes. (5)	Accurate results; some useful discussion. (4)	Results mostly correct; discussion basic. (3)	Results incomplete or partially wrong; weak discussion. (2)	Presents accurate results; clearly compares with standards; insightful discussion of deviations and causes. (1)
Viva Voce (PO9) (5)	Answers all questions confidently, showing deep conceptual and practical understanding. (5) / (17-20)	Answers most correctly; minor conceptual gaps. (4)	Answers some but lacks depth. (3)	Gives vague or incomplete answers. (2)	Unable to answer. (1)

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1 1	PSO 1	PSO 2
CO1	3	2		1	1	1		1	2				
CO2	3	2		1	1	1		1	2				
CO3	3	1		1	1	1		1	2				
CO4	3	1		1	1	1		1	2				

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Course Title	Elements of Mechanical Engineering Lab		
CourseCode	EME6234A	LTPC	0-0-2-1
Exam	03 Hours	Hours / Week	2
SEE	50 Marks	Totalhours	28P+02ABL=30

Course objectives:

To introduce fresh entrants of mechanical engineering lab course to the principles and fundamentals of Mechanical Engineering.

Course Outcomes (COs){with mapping shown against the **Program Outcomes (POs)**}

Upon completion of the course, students shall be able to:

COs	Outcomes	POs	PSOs
1.	Perform various operations using lathe and welding machine.	1, 2,4,6,8,9	-
2.	Calibrate various measuring devices to achieve accuracy of measurement.	1,2,4,6,8, 9	-
3.	Demonstrate angular measurement of a given specimen using appropriate device.	1,2,4,6,8, 9	
4.	Determine the properties and characteristics of fuels and oils.	1, ,4,6,8, 9	-
5.	Determine the hardness of materials using hardness testing machine.	1, ,4,6,8, 9	-

Course Content:

14Hours

PART - A: Conventional Experiments

Exp. No.	Experiment Description
Exp. 1	Performing facing, plain turning and step turning operations by using a lathe.
Exp. 2	Performing facing, plain turning and knurling operations by using a lathe.
Exp. 3	Preparation of welded joints using the arc welding process.
Exp. 4	Calibration of vernier caliper and micrometer using slip gauges.
Exp. 5	Determination of the angle of a specimen using a sine bar.
Exp. 6	Determination of the hardness of materials using hardness testing machine.

PART - B: Typical Open-Ended Experiments

Overview: Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

Exp. No.	Open-Ended Experiment Statement
Exp. 1	Comparative study of flash point and fire point of various fuels / oils using the open cup method.
Exp. 2	Comparative study of flash point and fire point of various fuels / oils using the closed cup method.
Exp. 3	Comparative study on viscosity of different base fuels.
Exp. 4	Investigation of the effect of additives on the viscosity of base fuels.
Exp. 5	Selection and justification of appropriate joining techniques for given applications.
Exp. 6	Fabrication of a sheet metal part with simple geometry and soldering.

Course Laboratory Examination Guidelines & Notes

1. The laboratory syllabus consists of PART-A and PART-B. While PART-A has 6 conventional experiments, PART-B has 6 typical open-ended experiments. The maximum marks for the laboratory course are 100 (CIE-50 & SEE-50).
2. Both PART-A and PART-B are considered for CIE and SEE.
3. Students have to answer 1 (one) question from PART-A and 1 (one) question from PART-B: The questions set for SEE shall be from among the experiments under PART-A. It is evaluated for 30 marks.The open-ended question set for SEE shall be any other open-ended question and not selected from the experiments under PART-A. It shall be evaluated for 10 marks.
4. For continuous internal evaluation, during the semester classwork, the typical open-ended questions shall be from PART-B, and any other similar questions to enhance the skill of the students.

Prescribed Text Books:

Sl. No	BookTitle	Authors	Edition	Publisher	Year
1	Elements of Mechanical Engineering	K R Gopala Krishna	38	Subhash Publications	2018
2	Elements of Workshop Technology (Vol. 1 and 2)	HazraChoudhry and Nirzar Roy	17	Media Promoters and Publishers Pvt. Ltd.	2015

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	An Introduction to Mechanical Engineering	Jonathan Wickert	2nd	Cengage Learning	2006
2	Elements of Mechanical Engineering	K P Roy, S K H Choudhry, A K H Choudhry, Roy	7th	Media promoters and publishers	2014
3	Electric and Hybrid vehicles Khanna Publications	A. K. Babu	2nd	Khanna Publications	2022
4	Introduction to Mechatronics	AppuuKuttan K K	1st	Oxford University Press	2007

Reference Books / Manuals:

1. SeropeKalpakjian and Steven R Schmid, Manufacturing Engineering and Technology, Fourth Edition, Pearson Education, Asia, 2000.
2. P.N. Rao, Manufacturing technology -- Foundry, Forming and Welding, Tata McGraw Hill Education, 2001.
3. I.C. Gupta, Engineering Metrology, Dhanpat Rai Publications, New Delhi, 2018.
4. Ganeshan. V, Internal Combustion Engines, Tata McGraw Hill, 4th Edition, 2012.

Web Links and Video Lectures (e-Resources)

- Engine Lathe Overview: https://openoregon.pressbooks.pub/manufacturingprocesses45/chapter/chapter-unit-1-the-engine-lathe/
- Fundamentals of Welding: https://www.millerwelds.com/resources/article-library/the-fundamentals-of-welding-process-equipment-and-applications
- Video Lecture 1: https://www.youtube.com/watch?v=sbbwJ5p6irc
- Video Lecture 2: https://www.youtube.com/watch?v=TlhGTSDfQxc

Teaching-Learning Process (Innovative Delivery Methods)

The following sample strategies may be adopted to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes:

- Flipped Classroom
- Simulation and Virtual Labs
- Video Demonstration

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Assessment Structure & Evaluation Scheme

The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage (i.e., 50 marks each).

The CIE marks awarded shall be based on the continuous evaluation of the laboratory report using a defined set of rubrics. Each experiment report can be evaluated for 30 marks. The laboratory test (duration 03 hours) at the end of the last week of the semester / after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 20 marks.

For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	-	-	-
2	Practical	2	14	28
2	Student Study Hours – Self Learning	-	-	-
3	Evaluation of Learning Process	-	-	-
4	Activity Based Learning **(ABL)**	-	-	02
Total Learning Hours / Semester				**30**

Rubrics for Activity Based Learning:

(To be conducted for 50 marks and the marks obtained shall be reduced to 30)

Performance Indicators	Excellent	Good	Satisfactory	Needs Improvement	Poor
Technical Skills & Procedure (PO1 & PO5) (10)	Performs operations flawlessly, correct sequence, excellent tool use. (9-10)	Minor errors, generally correct sequence and tool use. (7-8)	Performs task with some errors; needs occasional help. (5-6)	Many errors, requires frequent guidance. (3-4)	Cannot perform task without continuous supervision. (0-2)

Safety Compliance (PO6) (5)	Strictly follows all safety protocols, proper PPE usage at all times. (5)	Follows safety rules, occasional minor lapses. (4)	Mostly safe, some reminders needed. (3)	Frequent safety violations. (2)	Unsafe behavior ignores safety rules. (0-1)
Interaction with the Group (PO8) (5)	Naturally leads, encourages, and includes all group members. Facilitates communication and ensures tasks are distributed fairly. Respects all opinions. (5)	Cooperates well with group members. Communicates clearly, shares the workload, and is a reliable and positive team member. (4)	Works alongside others but with limited communication or collaboration. Tends to work in isolation or contributes unevenly to the group effort. (3)	Fails to cooperate with the group. Is dismissive of others' ideas or causes friction and disagreement within the team. (2)	Refuses to work with the group or actively disrupts the group's ability to complete the experiment. (1)
Lab Report (PO9) (10)	Report is exceptionally well organized, detailed, and insightful. All data and analysis are accurate. Submitted on time. (9-10)	Report is complete, well organized, and accurate. All required sections are present and data is correctly reported. Submitted on time. (7-8)	Report has minor errors in data or analysis, or is missing some minor components. Organization could be clearer. (5-6)	Report is incomplete, contains significant errors, is poorly organized, or is submitted late without a valid reason. (3-4)	Fails to submit a report or the submitted work is of completely unacceptable quality and lacks critical information. (0-2)
Execution (PO3 & PO5) (10)	Executes operations accurately with correct parameters; smooth, safe handling of equipment. (9-10)	Minor execution errors; mostly correct handling of tools/ machines. (7-8)	Acceptable performance with some parameter or handling errors. (5-6)	Multiple execution errors; needs frequent correction. (3-4)	Unable to perform operation independently. (0-2)
Result and Discussion (PO4) (5)	Presents accurate results; clearly compares with	Accurate results; some useful discussion. (4)	Results mostly correct; discussion basic. (3)	Results incomplete or partially wrong; weak	Presents accurate results; clearly compares with

	standards; insightful discussion of deviations and causes. (5)			discussion. (2)	standards; insightful discussion of deviations and causes. (1)
Viva Voce (PO9) (5)	Answers all questions confidently, showing deep conceptual and practical understanding. (5) / (17-20)	Answers most correctly; minor conceptual gaps. (4)	Answers some but lacks depth. (3)	Gives vague or incomplete answers. (2)	Unable to answer. (1)

CourseArticulationMatrix

Course Outcomes	Program Outcomes [POs]												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1 1	PSO 1	PSO 2
CO1	3	2		1	1	1		1	2				
CO2	3	2		1	1	1		1	2				
CO3	3	1		1	1	1		1	2				
CO4	3	1		1	1	1		1	2				

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Course Title	ELEMENTS OF ELECTRICAL ENGINEERING		
Course Code	EEE5235	L-T-P	(3-0-1) 4
CIE	50	Hours/Week	4
SEE	50	Total Hours	40

Course Objective: The students acquire knowledge on electrical engineering.

Course Outcomes: At the end of course, students will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Discuss the fundamental laws of electrical engineering	1, 2	1
2	Apply the concepts to find solutions of electrical circuits	1, 2	1
3	Illustrate the skills and wiring adhering to safety measures	1, 2	1
4	Describe operation of electrical machines and electrical tariff.	1, 2	1

MODULE - 1 — 10 Hrs.

Electrical Energy: Importance of electrical engineering**,** Significance of electrical energy, sources of energy, Conventional and renewable energy sources, General structure of electrical power systems using single line diagram approach.

Electromagnetism: Faraday's Laws of Electromagnetic Induction, Lenz's Law, Fleming's rules, statically and dynamically induced EMF; concepts of self and mutual inductance. Coefficient of Coupling, Energy stored in magnetic field.

DC circuits: Definitions –Passive and active electrical elements, circuit, network, node, branches, mesh, loop. Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits, analysis of electrical circuits with two loops using Maxwell's loop equation.

Self-learning topics: Maxwell's loop equation for three loops

MODULE - 2 — 10 Hrs.

Single-phase AC circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents. Phase or representation of alternating quantities. Analysis of R, L, C, R-L, R-C and R-L-C circuits with phasor diagrams, Real power, reactive power, apparent power, and Power factor. Series, Parallel and Series-Parallel circuits.

Self-learning topics: Measurement of single phase AC power average & RMS values of square and triangular wave.

MODULE - 3 — 10 Hrs.

Three-phase AC circuits: Necessity and advantage of 3-phase system. Generation of 3-phase AC voltage. Definition of phase sequence. Balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced 3-phase circuits.

Transformer: Types of transformer, Emf equation, working principle of ideal transformer on no load and load.

DC Machines: Types of DC Machines, Emf equation, construction of DC machines, working principle of DC motor, applications.

Self-learning topics: Working principle of auto transformer.

MODULE - 4 — 10 Hrs

Domestic Wiring: Requirements of wiring system, Types of electrical wiring, Two way and three-way control of Lamps.

Earthing & Electrical Safety measures: Concept of earthing, Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits, Earthing: Types of earthing – Plate earthing & Pipe earthing, Safety Precautions to avoid shock.

Electrical Measuring Instruments: Moving coil – voltmeter, ammeter. Moving iron – voltmeter, ammeter. Single phase induction type energy meter. Types of wattmeter's. Introduction to digital meter, comparison between analog and digital meters. Digital voltmeter, ammeter and digital multimeter.

