



Bachelor of Engineering
in
Electrical and Electronics
Engineering

Scheme and Syllabus
(2025 Scheme)

III Semester



VISION OF THE INSTITUTE

Be an Institution of Excellence with International Standards.

MISSION OF THE INSTITUTE

- Impart quality education, along with industrial exposure
- Provide world-class facilities to undertake research activities relevant to industrial and professional needs.
- Promote Innovation, Entrepreneurship and Value-added