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Laboratory component

1	Verification of Ohm's law and Kirchhoff's laws.
2	Measurement of low range resistance using voltmeter-ammeter method. Verification of resistance value using multimeter/LCR meter.
3	Measurement of resistance, inductance, impedance and power factor using voltmeter, ammeter and wattmeter in single-phase AC circuits.
4	Measurement of three-phase power of an inductive load by 2-wattmeter method, when the load is (a) star connected and (b) delta connected. Calculation of resistance, reactance, impedance and power factor.
5	Wiring an appropriate electric circuit, understanding the basic principle used for 2-way and 3-way control of load.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Electrical Engineering	Rajendra Prasad	1st	Prentice-Hall of India Pvt. Ltd	2005

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Basic Electrical Engineering	D. C. Kulshreshtha	2nd	McGraw Hill	2019
2	Electrical and Electronics Technology	E. Hughes	2nd	Pearson	2010
3	Basic Electrical Engineering	D.P. Kothari, I.J. Nagrath	4th	McGraw Hill Education	2019

E Books and online course materials:

1. https://www.mheducation.co.in/basic-electrical-and-electronics-engineering-9789364441070-india
2. https://www.pcefet.com/common/library/books/39/173_BasicElectricalEngineeringbyV.K.MehtaandRohitMehta.pdf

Online Courses and Video Lectures:

1. https://www.youtube.com/watch?v=rLUyP6g1VNI&list=PL425060D3C78350E1
2. https://www.youtube.com/watch?v=VXo0p_1z3Uw&list=PLp6ek2hDcoNCc3IgSGVjIsiMhM_Ll9FEn

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity details	Writing Record – 10 marks Laboratory CIE -10 marks	20
Total		**50**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2										3	
CO2	3	2										3	
CO3	3	3										3	
CO4	3	2										2	

EMERGING SCIENCE COURSES

1. INTRODUCTION TO CIVIL ENGINEERING
2. INTRODUCTION TO ELECTRICAL ENGINEERING
3. INTRODUCTION TO ELECTRONICS ENGINEERING
4. INTRODUCTION TO MECHANICAL ENGINEERING
5. ESSENTIALS OF INFORMATION TECHNOLOGY

Course Title	INTRODUCTION TO CIVIL ENGINEERING		
Course Code	ESC614A/624A	**(L-T-P) C**	(3-0-0) 3
CIE	30+20	**Hours/Week**	03
SEE	50	**Total Hours**	42L+41ABL+7ELP=90

Course Objective:

To equip students with foundational knowledge of civil engineering by introducing key disciplines, essential construction materials, structural systems, sustainable development principles, and basic analytical methods—fostering an understanding of how civil engineering shapes resilient, efficient, and environmentally responsible infrastructure for society.

Course Outcomes:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Distinguish between different civil engineering disciplines based on their scope and application.	1	-
2	Evaluate **c**onstruction materials, structural components, and transportation infrastructure based on their properties and applications in building systems and road design.	1	-
3	Apply concepts of sustainability, smart infrastructure, and environmental systems in the context of green and energy-efficient construction.	1	-
4	Analyze force systems and calculate centroids for the built-up lamina	1,2	-

MODULE-1	**10 Hrs.**

Civil Engineering Disciplines and Building Science:

Introduction to Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Environmental Engineering, Construction planning & Project management.

Basic Materials and Construction: Bricks-types, properties and tests, Cement-types, properties and basic tests & mortar, Plain, Reinforced & Pre-stressed Concrete, Structural steel, Construction Chemicals, Precast construction.

Structural elements of a building: foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase.

MODULE-2	**10 Hrs.**

Sustainable Development and Smart Infrastructure in Civil Engineering

Sustainable materials and green construction: Green Building rating systems (LEED, IGBC, GRIHA), Energy-efficient designs and materials, rainwater harvesting, green roofs. Use of sensors and smart systems in green buildings.

Built- environment: Embodied energy, temperature and sound control in buildings, Security systems. Recycling. Environment: Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Land fill sites, urban flood control.

MODULE-3	**11 Hrs.**

Analysis of force systems:
Concept of idealization, system of forces, principles of super position and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent coplanar force systems- (equilibrium of concurrent). Resultant of non-concurrent coplanar force systems, Varignon's theorem, moment of forces, couple, free body diagram, and non-concurrent coplanar force systems (beams) Numerical examples.

MODULE-4	**11 Hrs.**

Centroid:
Importance of centroid and centre of gravity, determination of centroid by method of moments, axis of reference, methods of determining the centroid, Numerical examples for locating the centroid of built-up sections (Simple sections).

Transportation Engineering:
Introduction to Transportation Engineering: Definition and scope, Role in civil engineering and national development, Importance of transportation in economic growth and mobility.
Highway Engineering Basics: Types of roads (NH, SH, MDR, rural roads) Pavement types: Flexible vs. rigid Basic Road components: carriageway, shoulders, medians, footpaths, Surface Characteristics, Cross Sectional elements, Camber, Road hierarchy and layout, Common traffic signs and road markings.

Prescribed Textbooks:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	A Textbook of Applied Mechanics Dynamics and Statics	I B Prasad	19th Edition	Khanna Publishers. New Delhi. ISBN No. 978-81-7409-068-1	2016.
2	Basic Civil Engineering and Engineering Mechanics,	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan	-	Laxmi Publications	2015

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Engineering Mechanics	Bhavikatti SS	7th Edition	New Age International	2019
2	Basic Civil Engineering and Engineering Mechanics	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan		Laxmi Publications	2017

E Books and online course materials:

1. Understanding Civil Engineering Materials: An Introduction and Overview - Smart Civil Engineers
2. Engineering Mechanics: Download Subject Notes & Free PDF for AE/JE Exam

Online Courses and Video Lectures:

1. Introduction to Engineering Mechanics | Coursera
2. NPTEL :: Civil Engineering - NOC: Introduction to Civil Engineering Profession

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Classroom Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Activity Based Learning (ABL1&ABL2)	-	-	41
4	Evaluation of Learning Process	-	-	7
Total Learning Hours/Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Flipped class for module 2 2) Pragmatic theory application- module 3	20
Total		**50**

Activity Based Learning (41 Hours)

ABL1: Activity1- Flipped class		**Hours**
Sustainable Development and Smart Infrastructure in Civil Engineering.		**20**
1.	Prepare the presentation for the given topic from module 2 and present the same	
	Report preparation for the given topic	
Total		
ABL2: Activity2		**Hours**
2.	Students shall visit different construction sites and record the data for	
	Different components of the buildings • Foundation • Plinth • Masonry structure • Column, Slab and beams • Other sub-works related to site The site should cover residential buildings, commercial buildings, roads, drains and other special structures. Minimum of 2 sites has to be covered	**21**
Total		**41**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	Hours
Test (1,2 and 3)	3
Quiz (1and 2) (optional)	1
Semester End Exam	3
Total	07

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO1 1**	**PO1 2**	**PS O1**	**PS O2**
CO1	3													
CO2	3													
CO3	3													
CO4	2	3												

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Course Title	INTRODUCTION TO ELECTRICAL ENGINEERING		
Course Code	ESC514B/ESC524B	(L-T-P) C	(3-0-0)3
CIE	50	Hours/Week	3
SEE	50	Total Hours	40

Course Objective: To acquire basic knowledge of electrical engineering.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Explain the basic concepts of power system and AC and DC circuit analysis and basic electrical protection devices.	1, 2	1
2	Describe the operating principle of analog and digital measuring instruments.	1, 2	1
3	Apply the basic concepts of AC circuits and DC circuits.	1, 2	1
4	Analyze the working principle of electrical machines and transformers.	1, 2	1

MODULE – 1 — 10 Hrs.

Introduction: Conventional and Non-conventional energy resources with examples, advantages of renewable Energy Systems; General structure of electrical power systems using single line diagram approach.

Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of lamps.

Electricity bill: Power rating of household appliances like lights, fans, Air Conditioners, Personal Computers etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Measuring instruments: Dynamometer type Wattmeter, Energy meter, comparisons between digital and analog meters, digital multimeter.

MODULE – 2 — 10 Hrs.

Basics of Electromagnetic Induction: Faraday's law of Electromagnetic Induction, Significance of Lenz's law. Statically induced EMF and Dynamically induced EMF.

DC Circuits: Ohm's Law and its limitations**,** KCL & KVL, Series, and Parallel. Simple Numerical on KCL and KVL.

MODULE – 3 — 10 Hrs.

A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, Form factor, Peak factor. Simple problems on AC fundamentals.

Single phase AC circuit Analysis: Voltage and current relationship with phasor diagrams in R, L, and C circuits. Simple numerical on R, L & C circuits.

Three-phase AC circuits: Necessity and advantage of 3-phase system. Generation of 3-phase AC voltage. Definition of phase sequence. Balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections.

MODULE - 4 — 10 Hrs

DC machines: Construction and working principle. Classification of DC machine, EMF equation, problems on EMF.Applications.

Transformers: Necessity of transformer, principle of operation, Types of Transformers: Shell and Core type, EMF equation of a Transformer. Simple Numerical on EMF equations.Applications.

Three-phase induction Motors: Definition of rotating magnetic field (without derivation), Principle of operation. Constructional features of squirrel cage type and wound rotor type induction motor. Slip and its significance, problems. Applications.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Electrical Engineering	Rajendra Prasad	1st	Prentice-Hall of India Pvt. Ltd	2005

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Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Basic Electrical Engineering	D. C. Kulshreshtha	2nd	McGraw Hill	2019
2	Electrical and Electronics Technology	E. Hughes	2nd	Pearson	2010
3	Basic Electrical Engineering	D.P. Kothari, I.J. Nagrath	4th	McGraw Hill Education	2019

E Books and online course materials:

1. https://www.mheducation.co.in/basic-electrical-and-electronics-engineering-9789364441070-india
2. https://www.pcefet.com/common/library/books/39/173_BasicElectricalEngineeringbyV.K.MehtaandRohitMehta.pdf

Online Courses and Video Lectures:

1. https://www.youtube.com/watch?v=rLUyP6g1VNI&list=PL425060D3C78350E1
2. https://www.youtube.com/watch?v=VXo0p_1z3Uw&list=PLp6ek2hDcoNCc3IgSGVjIsiMhM_Ll9FEn

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Details of activity 1(Modelling of two and Three way control of lamps) 2) Details of activity 2 (Demonstration of different types of wires used)	20
Total		**50**

Course Articulation Matrix

Course Outcomes	Program Outcomes													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2											3	
CO2	3	2											3	
CO3	3	3											3	
CO4	3	2											2	

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Course Title	INTRODUCTION TO ELECTRONICS ENGINEERING		
Course Code	ESC614C	(L-T-P) C	(3-0-0) 3
Exam	3 Hours	Hours/Week	3
SEE	50 Marks	Total Hours	42L+48ABL=90

Course Objective: The objective of the course is to equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.

Course outcomes: Upon completion of the course, students shall be able to

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Develop the basic knowledge on construction, operation and characteristics of semiconductor devices.	1,2	1,2
2	Apply the acquired knowledge to construct small scale circuits consisting of semiconductor devices.	1,2, 5, 8	1,2
3	Develop competence knowledge to construct basic digital circuit by make	1, 5, 8	1,2
4	Apply the knowledge of embedded system and basic communication system.	1,2	1,2

MODULE-1 — 10Hrs.

Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, voltage Multiplier.

Amplifiers – CE amplifier input and output characteristics, multi-stage amplifier; BJT as a switch: Cut- off and saturation modes, BJT Biasing: Introduction, self bias and fixed bias.

MODULE-2 — 11 Hrs.

Operational amplifiers - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op- amp circuits: Inverting and non-inverting amplifiers, voltage follower, summer, subtractor, integrator, differentiator. (Text 1)

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, **RC Phase Shift Oscillator**, Colpitt's and Hartley oscillator, Crystal oscillator, Multivibrators, Single-stage astable multivibrator (using transistor only). (Only Concepts, working, and waveforms. No mathematical derivations).

MODULE-3 — 10 Hrs.

Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2: 1.2, 1.3, 1.4, 1.5,2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7)**.**

Combinational logic: Introduction, Design procedure, Adders -Half adder, Full adder.

MODULE-4 — 11Hrs

Embedded Systems–Definition, Embedded systems vs general computing systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller**.** (Text 4).

Analog Communication Schemes – Modern communication system scheme, Information source,and input transducer, Transmitter, Channel – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM,FM. (Problems on AM only).

Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK.(Only concepts, no mathematical derivations) (Text 3).

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Prescribed Text Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	'Electronic Circuits, Fundamentals & Applications'	Mike Tooley	4th	Elsevier	2015
2.	Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008	M. Morris Mano	1st	Pearson education	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	'Basic Electronics'	D P Kothari, I J Nagrath,	2nd	McGraw Hill Education (India), PrivateLimited,	2018
2.	"Introduction to Embedded systems"	Shibu K V	4th	McGraw Hill Education (India), PrivateLimited	2011

Online course and video lecture:

1. https://www.youtube.com/watch?v=AUNQnmuIoJI&list=PLgdFAtuRW5n7LgdFwLaGfK3cWlbNxl7pA
2. https://www.youtube.com/watch?v=r9DU7yuWEao&list=PLu7- Sp50sShdDx6EVpK2yOYSWmqBJrfVH
3. https://www.youtube.com/watch?v=IoDoW5kykkw&list=PLzJaFd3A7DZsA8xZg3tgoshboIIBY98c

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	3	14	42
2.	Activity Based Learning (ABL1&ABL2)	-	-	38
3.	Evaluation of Learning Process	-	-	10
Total Learning Hours/Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Two tests conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted Activity1- Analog Circuit design and implementationon using open source Simulator (10 Marks). Activity2-Digital Circuit design and implementation using open- source Simulator (10 Marks).	20
Total		**50**

Activity Based Learning (38 Hours)

Activity 1 Details:	**Hours**
Following are the experiments list of analog circuit design and implementation using open-source simulator. 1. For a mobile charger design a zener voltage regulator that takes ripple DC voltage produced by bridge rectifier circuit and delivers a DC regulated supply of 5 V, 5 mA across load resistor. 2. Construct an audio amplifier which takes 20 mV audio signal and delivers 2 V output signalto a loudspeaker inside a radio system.	

3. Construct a sinusoidal wave generator circuit using crystal oscillator to generate an audio signal frequency of 2 kHz. 4. Design an inverting amplifier to have a voltage gain of 50 and the output voltage amplitudeis to be 2.5 V. 5. A direct-coupled noninverting amplifier with a ± 25 mV input is to produce a ± 5 V output.Design the circuit with suitable resistance values. 6. Design a bridge full wave rectifier circuit to produce 12 V unregulated DC voltage using acapacitor filter used in an electric vehicle charger circuit. 7. The difference of two input signals is to be amplified by a factor of 20. Design the circuit with suitable resistance values. 8. Design a three-input inverting summing amplifier circuit and show how it can be convertedinto an averaging circuit.	
Total	**25**
Activity 2 Details: **Following are the experiments list of circuit design and implementation using open source simulator.** 1. Realization of Boolean expressions using basic gates. 2. Realization of half adder circuit. 3. Realization of full adder circuit. 4. Realization of 4-bit parallel adder. 5. Realization of Integrator. 6. Realization of Differentiator.	**Hours** 13
Total Learning Hours/Semester	**38**

Evaluation of Learning Process (10 Hours)

Type of Evaluation	Hours
Test (1 and 2)	3
Demonstration of activity	4
Semester End Exam	3
Total	**10**

Course Articulation Matrix

Course Outcomes	Program Outcomes												Program Specific Outcomes
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PS01**	**PSO2**
CO1	3	2										2	1
CO2	3	2			2			1				2	1
CO3	3				2			1				2	1
CO4	3	2						1				2	1

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Course Title	INTRODUCTION TO MECHANICAL ENGINEERING		
Course Code	ESC614D/ 624D	(L-T-P) C	(3-0-0) 3
Exam	3 Hrs.	Hours/ Week	3
SEE	50 Marks	Total Hours	48 L + 42 ABL = 90

Course Objective:To provide students with the fundamental knowledge of mechanical engineering principles and their practical applications.

Course Outcomes (COs):

COs	Outcomes	POs	PSOs
1.	explain the basic principles of energy systems,flying Machines and refrigeration	1, 2	-
2.	compare engines, power transmission systems, and modern mobility solutions	1, 2, 5	-
3.	classify and identify properties and applications of engineering, composite, and lightweight materials	1, 6, 11	-
4.	describe manufacturing processes, machine tools, modern methods, and recent advances in automation and mechatronics	1, 5, 11	-

MODULE - 1	10 Hrs.

Fundamentals of Mechanical Engineering: Streams of Mechanical Engineering and their relevance to society; Role of mechanical engineers in solving real-world problems.**Energy Conversion Systems:**Pelton turbine and Francis turbine – basic principles, schematic representation, and applications in power generation.**Flying Machines:**basic drone components, and working principle with simple examples.**Refrigeration & Air Conditioning:**working principle of vapour compression refrigeration system,working principle ofAir Conditioning and applications in domestic and industrial systems.

MODULE - 2	10 Hrs.

Engines: Introduction to petrol and diesel engines, 4-stroke working principle (No Numerical). Comparison of petrol and diesel engines. **Future Mobility:** Electric & Hybrid Vehicles – major components, advantages, limitations, and role in sustainable transport.**Power Transmission Systems:** Classification of gears, Spur gear, Helical gear, worm wheel and rack and pinion. Gear trains- simple and compound gear trains (No Numerical).

MODULE - 3	10 Hrs.

Engineering Materials: Classification, Ferrous metals (cast iron, mild steel) and Non-ferrous metals (aluminium, copper) – basic properties and common engineering applications.Materials behaviour-stress strain curve for ductile material.

Composite Materials: Constituents, classification, matrix & reinforcement,applications.**Lightweight Materials for Automotive & Aerospace:**Metal matrix composites, Polymer matrix composites, Ceramic matrix composites-Advantages and applications.

MODULE - 4	10 Hrs.

Manufacturing Processes: Welding (arc and gas welding), soldering, brazing – principles & applications.**Machine Tools:** Lathe (Facing& Taper turning) drilling (counter boring & reaming), milling (Up milling & down milling) – basic operations. **Modern Processes:** CNC – components, advantages, applications; Steps involved in Additive Manufacturing (3D printing).**Advances in Manufacturing Processes:** Automation –types, Mechatronics – open loop and closed loop; – working principles and applications.

Prescribed Textbooks:

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Elements of Mechanical Engineering	K R Gopalakrishna, SudhirGopalakrishna, S C Sharma	36th	Subhas Stores	2016
2.	An Introduction to Mechanical Engineering	Jonathan Wickertand Kemper Lewis	3rd	Cengage Learning	2012

Reference Books:

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Manufacturing Technology- Foundry, Forming and Welding	PNRao	3rd	Tata McGraw Hill	2003
2.	Materials Science & Engineering, An Introduction	William D Callister		John Wiley & Sons Inc	2010
3.	Internal Combustion Engines	V Ganesan	4th	Tata McGraw Hill Education	2017
4.	Introduction to Robotics	S K Saha	3rd	McGraw Hill	2024
5.	Introduction to Mechatronics	K KAppukuttan	1st	Oxford University Press	2007
6.	Automation, production systems, and computer integrated manufacturing	Groover M P	3rd	Prentice Hall	2008

E-Books and online course materials:

1. https://books.google.com.et/books?id=CtT0fzwkMvUC&printsec=frontcover#v=onepage&q&f=false
2. https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/DESIGN%20SISTEM%20DAYA%20GERAK/An%20Introduction%20to%20Mechanical%20Engineering.pdf

Online Courses and Video Lectures:

1. https://onlinecourses.nptel.ac.in/noc25_me09/preview
2. https://onlinecourses.swayam2.ac.in/nou24_ec10/preview
3. https://nptel.ac.in/courses/112105212
4. https://nptel.ac.in/courses/107106090
5. https://nptel.ac.in/courses/112104526
6. https://nptel.ac.in/courses/112104616
7. https://nptel.ac.in/courses/112104769

Teaching -Learning- Evaluation Scheme:

Sl. No.	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Classroom Teaching &Learning	3	14	42
2.	Activity-Based Learning (ABL1 & ABL2)	-	-	41
3.	Evaluation of Learning Process	-	-	07
			Total Learning Hours/Semester	**90**

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Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1. ABL1 - Industrial/ Laboratory Visit with Reflective Report & Presentation 2. ABL2 - Poster/ Model/ Infographic Presentation with Demonstration & Peer Review	20
	Total	**50**

Activity-Based Learning (41 Hours)

ABL1 (20 Hours): Industrial/ Laboratory Visit	**Hours**
Consent and preparation for visit (briefing and instruction)	1
Visit to industry/ lab	6
Interaction and observations at the industry/ lab	3
Preparation of report (formatting, content writing, editing)	6
Report presentation and discussion	4
Total	**20**

ABL2 (21 Hours): Poster/ Model/ Infographic Presentation	**Hours**
Topic selection, literature review, and material collection	4
Design and development of a poster or a working model	8
Practice and preparation for the presentation	4
Final presentation or demonstration with Q&A	3
Feedback, peer discussion, and reflection	2
Total	**21**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	Description	Hours
Continuous Internal Evaluation (CIE-1, CIE-2, CIE-3)	Descriptive tests (Syllabus to be decided by the course coordinators, such that all the COs shall be covered)	3 hrs
Activity Evaluation	Assessment of ABL components through demonstration, mini-reports, and participation	1 hr
Semester End Examination (SEE)	Final exam (descriptive, 3 hours)	3 hrs
	Total	**7 hrs**

COURSE ARTICULATION MATRIX

Course Outcomes	`Program Outcomes (POs)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	2	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	2	-	-	-	-	2	-	-
CO4	3	-	-	-	3	-	-	-	-	-	2	-	-

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Course Title	**ESSENTIALS OF INFORMATION TECHNOLOGY**		
Course Code	**ESC614E/ESC624E**	**(L-T-P)C**	**(3-0-0) 3**
Exam	**3 Hrs.**	**Hours/Week**	**3**
CIE	**50 marks**	**Total Hours**	**42L+36ABL+12E=90**
SEE	**50 marks**		

Course Objective: To introduce the core technical concepts of Information Technology and demonstrate awareness of ethical issues in information technology.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs
1.	Describe various information representation and manipulation schemes.	1
2.	Examine the concepts of operating system, algorithms, cyber security, computer graphics and networking principles.	1
3.	Apply software engineering principles for basic application development, considering ethical issues.	3, 8
4.	Develop web pages using HTML and CSS.	3, 5

Course Contents:

MODULE – 1	**11 Hrs**

Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers, Storing Fractions**.**
Data Manipulation: Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices
Database Systems: Database Fundamentals, The Relational Model

MODULE – 2	**11 Hrs**

Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Processes, Security.
Algorithms: The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery**.**
Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security

MODULE – 3	**10 Hrs**

Cyber security: Overview—What is cyber security? Brief History of Cyber security Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cyber security**.**
Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade.
Ethical Issues in Information Technology: Overview, Ownership Rules, Ethics and Online Content

MODULE – 4	**10 Hrs**

Introduction to HTML and Website Development: What is HTML? Cascading Style Sheets (CSS), Website Design and Story boarding, Structure of a Website
Computer Graphics: The Scope of Computer Graphics, Overview of 3D Graphics, **Comparison of 2D and 3D Graphics**, Applications of 3D Graphics, Popular 3D Graphics Software.

Text Books

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Computer Science: An Overview	J. Glenn Brookshear and Dennis Brylow	Second Edition	Pearson Education	2017

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2.	Fundamentals of Information Technology	Roy, Shambhavi; Daniel, Clinton and Agrawal, Manish	-	Digital Commons at The University of South Florida	2023

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	"Introduction to Information Technology"	V. Rajaraman	Third Edition,	PHI Learning,	2018
2.	Information Technology in Theory	Pelin Aksoy	First Edition,	Cengage	-

EBOOKS/MOOC:

1. Fundamentals of Information Technology:

Online Courses and Video Lectures:

1.InformationTechnology:https://onlinecourses.swayam2.ac.in/cec20_cs05/preview
2.ComputerOrganizationandArchitecture:https://nptel.ac.in/courses/106103068
3.Introduction To Internet: https://nptel.ac.in/courses/106105084

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	3	14	42
2.	Activity Based Learning (ABL1&ABL2)	3	12	36
3.	Evaluation of Learning Process	-	-	12
			Total Learning Hours/Semester	**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 50 marks & reduced to 15 marks	15
	CIE2	Conducted for 50 marks & reduced to 15 marks	15
Activity Details	Activity 1	Practical Assessment-1	10
	Activity 2	Practical Assessment-2	10
		Total Marks	**50**

Activity Based Learning **36**

Sl No	Programs	Hours
1 2	Design and develop a personal web page, Exploring Operating Systems in Everyday Life	36

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Activity/Assessment

1. Create files of specific types, changing file properties & permissions, search files based on criteria. Creating hierarchy of folders, folder paths, changing folder properties and related operations on folders. File compressions, file backup and cloud-based file management.
2. Create word file with suitable content and performs various operations related to document Revision, Proofreading and references (As listed in the Textbook).
3. Locate the templates available for a word processing application that you have access to. Search the templates for a "Resume." Review the "Resume" template of your choice. Identify all the word processing features used in the "Resume" template. Use the "Resume" template to create your own resume. As you fill out the template, be sure to use the application to check your spelling and grammar. Verify the print layout of your resume. Save the resume and print a copy.
4. Consider the following data: Student First Name, Student Last Name, Student Age, Student Grade, Student School, Telephone Number, Sport (Volleyball, Basketball, Softball, Baseball, Soccer, or Football). Considering the data required in the list above, create a spreadsheet in a spreadsheet application you have access to. Add at least 10 rows of data to your spreadsheet. Once you add all the data to the spreadsheet, what is the average age for all the students? What formula did you use to calculate the average age?
5. Add a chart to the above spreadsheet that illustrates the total number of students for each sport. Which sport has the highest number of students? What formula did you use to count the total number of students for each sport?
6. Use the above spreadsheet to Analyzing and Organizing Data with suitable filters, sorting, conditional formatting and pivot tables.
7. Create a presentation (power point) using a presentation application you have access to that meets the requirements of marketing of brand-new product. Apply a theme, background, and professional layout for chosen product.
8. Create a Web page with basic HTML elements (tags). Insert lists, images, drop down lists and tables.

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	2	-	-	-
CO4	-	-	3	-	3	-	-	-	-	-	-

EMERGING TECHNOLOGY COURSES

1. Introduction to AI and its use cases for Civil Engineering
2. Introduction to AI and its use cases for Mechanical Stream
3. Introduction to AI and its use cases for Electrical & Electronics Engineering
4. Introduction to AI and its use cases for Electronics Stream
5. Introduction to AI and its use cases for Computer Science Stream

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CourseTitle	Introduction to AI and its use cases for Civil Engineering		
CourseCode	ETC615K/625K	**(L-T-P)C**	(3-0-0)3
Exam	Theory	**Hours/Week**	3
SEE	100	**TotalHours**	40

CourseObjectives:

1. ExplainAI concepts,machinelearningmodels,andpromptengineeringbasics.
2. ApplyAImethods(regression,classification,andclustering,neuralnetworks)tocivil engineering datasets.
3. Identifyandanalyzereal-worldAIapplicationsinconstruction,transportation,waterresources, and environmental engineering.
4. Discuss recent AI trends, ethical concerns, and emerging opportunities in civil infrastructuredevelopment.

CourseOutcomes:

#	CourseOutcomes	Mappingto PO's	Mapping toPSO's
1	Explain the fundamental concepts of AI, types of intelligence, search methods, and knowledge representation with relevance to civil engineering systems.	PO1,PO2	
2	Demonstrate prompt engineering techniques and generative AI tools for solving and documenting civil engineering tasks such as DPRs, reports, and sustainable design brainstorming.	PO1,PO6	
3	Apply regression, classification, clustering, and advanced ML modelstotransportation,structural,andwaterresourcedatasets in civil engineering.	PO1, PO6	
4	Analyze AI-driven applications, robotics, and IoT in smart infrastructure, sustainable development, and civil project management.	PO7,PO8	

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MODULE-1	10Hrs.
Foundations of AI for Civil Engineering*: Artificial Intelligence Overview:** History, advantages/disadvantages, types (Weak AI, Strong AI, Reactive, Limited Memory, Self-aware). **Human vs Machine Intelligence:** Defining intelligence, components, agents, and environments with traffic signal systems, water networks. **Search & Knowledge Representation:** Uninformed and informed search (best-first, greedy), knowledge-based systems (applications in building codes and design standards). ***Self-studycomponent:*Mini-report:"HowAIcanimprovefloodevacuationplanningincities."*	
MODULE-2	**10Hrs.**
Prompt Engineering and Generative AI in Civil Engineering*: Prompt Engineering Basics:** Evolution, types of prompts, advantages in engineering communication. **Prompting Techniques:** Zero-shot, one-shot, few-shot, chain-of-thought, role-based prompting. **Applications:** Writing technical reports, environmental impact assessments, DPRs, sustainable design brainstorming. ***Self-studycomponent:*Promptsforconcretemixoptimization,watercycleexplanation, and structural design alternatives.*	
MODULE-3	**10Hrs.**
MachineLearningforCivilDataAnalysis*:Regression:**Predictingconcretestrength,traffic growth, water demand, **Classification:** Soil type classification, flood risk prediction, **Clustering:** Rainfall pattern grouping, accident hotspot identification, **Advanced ML:** Naive Bayes, Neural Networks, SVM — applied to structural health monitoring, pavement distress detection. ***Self-studycomponent:*Collectrainfall/temperaturedataforyourcityandapplyregressionin Excel/Python.*	
MODULE-4	**10Hrs.**
Trends, Robotics, and Applications in Civil Infrastructure*: Trends in AI:** Ethical concerns, AI as a Service (AIaaS), Expert systems, IoT &AIoT for smart cities, **Robotics & Automation:** Drones in surveying, AI robotics in construction, no-code & low-code AI platforms.**, Industrial & Civil Applications:** Transportation: traffic flow prediction, signal optimization.**,** Water Resources: leakage detection, water quality forecasting, Environment: pollution monitoring, STP optimization. ***Self-study component: Prepare *a porton"Drone-basedAIapplicationsinhighwayconstruction."*	

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COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	✔	✔											
CO2	✔					✔							
CO3	✔					✔							
CO4							✔	✔					

TextBooks

1. SatishChander,*ArtificialIntelligenceApplicationsinCivilEngineering*,Springer.
2. RajasekaranS.&VijayalakshmiPaiG.A.,*NeuralNetworks,FuzzyLogicandGenetic Algorithms*, PHI.
3. ReemaThareja,*ArtificialIntelligence:BeyondClassicalAI*,PearsonEducation.
4. AjanthaDeviVairamani&AnandNayyar,*PromptEngineering:Empowering Communication*, CRC Press, Taylor & Francis Group.

ReferenceBooks

1. Stuart Russell & Peter Norvig, *Artificial Intelligence: A Modern Approach* (4th Edition),Pearson.
2. ElaineRich,KevinKnight&ShivashankarB.Nair,*ArtificialIntelligence*,McGrawHill.
3. TomTaulli,*PromptEngineeringforGenerativeAI:ChatGPT,LLMs,andBeyond*, Apress, Springer.
4. RaoS.S.,*EngineeringOptimization:TheoryandPractice*,Wiley.
5. Recent IEEE/Elsevier research papers on AI in civil engineering domains (transportation, construction, water resources, environmental engineering).

E-LearningResources

1. **NPTEL / SWAYAM**: *Artificial Intelligence for Engineers*, *Machine Learning Foundations*.

2. **MOOCs**:
- *AIforEveryone*(AndrewNg).
- *MachineLearning*(StanfordUniversity–AndrewNg).
- *GenerativeAIforEveryone*.

3. **Data&CaseStudyPlatforms**:

- Kaggle–CivilEngineering datasets (Concretestrength,traffic,waterquality).
- ASCE*JournalofComputinginCivilEngineering*(CasestudiesonAIininfrastructure)

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CourseTitle	INTRODUCTION TO AI AND ITS USE CASES		
CourseCode	ETC625L	(L-T-P)C	42L+48ABL
Exam	03 Hours	Hours/Week	03
SEE	50 Marks	TotalHours	90

Course Objective: To explore the applications of AI in real world

Course Outcomes: UponCompletionofthecourse,students shallbe ableto:

#	Course Outcomes	Mapping to PO's
1.	Explain the concepts and types of artificial intelligence.	1
2.	Illustratebasicmachinelearningmethodsforregression,classificationandclustering.	3
3.	InteractwithgenerativeAItools usingpromptengineeringtechniques	5
4.	Describe recent trends in artificial intelligence and machine learning	1

MODULE-1 **10Hrs.**

Introduction to Artificial Intelligence: Artificial Intelligence, How Does AI Work, Advantages and Disadvantages of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Weak AI, Strong AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Awareness, Is Artificial Intelligence Same as Augmented Intelligence and Cognitive Computing, Machine Learning and Deep Learning.

Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment, Search, Uninformed Search Algorithms, Informed Search Algorithms (only fundamentals)

MODULE-2 **10Hrs.**

Knowledge Representation: Introduction, Knowledge Representation, Knowledge-Based Agent, Types of Knowledge.

Introduction to Prompt Engineering: Introduction to Prompt Engineering, The Evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work, Comprehending Prompt Engineering's Function in Communication, The Advantages of Prompt Engineering, The Future of LLM Communication.

Prompt Engineering Techniques for ChatGPT: Introduction to Prompt Engineering Techniques, Instructions Prompt Technique, Zero, One, and Few Shot Prompting, Self-Consistency Prompt.

MODULE-3 **10Hrs.**

Machine Learning: Introduction, Evolution, Need, Applications in Industry and Real World, Types of ML (Supervised, Unsupervised and Reinforcement), Case Studies.

MODULE-4 **10Hrs.**

Trends and Applications of AI: AI and Ethical Concerns, AI as a Service (AIaaS), Internet of Things, Artificial Intelligence of Things (AIoT), Robotics using AI, Drones using AI, AI in Healthcare, AI in Finance, AI in Agriculture, AI in Transportation.

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Artificial Intelligence: Beyond Classical AI	ReemaThareja		Pearson Education,	2023
2	Prompt Engineering: Empowering Communication	Ajantha Devi Vairamaniand Anand Nayyar	1st	CRC Press, Taylor & Francis Group	2024
3	AI for Everyone – A Beginner's Handbook for Artificial Intelligence"	Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti		Pearson	2024

Reference Books:

SN	BookTitle	Authors	Edition	Publisher	Year
1	Artificial Intelligence: AModern Approach,	Stuart Russell and Peter Norvig	4th	Pearson Education	2023
2	Artificial Intelligence	Elaine Rich, Kevin Knight, and Shivashankar B. Nair		McGraw Hill Education	
3	PromptEngineeringforGenerativeAI:ChatGPT,LLMs,andBeyond,Apress,	Tom Taulli		Springer Nature	
4	Artificial Intelligence: Making A System Intelligent,	Nilakshi Jain	1st	Wiley	

Online Courses and Video Lectures:

1. ElementsofAI–*https://www.elementsofai.com*
2. CS50'sIntroductiontoArtificialIntelligencewithPython–Harvard *https://cs50.harvard.edu/ai/*
3. GoogleMachineLearningCrashCourse–*https://developers.google.com/machine-learning/crash-course*
4. LearnPrompting(Open-SourceGuide)–*https://learnprompting.org*
5. GoogleAI–LearnwithGoogleAI*https://ai.google/education/*
6. Coursera–MachineLearningbyAndrewNg(StanfordUniversity) *https://www.coursera.org/learn/machine-learning*
7. OpenAIPromptEngineeringGuide(forChatGPT) *https://platform.openai.com/docs/guides/gpt-best-practices*
8. PromptEngineeringforDevelopers–DeepLearning.AI+OpenAI *https://www.deeplearning.ai/short-courses/chatgpt-prompt-engineering-for-developers/*
9. EthicsinAI–GoogleResponsibleAIPractices *https://ai.google/responsibilities/responsible-ai-practices/*
10. GoogleTeachableMachine(TrainAImodelsvisuallywithoutcode)

https://teachablemachine.withgoogle.com

Proposed Assessment Plan(for50marksof CIE):

Tool		Remarks	Marks
CIE	CIE1	Conductedfor 50 marks & reduced to15marks	15
	CIE2	Conductedfor 50marks&reduced to 15marks	15
ActivityDetails		Two activity of each 10 marks	20
Total			50

Teaching-Learning–Evaluation Scheme				
Sl. No	Teaching-LearningMethod	No.of Hours/ Week	No.ofWeeks	Hours/ Semester
1	ClassRoom Teaching	3	14	42
3	ActivityBased Learning	3	12	36
4	Evaluation of LearningProcess			12
TotalLearningHours/Semester				90

Activity Based Learning:	Hours / Semester 36

1. **Spam Email Detector:** The Spam Email Detector is one of the earliest and most practical AI applications. This project involves training a machine learning model to classify emails as spam or legitimate.
2. **Sentiment Analysis of Product Reviews:** This project focuses on analyzing text data from platforms like Twitter, Facebook, or Instagram to determine the sentiment behind posts. By classifying content as positive, negative, or neutral, organizations can better understand public opinion, monitor brand health, and respond quickly to trends.
3. **Chatbot for Customer Service:** Chatbots are everywhere today, from e-commerce websites to banking apps. This project involves creating an AI-powered conversational agent that can answer FAQs, resolve simple queries, or even process transactions.
4. **Stock Price Prediction:** Financial forecasting is one of the most widely recognized applications of AI. In this project, you'll explore Stock Price Prediction by analyzing historical market data to anticipate future price movements.
5. **Language Translation Model:** A Language Translation Model project aims to build an AI system capable of translating text from one language to another. To tackle this challenge, beginners can explore sequence-to-sequence models and attention mechanisms, gaining exposure to natural language processing and machine translation techniques

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-

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Course Title	INTRODUCTION TO AI AND ITS APPLICATIONS (EEE)		
Course Code	ETC515M	(L-T-P) C	(3-0-0)3
CIE	50	Hours/Week	3
SEE	50	Total Hours	40

Course Objective: To understand the basics, techniques, and applications of Artificial Intelligence and its impact in electrical engineering.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Explain the fundamentals of artificial intelligence.	1, 2	1
2	Analyze simple problem statements using basic AI principles.	1, 2	1
3	Apply basic AI logic and programming constructs to develop simple AI-based applications.	1, 2	1
4	Demonstrate the functionality of simple AI applications developed through course activities.	1, 2	1

MODULE – 1 **10 Hrs.**

Introduction to Artificial Intelligence: Artificial Intelligence, How Does AI Work?, Advantages and Disadvantages of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Weak AI, Strong AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Awareness, Is Artificial Intelligence Same as Augmented Intelligence and Cognitive Computing, Machine Learning and Deep Learning.

MODULE – 2 **10 Hrs.**

Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment – Rationality, Types of Agents, Types of Environments, Search, Uninformed Search Algorithms, Informed Search Algorithms: Pure Heuristic Search, Best-First Search Algorithm (Greedy Search).

MODULE – 3 **10 Hrs.**

Machine Learning: Techniques in AI, Machine Learning Model, Regression Analysis in Machine Learning, Classification Techniques, Clustering Technique (K-mean's), Naïve Bayes Classification, Support Vector Machine (SVM), Neural Network (excluding deep learning).

Knowledge Representation: Introduction, Knowledge Representation, Knowledge-Based Agent, Types of Knowledge.

MODULE - 4 **10 Hrs**

Trends in AI: AI and Ethical Concerns, AI as a Service (AIaaS), Expert System, Internet of Things, Artificial Intelligence of Things (AIoT).

Introduction to Prompt Engineering, Introduction to Prompt Engineering, The Evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work?, Comprehending Prompt Engineering's Function in Communication, The Advantages of Prompt Engineering, The Future of LLM Communication.

Applications of AI Techniques: Application of AI in Electrical Engineering- AI in Renewable Energy and Smart Grid Systems, Application of AI in Healthcare, Application of AI in Finance, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence: Beyond Classical AI	Reema Thareja	-	Pearson Education	2023
2	Prompt Engineering: Empowering Communication	Ajantha Devi Vairamani and Anand Nayyar,	1st	CRC Press, Taylor & Francis Group	2024
3	AI for Everyone – A Beginner's Handbook for Artificial Intelligence	Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti	-	Pearson	2024

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year

1	Artificial Intelligence: A Modern Approach	Stuart Russell and Peter Norvig	4th	Pearson Education	2023
2	Artificial Intelligence	Elaine Rich, Kevin Knight, and Shivashankar B. Nair	-	McGraw Hill Education	-
3	Prompt Engineering for Generative AI: ChatGPT, LLMs, and Beyond	Tom Taulli	-	Apress, Springer Nature	-
4	Artificial Intelligence: Making A System Intelligent	Nilakshi Jain	1st	Wiley	-

E Books and online course materials:

1. https://people.engr.tamu.edu/guni/csce642/files/AI_Russell_Norvig.pdf

Online Courses and Video Lectures:

1. Elements of AI – *https://www.elementsofai.com*
2. CS50's Introduction to Artificial Intelligence with Python – Harvard *https://cs50.harvard.edu/ai/*
3. Google Machine Learning Crash Course – *https://developers.google.com/machine-learning/crash-course*
4. Learn Prompting (Open-Source Guide) – *https://learnprompting.org*
5. Google AI – Learn with Google AI *https://ai.google/education/*
6. Coursera – Machine Learning by Andrew Ng (Stanford University) *https://www.coursera.org/learn/machine-learning*
7. OpenAI Prompt Engineering Guide (for ChatGPT) *https://platform.openai.com/docs/guides/gpt-best-practices*
8. Prompt Engineering for Developers – DeepLearning.AI + OpenAI *https://www.deeplearning.ai/short-courses/chatgpt-prompt-engineering-for-developers/*
9. Ethics in AI – Google Responsible AI Practices *https://ai.google/responsibilities/responsible-ai-practices/*
10. Google Teachable Machine (Train AI models visually without code) https://teachablemachine.withgoogle.com

Proposed Assessment Plan (for 50 marks of CIE):

Tool	**Remarks**	**Marks**
CIE		
	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity		

	1. Basic Prompt writing: Create two different prompts to ask an AI about the topic "Electricity." The first prompt should be vague, and the second prompt should be clear and specific. Compare the responses you get and describe which prompt gave a better answer and why. 2. Zero-Shot Prompting: Create a prompt that asks an AI to explain Ohm's Law without giving any example or background. Evaluate how well the AI explains the concept based on your prompt alone. 3. One-Shot and Few-Shot Prompting: Provide the AI with a single example of how to calculate the resistance in a simple circuit. Then write your own prompt asking the AI to solve a similar resistance calculation. After that, add two more examples to your prompt and observe any changes in the AI's response quality. 4. Chain-of-Thought Prompting: Develop a prompt that guides the AI step-by-step through calculating current flow in a circuit using Ohm's Law with resistors in series. Then, ask a final question for the AI to solve. Analyze how breaking down the reasoning steps impacts the accuracy of the answer. 5. Prompt Refinement: Start with an ambiguous prompt related to the "Water Cycle." Test the AI's response, note the confusion or errors, and then refine your prompt to make it clearer and more specific. Repeat this process twice and record how the AI's responses improve with each refinement. Role-Based Prompting: Create three prompts asking the AI to explain "Newton's Laws of Motion," each with a different role instruction: (a) as an expert engineer, (b) as a high school teacher, (c) as a	20

	beginner. Compare the tone, detail, and style of the responses. 6. Creative Engineering Problem Prompts: Craft a prompt that asks the AI to brainstorm ideas for designing a low-cost water purification system suitable for rural areas. Encourage creativity by adding phrases like "limited resources" and "sustainability" 7. Ethical Prompt Design Discussion: Identify a biased prompt related to job descriptions (e.g. language with respect to a gender). Rewrite the prompt to remove bias and create a neutral, inclusive version. Explain why this revision is more ethical. 8. Simulated Customer Support Chatbot: Develop a prompt that instructs the AI to play the role of a technical support agent helping a customer troubleshoot a failure in an electronic circuit. Include instructions to keep the tone friendly and professional and to ask diagnostic questions. 9 Multi-Language Prompting: Develop a prompt that asks the AI to translate a simple engineering glossary (5 technical terms) from English to your native language. Then modify the prompt to request additional explanations of these terms in the translated language. 10 Review a curated set of different prompt types (e.g., for summarization, information extraction, paraphrasing, question answering) from a "Prompt Gallery." For each prompt type, match it with a realworld task (e.g., summarizing a lecture note, extracting names from a project report). Test at least three prompt templates on an AI tool or by role-play (students simulate being the AI), with varied wording. Record the outcomes and discuss which prompt (or template) was most effective for each task, and explain why you think it worked best. Reflect on how changing small parts of a prompt can alter model response quality, completeness, or accuracy. 11 Choose a real engineering challenge or societal problem relevant to your field (e.g., "Reducing plastic waste in campus cafeterias" or "Optimizing solar panel placement on campus rooftops"). Draft an initial prompt that asks an AI to propose practical solutions. Share the AI's (or peer's) answer in small groups and identify aspects that are missing, vague, or not actionable. Refine your prompt based on feedback (e.g., specify constraints, ask for step-by-step solutions, or require a list of pros and cons). Repeat the process one more time, refining again for further clarity or specificity. Document the entire prompt-refinement process and share the best solution generated, along with a brief analysis of how prompt improvements led to better responses	
Total		**50**

Course Articulation Matrix

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

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Introduction to AI and Applications for Electronics Stream			Semester I/II
Course Code	ETC615N	**(L-T-P) C**	**(3-0-0)3**
Exam	**3hrs**	**Hours/Week**	**3**
SEE	**50**	**Total Hours**	**42L+38ABL=90**

Course outcome (Course Skill Set)

At the end of the course, the student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Explain the concepts and types of artificial intelligence.	1,2, 8, 9, 11	-
2	Illustrate basic machine learning methods for regression, classification and clustering	1,8, 11	-
3	Identify real-world applications across different disciplines.	1,3, 11	-
4	Outline recent trends in artificial intelligence and machine learning.	1,3, 7, 11	-

MODULE-1 **11Hrs.**

Introduction to Artificial Intelligence: Artificial Intelligence, How Does AI Work?, Advantages and Disadvantages of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Weak AI, Strong AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Awareness, Machine Learning and Deep Learning.

Knowledge Representation: Introduction, Knowledge Representation, Knowledge-Based Agent, Types of Knowledge.

Textbook 1: Chapter 1 (1.1-1.5), Chapter 4 (4.1-4.4)

MODULE-2 **11Hrs.**

Machine Learning: Techniques in AI, Machine Learning Model – Types of ML: Supervised, Unsupervised, Semi-Supervised and Reinforcement Learning with example, Comparison b/w ML & DL, Neural Network, Support Vector Machine (SVM)- Example.

Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment, Search, Uninformed Search Algorithms, Informed Search Algorithms: Pure Heuristic Search, Depth-First Search Algorithm (Greedy Search).

Textbook 1: Chapter 2 (2.1-2.8), Chapter 3 (3.1-3.7.2)

MODULE-3 **10Hrs.**

Trends in AI: AI and Ethical Concerns, AI as a Service (AIaaS), Recent trends in AI – Collaborative Systems, Expert System – Working of an Expert System with Examples, Characteristics & Components of an Expert Systems, Internet of Things – Examples, Sensors, Artificial Intelligence of Things (AIoT) – Applications & Examples of AIoT.

Textbook 1: Chapter 8 (8.1, 8.2, 8.4.1, 8.4.2), Chapter 9 (9.1- 9.3)

MODULE-4 **10Hrs**

Robotics – Artificially Intelligent Robots, Characteristics of Robots, Types of Robots, Components of Robot, Drones Using AI, No Code AI, Low Code AI.

Textbook 1: Chapter 8 (8.3), Chapter 1 (1.8, 1.10, 1.11)

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Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence: Beyond Classical AI	ReemaThareja	-	Pearson Education	2023
2	AI for Everyone – A Beginner's Handbook for Artificial Intelligence	SaptarsiGoswami, Amit Kumar Das and AmlanChakrabarti	-	Pearson	2024

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Artificial Intelligence: A Modern Approach	Stuart Russell and Peter Norvig	4th	Pearson Education	2023
2.	Artificial Intelligence	Elaine Rich, Kevin Knight, and Shivashankar B. Nair	-	McGraw Hill Education.	-
3.	Artificial Intelligence: Making A System Intelligent	Nilakshi Jain	1st	Wiley	-

Web Links and Video Lectures (e-Resources):

1. Elements of AI – https://www.elementsofai.com
2. CS50's Introduction to Artificial Intelligence with Python – Harvard https://cs50.harvard.edu/ai/
3. Google Machine Learning Crash Course – https://developers.google.com/machine-learning/crash-course
4. Google AI – Learn with Google AI https://ai.google/education/
5. Coursera – Machine Learning by Andrew Ng (Stanford University) https://www.coursera.org/learn/machine-learning
6. Ethics in AI – Google Responsible AI Practices https://ai.google/responsibilities/responsible-ai-practices/
7. Google Teachable Machine (Train AI models visually without code)https://teachablemachine.withgoogle.com

Teaching-Learning–Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	3	14	42
2.	Activity Based Learning (ABL1&ABL2)	-	-	38
3.	Evaluation of Learning Process	-	-	10
Total Learning Hours/Semester				**90**

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Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks	Hours
CIE	Two tests conducted for 50 marks each and reduced to 15 marks	30	3
Activity Details	Details of activities to be conducted 1) Conduction of in class Essay/Debate with topics related to AI in the fields of Ethics and Society, jobs and the economy, education and learning, creativity and Identity, rights and personhood. Proper rubrics to be set by faculty for evaluation. 2) Group activity: a)Build a simple chatbot to serve specific application using any AI tools like Dialogflow or Scratch Extension b) Development and demonstration of image classifier using google's teachable machine. c)Creating a emoji translator using any AI tool which converts text to emoji's using natural language processing.	20	38
Total		**50**	

Course Articulation Matrix

Course Outcomes	Program Outcomes													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO1 1**	**PO12**	**PSO 1**	**PSO2**
CO1	3	2						1	1		1			
CO2	3							1			1			
CO3	3		1								1			
CO4	3						2				1			

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Course Title	Introduction to AI and Applications		
Course Code	ETC615O/ ETC625O	(L-T-P)C	(3-0-0)3
Exam	03Hours	Hours/Week	03
CIE	50 Marks	Total Hours	42L+36ABL+12E=90
SEE	50 Marks		

Course Objective: To explore the applications of AI in real world

Course Outcomes: Upon Completion of the course, students shall be able to:

#	Course Outcomes	Mapping to PO's
1.	Describe the fundamental concepts and recent trends in Artificial Intelligence and Machine Learning.	1
2	Apply concepts of Artificial Intelligence and Machine Learning for real life scenarios.	3, 5
3	Use prompt engineering techniques and generative AI tools for problem solving.	3, 5, 9

MODULE-1 — 12Hrs.

Introduction to Artificial Intelligence: Artificial Intelligence, How Does AI Work?, Advantages and Disadvantages of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Weak AI, Strong AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Awareness, Is Artificial Intelligence Same as Augmented Intelligence and Cognitive Computing, Machine Learning and Deep Learning.

Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment, Search, Uninformed Search Algorithms, Informed Search Algorithms: Pure Heuristic Search, Best-First Search Algorithm (Greedy Search).

MODULE-2 — 10Hrs.

Knowledge Representation: Introduction, Knowledge Representation, Knowledge-Based Agent, Types of Knowledge.

Machine Learning: Techniques in AI, Machine Learning Model, Regression Analysis in Machine Learning, Classification Techniques, Clustering Techniques, Naïve Bayes Classification, Neural Network, Support Vector Machine (SVM).

MODULE-3 — 10 Hrs.

Trends in AI: AI and Ethical Concerns, AI as a Service (AIaaS), Recent trends in AI, Expert System, Internet of Things, Artificial Intelligence of Things (AIoT), Robotics, Robotics-an Application of AI, Drones Using AI, No Code AI, Low Code AI.

Introduction to Prompt Engineering, Introduction to Prompt Engineering, The Evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work?, Comprehending Prompt Engineering's Function in Communication, The Advantages of Prompt Engineering, The Future of LLM Communication

Prompt Engineering Techniques for ChatGPT, Introduction to Prompt Engineering Techniques, Instructions Prompt Technique, Zero, One, and Few Shot Prompting, Self-Consistency Prompt.

Prompts for Creative Thinking: Introduction, Unlocking Imagination and Innovation.

Prompts for Effective Writing: Introduction, Igniting the Writing Process with Prompts.

MODULE-4 — 10 Hrs.

Industrial Applications of AI: Application of AI in Healthcare, Application of AI in Finance, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation, AI in Experimentation and Multi-disciplinary research.

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Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence: Beyond Classical AI	Reema Thareja		Pearson Education,	2023
2	Prompt Engineering: Empowering Communication	Ajantha Devi Vairamaniand Anand Nayyar	1st	CRC Press, Taylor & Francis Group	2024
3	AI for Everyone – A Beginner's Handbook for Artificial Intelligence"	Saptarsi Goswami, AmitKumar Dasand Amlan Chakrabarti		Pearson	2024

Textbook1:Chapter1(1.1-1.5,1.7,1.8,1.10,1.11),Chapter2(2.1-2.8),Chapter3(3.1-3.7.2),Chapter 4(4.1-4.4),Chapter8(8.1,8.2,8.3,8.4),Chapter9(9.1- 9.3)
Textbook2:Chapters1,3,4&5
Textbook3:Chapter3,Chapter5(5.1)

Reference Books:

SN	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence: A Modern Approach,	Stuart Russell and Peter Norvig	4th	Pearson Education	2023
2	Artificial Intelligence	Elaine Rich, Kevin Knight, and Shivashankar B. Nair		McGraw Hill Education	
3	Prompt Engineering for Generative AI: ChatGPT, LLMs, and Beyond, Apress	Tom Taulli		Springer Nature	
4	Artificial Intelligence: Making A System Intelligent,	Nilakshi Jain	1st	Wiley	

Online Courses and Video Lectures:

1. Elements of AI–*https://www.elementsofai.com*
2. CS50'sIntroductiontoArtificialIntelligencewithPython–Harvard *https://cs50.harvard.edu/ai/*
3. Google Machine Learning Crash Course – *https://developers.google.com/machine-learning/crash-course*
4. Learn Prompting(Open-Source Guide)–*https://learnprompting.org*
5. Google AI–LearnwithGoogleAI*https://ai.google/education/*
6. Coursera – Machine Learning by Andrew Ng(Stanford University) *https://www.coursera.org/learn/machine-learning*
7. Open AI Prompt Engineering Guide (for ChatGPT) *https://platform.openai.com/docs/guides/gpt-best-practices*
8. Prompt Engineering for Developers –Deep Learning. AI + Open AI *https://www.deeplearning.ai/short-courses/chatgpt-prompt-engineering-for-developers/*
9. Ethics in AI – Google Responsible AI Practices *https://ai.google/responsibilities/responsible-ai-practices/*
10. Google Teachable Machine (Train AI models visually without code) https://teachablemachine.withgoogle.com

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Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 50 marks & scaled to 15 marks	15
	CIE2	Conducted for 50 marks & scaled to 15 marks	15
Activity Details		Practical Assessment	20
Total			**50**

Teaching-Learning–Evaluation Scheme				
Sl. No	**Teaching-Learning Method**	**No. of Hours/ Week**	**No. of Weeks**	**Hours/ Semester**
1	Class Room Teaching	3	14	42
2	Activity Based Learning	3	12	36
3	Evaluation of Learning Process			12
Total Learning Hours/Semester				**90**

Activity Based Learning: **Hours/ Semester 36**

1. Basic Prompt writing: Create two different prompts to ask an AI about the topic "Electricity." The first prompt should be vague, and these cmd prompt should be clear and specific. Compare the responses you get and describe which prompt gave a better answer and why.
2. Zero-Shot Prompting: Create a prompt that asks an AI to explain Ohm's Law without giving any example or background. Evaluate how well the AI explains the concept based on your prompt alone.
3. One-Shot and Few-Shot Prompting: Provide the AI with a single example of how to calculate the resistance in a simple circuit. Then write your own prompt asking the AI to solve a similar resistance calculation. After that, add two more examples to your prompt and observe any changes in the AI's response quality.
4. Chain-of-Thought Prompting: Develop a prompt that guides the AI step-by-step through calculating current flow in a circuit using Ohm's Law with resistors in series. Then, ask a final question for the AI to solve. Analyze how breaking down the reasoning steps impacts the accuracy of the answer.
5. Prompt Refinement: Start with an ambiguous prompt related to the "Water Cycle." Test the AI's response, note the confusion or errors, and then refine your prompt to make it clearer and more specific. Repeat this process twice and record how the AI's responses improve with each refinement. Role-Based Prompting: Create three prompts asking the AI to explain "Newton's Laws of Motion," each with a different role instruction: (a) as an expert engineer, (b) as a high school teacher, (c) as a beginner. Compare the tone, detail, and style of the responses.
6. Creative Engineering Problem Prompts: Craft a prompt that asks the AI to brainstorm ideas for designing a low-cost water purification system suitable for rural areas. Encourage creativity by adding phrases like "limited resources" and "sustainability"
7. Ethical Prompt Design Discussion: Identify a biased prompt related to job descriptions (e.g. language with respect to a gender). Rewrite the prompt to remove bias and create a neutral, inclusive version. Explain why this revision is more ethical.
8. Simulated Customer Support Chatbot: Develop a prompt that instructs the AI to play the role of a technical support agent helping a customer troubleshoot a failure in an electronic circuit. Include instructions to keep the tone friendly and professional and to ask diagnostic questions.
9. Multi-Language Prompting: Develop a prompt that asks the AI to translate a simple engineering

glossary (5 technical terms) from English to your native language. Then modify the prompt to request additional explanations of these terms in the translated language.

10. Review a curated set of different prompt types (e.g., for summarization, information extraction, paraphrasing, question answering) from a "Prompt Gallery." For each prompt type, match it with a real world task (e.g., summarizing a lecture note, extracting names from a project report). Test at least three prompt templates on an AI tool or by role-play (students simulate being the AI), with varied wording. Record the outcomes and discuss which prompt (or template) was most effective for each task, and explain why you think it worked best. Reflect on how changing small parts of a prompt can alter model response quality, completeness, or accuracy.
11. Choose a real engineering challenge or societal problem relevant to your field (e.g., "Reducing plastic waste in campus cafeterias" or "Optimizing solar panel placement on campus rooftops").Draft an initial prompt that asks an AI to propose practical solutions. Share the AI's (or peer's) answer in small groups and identify aspects that are missing, vague, or not actionable. Refine your prompt based on feedback (e.g., specify constraints, ask for step-by-step solutions, or require a list of pros and cons). Repeat the process one more time, refining again for further clarity or specificity. Document the entire prompt- refinement process and share the best solution generated, along with a brief analysis of how prompt improvements led to better responses.

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	3	-	-	-	-	-	-
CO3	-	-	3	-	3	-	-	-	2	-	-

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Course Title	Computer Aided Engineering Drawing (CAED) for ME stream		
Code	CED513	LTPC	2-0-2-3
SEE Duration	3 Hours	Hours/ Week	04
CIE (Theory Marks)	20	CIE (Practical/ Activity Marks)	30
SEE Marks	50	Total Hours	28L+28P+34ABL=90

Course Objective: To introduce the students to "universal language of Engineers" for effective communication and perform drafting exercises of geometrical shapes, solids and machine elements in different systems of Projection using BIS/ISO standards and conventions with the aid of manual drafting and CAD package to effectively take-up the basic industrial/societal drawing needs.

Course Outcomes:

Upon completion of the course, students shall be able to;

COs	Statement	POs
1	Apply the principles of orthographic projection and create projections of planes and basic geometric solids.	1,2, 5, 9
2	develop the lateral surfaces of geometrical solids	
3	interpret isometric views and draw orthographic views of machinecomponents	

Course contents:

MODULE 1	14 Hours
Principles of orthographic Projections: Different planes of projection and views taking point as an example with explanation about distance of a point from planes of projections. Concept of true length and true inclination of a line (emphasis on practical problems).	
Orthographic Projection of Planes:Projection of Planes by change of position method only (no combination of planes).	
MODULE 2	**18 Hours**
Orthographic Projection of Solids:Front, top and profile views of geometric solids resting with their base completely on HP (no other positions).	
Development of lateral surfaces: Introduction to section planes and section of regular solids, Parallel and Radial line methods.	
MODULE 3	**12 Hours**
Isometric Projections: Isometric projections of geometric solids and simple machine components. Conversion of Isometric views into Orthographic views: Simple machine components.	

MODULE 4	08 Hours

Multidisciplinary Applications & Practice(Self Study Component)

3D Modeling: Simple machine parts / engineering components. (Applying material properties rendering for realistic visualization)

Sheet Metal & Surface Design: Automotive panels, HVAC ducting Concept of Industrial drawing

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Engineering Drawing	N.D.Bhatt&M.Panchal	55th	Charotar Publishing House	2024
2.	Engineering Drawing	K.R. Gopal Krishna	30th	Subhash Publications, Bangalore	2017

Reference Books:

	Book Title	Authors	Edition	Publisher	Year
1.	Engineering Drawing & Design	Cencil Jensen, Jay D. Helsel, Dennis R. Short	7th	Tata McGraw-Hill	2007
2.	Printed Circuit Board Design using AutoCAD	Chris Schroder	-	Newness	1997
3.	Design of foundation systems	NainanPKurian	3rd	Alpha Science International Ltd	2005

Teaching -Learning– Evaluation Scheme:

Sl.No	TeachingandLearningMethod	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	4	14	56
2	Integrated Lab Component	-	-	-
3	Student Study Hours - Self Learning	-	-	-
3	Activity Based Learning (ABL1)	-	-	27
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**90**

Proposed Assessment Plan (for 50marks of CIE):

Tool	**Remarks**	**Marks**
CIE	Two CIEs conducted for 50 marks each and reduced to 10 marks	20
Activity Details	Submission of printouts of computer-solved problems	30
Total		**50**

Activity Based Learning (27Hours)

ABL1(XX Hours) : Activity 1 details		**Hours**
1.	Computer-solved problems printout of **Projection of Planes**	5
2.	Computer-solved problems printout of **Projection of Solids**	5
3.	Computer-solved problems printout of **Development of lateral surfaces**	6
4.	Computer-solved problems printout of **Isometric Projections**	6
5.	Computer-solved problems printout of **Basic Applications**	5
Total		27

Evaluation of Learning Process(7Hours)

Type of Evaluation	**Hours**
Test(1 and 2)	3
Submission of printouts	1
Semester End Exam	3
Total	**7**

COURSE ATRICULATION MATRIX

Course Out comes	Program Outcomes [POs]												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1			3				2				
CO2	1	1			3				2				
CO3	1	1			3				2				

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COURSE 1: SOFT SKILLS DEVELOPMENT

Semester I/II | Duration: 15 Hours

Course Objective

To develop students' personality, confidence, emotional intelligence, teamwork, leadership, goal-setting, self-management and professional behaviour.

Course Outcomes

- Develop self-confidence and a positive professional attitude.
- Demonstrate effective interpersonal and teamwork skills.
- Set and manage personal and professional goals.
- Manage time effectively and improve productivity.
- Demonstrate leadership, decision-making and conflict-management abilities.
- Apply professional etiquette and behaviour in academic and workplace settings.

Unit	Course Content	Focus / Expected Competency	Hours
1	Personality Development – personality traits, self-confidence, positive attitude, grooming and professional behaviour	Build self-confidence, positive attitude and professional conduct	3
	Emotional Intelligence – self-awareness, self-regulation, empathy, social awareness and stress management	Improve emotional awareness, empathy and self-management	
2	Goal Setting – importance of goals, short-term and long-term goals, SMART goals	Set clear, realistic and actionable goals	3
	Time Management – importance, common myths, time wasters and effective time utilisation	Manage time and improve personal productivity	
3	Team Building – effective teams, team roles, team dynamics and collaboration	Work effectively in teams and manage team interactions	3
	Leadership Skills – leadership principles/styles, decision-making, team building and conflict management	Demonstrate leadership, decision-making and conflict-management skills	
4	Interpersonal Skills – self-awareness, empathy, relationship building, teamwork and collaboration	Develop healthy professional relationships and collaboration	3
	Professional Etiquette – professional grooming, workplace behaviour, business etiquette and organisational culture	Demonstrate appropriate professional behaviour	
5	Critical Thinking & Problem Solving – analytical thinking, logical reasoning and problem-solving techniques	Apply analytical and logical approaches to practical problems	3
	Decision-Making Skills – decision-making process, evaluation of alternatives and responsible decisions	Make informed, effective and responsible decisions	

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COURSE 2: COMMUNICATION SKILLS

Semester I/II | Duration: 15 Hours

Course Objective

To develop students' verbal, non-verbal, written and professional communication abilities and prepare them for academic, workplace and recruitment interactions.

Course Outcomes

- Communicate effectively in academic and professional environments.
- Demonstrate improved verbal, non-verbal and written communication.
- Apply active listening and presentation skills.
- Participate effectively in group discussions and professional interactions.
- Prepare professional emails, reports and business correspondence.
- Demonstrate effective communication during interviews and professional networking.

Unit	Course Content	Focus / Expected Competency	Hours
1	Fundamentals of Communication – verbal, non-verbal and written communication; barriers and solutions	Communicate clearly and appropriately in different contexts	3
	Listening Skills – active, passive and reflective listening; recognising non-verbal cues	Demonstrate active listening and interpret communication signals	
2	Verbal Ability – vocabulary, grammar, sentence construction and verbal reasoning	Improve language proficiency and communication accuracy	3
	Reading & Comprehension – reading comprehension and understanding written information	Interpret written information accurately and efficiently	
3	Presentation Skills – presentation structure, visual aids, slide design and delivery	Deliver structured and confident presentations	3
	Public Speaking – speech structure, confidence, body language, tone, pace and Q&A	Speak confidently and engage an audience effectively	
4	Group Discussion Skills – GD types, communication techniques, participation, collaboration and leadership	Participate effectively in group discussions	3
	Email & Business Communication – professional emails, correspondence, reports and meeting communication	Write and communicate professionally in workplace situations	
5	Workplace Communication – professional communication, communication protocols and effective workplace interactions	Apply appropriate communication strategies in professional settings	3
	Career & Employability Communication – resume preparation, interview skills and professional networking	Communicate effectively during recruitment and career interactions	

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INDIAN CONSTITUTION

Course Title:	**Indian Constitution**		
Course Code:	ICO617/627		
Teaching Hours/Week (L:T:P: S)	1:0:0:0	CIE Marks	100
Total Hours of Pedagogy	30 hours	Total Marks	100

Course objectives:

The course **INDIAN CONSTITUTION (22ICO17 / 27)** will enable the students,

1. To know about the basic structure of Indian Constitution.
2. To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

Course outcome (Course Skill Set)

At the end of the course 22ICO17/27 the student will be able to:

CO1	Analyze the basic structure of Indian Constitution.
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3	Know about our Union Government, political structure & codes, procedures.
CO4	Understand our State Executive & Elections system of India.
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching – Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based

learning through discussion.

(ii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students in theoretical applied and practical skills.

Module-1	**(04 hours)**

Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.

Module-2	**(04 hours)**

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.

Module-3	**(04 hours)**

Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.

Module-4	**(04 hours)**

Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.

State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral

Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18

marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Two Unit Tests each of 30 Marks (duration 01 hour)

- First test after the completion of 30-40 % of the syllabus.
- Second test after completion of 80-90% of the syllabus.

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration.

Two assignments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **01 hour.** The student must secure a minimum of 35% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

1. **"Constitution of India" (for Competitive Exams)** - Published by Naidhruva Edutech

Learning Solutions, Bengaluru. –2022.

2. "**Introduction to the Constitution of India**", (Students Edition.) by Durga Das Basu (**DD Basu**): Prentice –Hall, 2008.

Reference Books:

1. **"Constitution of India, Professional Ethics and Human Rights"** by Shubham Singles, Charles E.Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
2. **"The Constitution of India"** by Merunandan K B: published by Merugu Publication, SecondEdition, Bengaluru.
3. **"SamvidhanaOdu" - for Students & Youths by Justice HN NagamohanDhas, Sahayana, kerekon.**
4. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "**Engineering Ethics**", Prentice – Hall,2004.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Contents related activities (Activity-based discussions)
2. For active participation of students instruct the students to prepare Flowcharts and Handouts
3. Organizing Group wise discussions Connecting to placement activities
4. Quizzes and Discussions, Seminars and assignments.

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Course Title	**SAMSKRUTHIKA KANNADA**		
Course Code	**KSK619/629**	**(L-T-P)C**	**(1-0-0)1**
CIE (Theory) marks	50	**Class Hours/Week**	01
SEE marks	50	**Total class hours**	30

Course Outcomes (COs):

At the end of course, student will be able to

#	Course outcomes	Mapping to PO's	Mapping to PSO's
CO1	Kannada bashe , Sahithya mathu kannadadha samskruthiya kurithu arivu mudiruthadhe.	P10	-
CO2	Kannada sahithyadha pradhana bhaghavadha adhunika poorva mathu Adunika kavyagalannu sankethikavagi Kalithu hechina odhige mathu jnanakke spoorthi moodiruthadhe.	P10	-
CO3	Vidhyarthigalalli sahithya mathu samskruthiya bhagge arivu agu asakthiyannu hechaguthade.		
CO4	Thantrika vyaktigala parichaya agu avarugala sadhisidha vishayagalannu thilidhukondu nadina ennithara vyakthigala bhagge thilidhukollalu Kauthukathe hechaguthadhe.		
CO5	Samskruthika,janapadha agu oravasa kathanagala parichaya madikoduvudu.		

Course Contents:

Ghataka -1: Kannada Samkruthi mathu bhashe Kurithadha Lekhanagalu

1. Karnataka Samkruthi – Hampa Nagarajayya

2. Karnatakada yekikarana : Ondhu Apoorva Charithre – G.Venkatasubbayya

3. Adalitha Bhasheyaagi kannada – Dr. L.Thimmesha mathu, Prof.V.Keshavamurthy

Ghataka -2: Adhunika poorvadha kavya bhaga

4 .Vachanagalu : Basavanna , Akkamahadevi , Allamaprabhu , Aydhakki Maaraiyya ,

Jedaradasimaiyya , Aydhakki Lakkamma.

5. Kirthanegalu : Adharindenu pala edharindhenu pala? Purandharadhasaru Thalanisadhiru kandya thalu manave – Kanakadasaru

6. Thatvapadagalu : Saavira kodagala suttu – Shishunaala sharipha

Ghataka -3: Adhunika kavyabhaga

7. DVG ravara Mankuthimmana kaggadhindha aydhu bandha kelavu bhagagalu

8. Kurudu kachana : Da.Ra.Bhendre

9.Hosabalina geethe : Kuvempu

Ghataka -4: Thantrika Vyakthigala Parichaya

10. Dr.Sir.M.Visveshwaraih : Vyakthi mathu Aithihasika – A.N.Murthyrao

11. Karakushala kalegalu mathu parampareya vignana – Karigowda Bichanahalli

Ghataka -5: Samkruthika , janapadha kathe mathu pravasa kathegalu

12. Ugadi – Vasudhendra

13. Meghane yembha girijana parvatha – Hi.Chi.Bhoralingaiyya

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Course Title	**BALAKE KANNADA (KANNADA FOR CONVERSATION)**		
Course Code	**KBK619/629**	**(L-T-P)C**	**(1-0-0)1**
CIE (Theory) marks	100	**Class Hours/Week**	02
SEE marks	50	**Total class hours**	30

Course Learning Objectives:
At the end of course, student will be able to

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Non kannadiga students to undrestan, speak, read and write kannada language	P10	-
2	Communicate (converse) in Kannada language in their daily life with kannada speakers	P10	-

Course Contents:

Part-I: Lessons to teach and learn Kannada Language

Lesson-1: Vayaktika swaamyasuuchaka/ sambandhitha saarwanaamagalu mattu prashnarthaka padagalu- personal pronouns, possessive forms, interrogative words

Lesson-2: Namapadagala sambandharthaka roopagalu, sandehaspada prashnegalu mattu sambhanda vachaka namapadagalu – Possessive forms of nouns, dubitive question and relative nouns

Lesson-3: Guna parimaana mattu varnabanna visheshanagalu sankhyavachakagalu- Qualitative, Quantitative and Color Adjectives, Numerals

Lesson-4: Kaaraka roopagalu mattu vibhakti prathyayagalu- sapthami vibhakti prathyaya- (aa, adu, avu, alli) Predictive forms, locative case

Lesson-5: Chathurthi vibhakthi prathyayada balake mattu sankhyavachakagalu- Dative cases and Numerals

Lesson-6: Sankhyaagunavaachakagalu mattu bahuvachana naamaroopagalu- Ordinal numerals and Plural markers

Lesson-7: Nyuuna / nishedhaarthaka kriyapadagalu mattu Varna gunavachakagalu- Defective / negative verbs and Color Adjectives

Lesson-8: Appane/oppige, nirdeshana, proothsaaha mattu otthaaya artharoopa padagalu mattu vaakyagalu- Permission, Commands, encouraging and Urging words (Imperative words and sentences)

Lesson-9 : Saamanya sambhaashanegalalli dvithiya vibhakthi prathyayagalu mattu sambhavaniya prakaaragalu- Accusative Cases and Potential Forms used in General Communication

Lessson-10 : "Iru mattu Iralla" sahayaka kriyaapadagalu, sambhavyasuchaka mattu nishedhaarthaka kriyaa padagalu – Helping Verbs "Iru and Iralla" , Corresponding future and Negation Verbs

Lesson-11:Hoolike (tharathama), sambhanda suchaka mattu vastu suchaka prathyayagalu mattu nishedhaarthaka padagala balake- Comparative, Relationship, Identification and Negation Words

Lesson-12: Kaala mattu samayada haagu kriyapadagala vividha prakaragalu- Different types of forms of Tense Sentences with Verb forms

Lesson-13: Dh, -Th, -Thu, -ithu, -aagi, -alla,-gh, -kh, -ide, kriyaa prathyayagalondige bhootha, bhavishyath mattu varthamana kaala vaakya rachane- Formation of Past, Future and Present Tense Sentences with Verb forms

Lesson-14: Karnataka raajya mattu raajyada bagge kurithaada ithare maahithigalu- Karnataka State and General information about the State

Lesson-15: Kannada bhaashe mattu saahithya- Kannada Language and Literature

Lesson-16: Bhaashe kaliyalu eenannu maadabeeku mattu maadabaaradu- Do's and Don'ts in Learning a Language

Lesson-17: Part-II

Kannada Language Script Part-1

Lesson-18 : Part-III

Kannada Vocabulary List: Sambhashaneyalli dinoopayoogi Kannada padagalu- Kannada words in Conversation.

University Guidelines for CIE Procedure:

i) CIE Marks in Vyavaharika Kannada and Aadalita Kannada shall be the sum of marks prescribed for tests and assignments. Marks prescribed for tests shall be 75 and that for the assessments be 25.

ii) The CIE marks awarded for the tests shall be based on three tests generally conducted at

the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 25 marks and the final CIE marks shall be the sum of the marks of all the three tests.

iii) The remaining 25 marks shall be awarded based on the evaluation of assignments/unit tests/written quizzes that supports to communication skills as per Bloom's Revised Taxonomy and Course/programme outcomes.

iv) Final marks awarded shall be the sum of (ii) and (iii) for a maximum of 100 marks.

The candidates shall write the test in Blue Books and also assignments/unit-tests/written quizzes in Blue Books/Notes which shall be preserved by the Principal/Head of the Department for at least six months after the announcement of University results and shall be made available for verification at the direction of the Registrar (Evaluation).

Course Title	**INNOVATION & DESIGN THINKING**		
Course Code	**IDT618**	**(L-T-P) C**	(1-0-0)1
SEE duration	2 hours	**Hours / Week**	02
CIE marks	50	**Total Marks**	100
SEE marks	50	**Total hours**	**14L+14ABL+2ELP=30**

CourseObjective:

The objective of this course is to make students choose real life problems andgenerate innovative ideas to solve them through design thinking approach.

Course Outcomes (COs) {with mapping shown against the **Program Outcomes (POs)}Uponcompletion of the course,studentsshallbeable to:**

Sl. No.	Course outcomes	Mapping to POs
1.	explain the different stages in design thinking	1, 6, 7
2.	generate solutions to real life problems by applying the design thinking approach	1, 2, 10, 12

Course Contents:

MODULE –1	5 Hrs.

Introduction: Innovation, Design, Early man as a designer, Design thinking levels: Component or product level, System or community level. **Morphology of Design:** Divergence or Explorative phase, Transformation or Creative phase, Convergence phase. Sustainable Development Goals.

MODULE –2	5 Hrs.

Fundamentals of Design Thinking: Design Thinking Process: Different Phases. Empathize: Observation,Interview, Literature Survey. Define/Analyze:5 Why's technique, Conflict Analysis.

MODULE –3	5 Hrs.

Ideate: Eskimo nine dot problem,Theory of Inventive Problem Solving (TRIZ method), Brain storming.**Prototype:** Methods of Prototyping. **Testing:** Self-reflection, Interviewing real customer.

Activities:

1. Identifying real life problems through observation & interaction with real world
2. Literature Review
3. Brain Storming Session to generate ideas for the chosen problem
4. Skill building to prepare a prototype

TEXTBOOKS:

1. Dr.BalaRamadurai***,"KarminDesignThinking",***MudranikTechnologyPrivateLtd.ISBN978-93-5419-0I0-0.
2. V. Gupta and P. Murthy, An Introduction to engineering design method, Tata McGraw Hill, 2000. ISBN-0070964416.

REFERENCES:

1. John.R.Karsnitz,StephenO'BrienandJohnP.Hutchinson,***"EngineeringDesign"***,Cengagelearning(International edition)SecondEdition,2013.
2. RogerMartin,***"TheDesignofBusiness:WhyDesignThinkingistheNextCompetitiveAdvantage"***,HarvardBusinessPress ,2009.
3. HassoPlattner,ChristophMeinelandLarryLeifer(eds),***"DesignThinking:Understand–Improve–Apply"***, Springer,2011
4. IdrisMootee,***"DesignThinkingforStrategicInnovation:WhatTheyCan'tTeachYouatBusinessorDesignSchool"***, JohnWiley&Sons2013.

Sl.No	TeachingandLearningMethod	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	ClassRoomTeaching	1	14	14
2	IntegratedLabComponent	-	-	-
3	StudentStudyHours–SelfLearning	-	-	-
4	TutorialComponent	-	-	-
5	ActivityBasedLearning(ABL1&ABL2)	1	14	14
6	EvaluationofLearningProcess	-	-	02
TotalLearningHours/Semester				**30**

List of Activities:

1. Writing observations using 4W1H method
2. Interviewing people who are experiencing the chosen problem
3. Literature Review
4. Applying Multi Why's Technique to find root cause of the problem
5. Drawing Cause and Effect Diagram
6. Brain storming to generate innovative ideas
7. Preparing a prototype (can be a poster, model, website, app etc.)
8. Writing self-evaluation report
9. Collecting feedback from people through an interview

Scheme of Evaluation (Laboratory Courses)

Level	Evaluation Type	Evaluation modules	Marks
1	Continuous internal Evaluation	Record Writing (individual project)	30
		Presentation based on individual project	20
2	Semester End Examination	Group project report	20
		Presentation based on group project	20
		Viva voce	10
		Total	**100**

Note: The marks distribution to be made based on the rubrics.

Examination	Maximum marks	Minimum marks to qualify
CIE	**50**	**20**
SEE	**50**	**20**

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Course Title	**Mathematics-II for Computer Science Engineering stream**		
Course Code	MAT6S21	**(L-T-P)**	(3-1-0)4
Exam	3hours	**Hours / Week**	04
SEE	50 Marks	**Total Hours**	42L+14SL+28T+36ABL=120

Course Objective To train the students to acquire knowledge in differential equations, vector calculus and curve fitting, so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	**Outcomes**	**POs**
CO1	Apply the concepts of ordinary differential equations, numerical methods, and probability theory to solve mathematical and engineering problems.	PO1
CO2	Analyze differential equation models, numerical techniques for ordinary and partial differential equations, and probabilistic methods to solve engineering problems of moderate complexity.	PO2
CO3	Develop mathematical models to analyze and solve real-life engineering and analytical problems using appropriate mathematical techniques.	PO2, PO3

MODULE - 1	**10 Hrs**

Ordinary Differential Equations - first order first degree - Exact differential equations, Linear differential equations, orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body, equi-potential lines in an electric field between two concentric cylinders.

Applications: Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth,. carbon dating half-life period.

Self-study - Bernoulli's differential equation, Reducible to exact differential equations.

MODULE - 2	**10 Hrs**

Linear differential equation with constant coefficients - Solutions of second-order and high order differential equations. Solution of non-homogenous differential equations for the combination of exponential, trigonometric and polynomial function. Method of variation of parameters.

Applications of second order, first degree Differential equations: - A Spring mass oscillations-Undamped free oscillations, damped free oscillations, forced oscillations with damping, forced oscillations without damping.

Self-study- Non- homogenous differential equations for the product of different standard forms, LDE with variable coefficients (Legendre's differential equations).

MODULE - 3	**10 Hrs**

Numerical solution of first order, first degree ODE: Taylor's series method, Euler's modified method, Runge-Kutta (RK) method of fourth order.

Numerical solution of Partial Differential Equations. Classification of PDE, Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula.

Applications: CPU load balancing in cloud systems, Data Transfer Rate Estimation.

Self-Study- Milne's Predictor-corrector method, Adam-Bash forth method.

MODULE - 4	12 Hrs
Probability Theory: Basic concepts of Probability and its properties (concept only), Baye's theorem. **Random Variable**: Introduction to Random variables, Discrete random variables, Binomial distribution and Poisson distribution. **Applications:** Bayes' Theorem – in E-Commerce, Website Request Analysis. **Self-Study**- Probability and set notations, independent events.	
Note: 1. Proofs are not required for any theorems and properties. 2. There should not be any questions from self-study part in Semester End Examination.	

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8 (Wiley student edition)	Wiley India P.v.t. Ltd	2018
3	Calculus	Thomas Finney	9	Pearson education	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2	A textbook of Engineering Mathematics	N.P. Bali and Manish Goyal	Reprint	Laxmi Publications	2010

EBooks and online course materials:

- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:

- **https://www.courseera.org/**
- **https://nptel.ac.in/courses/**

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Teaching - Learning - Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning (ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**

Activity Based Learning (29)

Problem Solving Assignment	Problem selection	4
	Formulate the methodology	6
	Solving the problem	6
	Report writing and submission	6
	Preparation of slide and presentation	7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1) Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1 and 2)	3
Activity component	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		2	1										

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Course Title	Mathematics-II for Electrical and Electronics Engineering stream		
Course Code	MAT6E21	(L-T-P) /C	(3-1-0) /4
Exam	3hours	Hours / Week	04
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective: To train the students to acquire knowledge in differential equations and vector calculus, so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of differential equations, numerical methods, vector calculus, and Laplace transforms to solve basic mathematical problems.	PO1	-
CO2	Apply differential equations, numerical techniques, vector operations, and Laplace transforms to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyse and solve engineering application problems involving population models, electrical circuits, fluid flow, electrostatics, and delayed systems using appropriate mathematical techniques.	PO2, PO3	

MODULE - 1	10 Hrs.

Ordinary Differential Equations - first order first degree - Exact differential equations, Linear differential equations, orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body, equi-potential lines in an electric field between two concentric cylinders.

Applications: Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth,Carbon dating half-life period.

Self-study - **Bernoulli's** differential equation, Reducible to exact differential equations.

MODULE - 2	10 Hrs.

Linear differential equation with constant coefficients - Solutions of second-order and high order differential equations. Solution of non-homogenous differential equations for the combination of exponential, trigonometric and polynomial function. Method of variation of parameters.

Applications of second order, first degree Differential equations -Oscillatory Electrical circuit, LC circuit, LCR circuit, LC circuit with E.M.F, LCR circuit with E.M.F, Electro-Mechanical Analogy.

Self-study - Non- homogenous differential equations for the product of different standard forms, LDE with variable coefficients (Legendre's differential equations).

MODULE - 3	10 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Euler's modified method, Runge-Kutta (RK) method of fourth order.

Vector Differentiation: Introduction to vectors, Velocity & acceleration, Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and Irrotational vector fields. **Vector Integration**: Line integrals **Applications -** Conservation of laws (Fluid flow- Divergence), Analysis of streamlines and electric potentials (Electrostatics). **Self-Study-**Adams-Bashforthmethod, Vector Integration - Surface integrals.

MODULE - 4	**12 Hrs.**
Laplace Transforms: Importance of Laplace transform in engineering applications, Laplace transform of standard functions properties, Laplace transform of standard functions, Laplace transform- unit-step functions. **Inverse Laplace Transforms:** Definition and general properties, Computation of the inverse by the method of partial fraction and completing square method, solution of differential equations by using Laplace Transforms. **Applications-**Network packet transmission with delayed start, Dual-phase CPU cooling system with delayed control response. **Self-Study-** Laplace transform of periodic functions, Unit impulse functions (Dirac – delta function).	

NOTE
1. Proofs are not required for any theorems and properties.

2. There should not be any questions from self-study part in semester End Examination.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
01	Higher Engineering Mathematics	Dr. B. S. Grewal	44th	Khanna	2016
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2004
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Numerical methods,	R. K. Jain and S. R. K. Jain & S. R. K. Iyengar,	6th edition,	New age International p.v.t. Publishers,	2014
2.	A textbook of Engineering Mathematics,	N.P. Bali and Manish Goyal	Reprint,	Laxmi Publications	2010

EBooks and online course materials:
- http://nptel.ac.in/courses.phd?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicerath.org/

Online Courses and Video Lectures:
- https://www.courseera.org/
- https://nptel.ac.in/courses/

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Teaching - Learning - Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning(ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**

Activity Based Learning (29)		Hours
Problem Solving Assignment	Problem Selection	4
	Formulate the methodology	6
	Solving the problem	6
	Report Writing & Submission	6
	Preparation of slide and presentation	7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Activity Based Learning	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1and 2)	3
Activity (1 and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	**3**												
CO2		**3**											
CO3		**2**	**1**										

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	**Mathematics-II for Civil Engineering**		
Course Code	MAT6C21	**(L-T-P)/C**	(3-1-0)4
Exam	3hours	**Hours / Week**	04
SEE	50 Marks	**Total Hours**	42L+14SL+28T+36ABL=120

Course Objective To train the students to acquire knowledge in differential equations, vector calculus and curve fitting, so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	**Outcomes**	**POs**	**PSOs**
CO1	Apply the concepts of differential equations, numerical methods, vector calculus, and Statistics to solve basic mathematical problems.	PO1	-
CO2	Apply differential equations, numerical techniques, vector operations, and Statistics to solve engineering problems of moderate complexity.	PO2	-
CO3	Analyze and solve engineering application problems involving population models, carbon dating half-life period, and Mechanical spring oscillation, Temperature Distribution in Concrete During Curing, Hydraulic Engineering Application-Reservoir Water Level Prediction, and Finding projectile height from its acceleration using appropriate mathematical techniques.	PO2, PO3	

MODULE - 1	**10 Hrs.**

Ordinary Differential Equations - first order first degree - Exact differential equations, Linear differential equations, orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body, equi-potential lines in an electric field between two concentric cylinders.

Applications: Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, carbon dating half-life period.

Self-study - Bernoulli's differential equation, Reducible to exact differential equations.

MODULE - 2	**12 Hrs.**

Linear differential equation with constant coefficients - Solutions of homogeneous equations. Particular solution of non-homogenous differential equations by inverse differential operator method for the following standard forms, exponential, polynomial, trigonometric. Method of variation of parameters to solve linear differential equation with constant coefficients.

Applications of second order, first degree Differential equations: - Mechanical spring oscillation-A Spring mass system $mu^{II}(t) + ku^{I}(t) + gu(t) = f(t)$, Undamped free vibrations, damped free vibrations, forced oscillations with damping, forced oscillations without damping.

Self-study- Particular solution of non- homogenous differential equations by inverse differential operator method for the product of standard forms, method of undetermined coefficients, LDE with variable coefficients (Legendre's differential equations. Mechanical system and transmission lines).

MODULE - 3	**10 Hrs.**

Numerical solution of first order, first degree ODE: Taylor's series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector methods, Euler's modified method.

Partial Differential Equations. Brief introduction to classification of PDE, Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula.

Applications: Temperature Distribution in Concrete During Curing, Hydraulic Engineering Application-Reservoir Water Level Prediction Using Milne's Predictor-Corrector Method.

Self-Study- Adams-Bashforth method, Application connected with civil Engineering.

MODULE - 4	**10 Hrs.**

Vector Calculus: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, Solenoidal and irrotational vector fields.

Statistics: curve fitting – Linear and quadratic equation, Exponential distribution and Geometric transformation

Applications: Finding projectile height from its acceleration.

Self-study: Rank correlation**,** lines of regression.

Note:

1. Proofs are not required for any theorems and properties.
2. There should not be any questions from self-study part in semester End Examination.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8 (Wiley student edition)	Wiley India P.v.t. Ltd	2018
3	Probability and Statistics for Engineering and the Sciences	L. Devore	-	-	2022

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2	Fundamentals of Statistics in Engineering	Srijib Bhusan Bagchi	-	-	2024

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://ocw.mit.edu/courses/res-18-001-calculus-fall-2023/pages/textbook/

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/learn/introduction-to-calculus
3. https://nptel.ac.in/courses/111104092

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Teaching - Learning - Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	3	14	42
2	Tutorial component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
4	Activity Based Learning (ABL)	-	-	29
5	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**
Activity based learning (29)				
Problem Solving Assignment		Problem selection		4
		Formulate themethodology		6
		Solving the problem		6
		Report writing and submission		6
		Preparation of slide and presentation		7

ProposedAssessmentPlan(for50marksofCIE):

Tool	Remarks	Marks
CIE	Two CIEsconductedfor50 marks each and reduced to 15 marks	30
ActivityDetails	Details of activities to be conducted 1) activity	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	3
Activity	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		2	1										

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Course Title	Mathematics-II for Mechanical Engineering stream		
Course Code	MAT6M21	(L-T-P)/C	(3-1-0)/4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	42L+14SL+28T+36ABL=120

Course Objective: To train the students to acquire knowledge in differential equations, numerical techniques and vector calculus so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to:

COs	Outcomes	POs	PSOs
CO1	Apply the concepts of ordinary differential equations, numerical methods, vector analysis, and linear algebra to solve mathematical and engineering problems.	PO1	-
CO2	Analyze and solve engineering problems by employing differential equations,vector field concepts, numerical and algebraic techniques.	PO2	-
CO3	Develop mathematical models to analyze and solve real-life engineering and analytical problems using appropriate mathematical techniques.	PO2, PO3	-

MODULE - 1	10 Hrs.

Ordinary Differential Equations - first order first degree - Exact differential equations, Linear differential equations, orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body, equi-potential lines in an electric field between two concentric cylinders.

Applications: Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, carbon dating half-life period.

Self-study - Bernoulli's differential equation, Reducible to exact differential equations.

MODULE - 2	12 Hrs.

Linear differential equation with constant coefficients - Solutions of second-order and high order differential equations. Solution of non-homogenous differential equations for the combination of exponential, trigonometric and polynomial function. Method of variation of parameters.

Applications of second order, first degree Differential equations: - A Spring mass oscillations-Undamped free oscillations, damped free oscillations, forced oscillations with damping, forced oscillations without damping.

Self-study- Non- homogenous differential equations for the product of different standard forms, LDE with variable coefficients (Legendre's differential equations).

MODULE - 3	10 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Euler's modified method, Runge-Kutta (RK) method of fourth order.

Numerical solution of Partial Differential Equations. Classification of PDE, Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula

Applications: Engine component Cooling with Internal Heat Generation, vibration of a spring mass system.

Self-Study-Milne's Predictor-corrector method, Adam-Bash forth method.

MODULE - 4	**10 Hrs.**

Vector Calculus: Scalar and vector fields, Gradient, directional derivative, curl and divergence - Physical Interpretation, Solenoidal and Irrotational vector fields.

Linear Algebra: Eigen values and Eigen vectors, Diagonalization and Powers of matrices (3x3), Rayleigh power method.

Applications: Application of Gradient in Heat Flow Analysis, Air flow in an HVAC duct system and ideal fluid flow around an aircraft wing.

Self-study: LU Decomposition method

Note:

1. Proofs are not required for any theorems and properties.
2. There should not be any questions from self-study part in semester End Examination.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2021
2	Advanced Engineering Mathematics	Erwin Kreyszig	8 (Wiley student edition)	Wiley India P.v.t. Ltd	2018

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Numerical methods	R. K. Jain and S. R. K. Jain& S. R. K. Iyengar	6	New age International p.v.t. Publishers	2014
2	Fundamentals of Statistics in Engineering	SrijibBhusanBagchi	First Edition	Shroff Publishers & Distributors Pvt. Ltd	2024
3	A Text book of Engineering Mathematics	N.P.Bali and Manish Goya	10	Laxmi Publications	2022

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
2. https://ocw.mit.edu/courses/res-18-001-calculus-fall-2023/pages/textbook/

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/learn/introduction-to-calculus
3. https://nptel.ac.in/courses/111104092Teaching - Learning - Evaluation Scheme:

MALNAD COLEGE OF ENGINEERING, HASSAN
First year syllabus 2026-2027

Teaching - Learning - Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	3	14	42
2	Tutorial Component	2	14	28
3	Student Study Hours - Self Learning	1	14	14
3	Activity Based Learning (ABL)	-	-	29
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**120**

Activity Based Learning (29)		
Problem Solving Assignment	Problem selection	4
	Formulate the methodology	6
	Solving the problem	6
	Report writing and submission	6
	Preparation of slide and presentation	7

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Two CIEs conducted for 50 marks each and reduced to 15 marks	30
Activity Details	Details of activities to be conducted 1) Problem Solving Assignment	20
Total		**50**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
CIE (1 and 2)	3
Activity component	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		2	1										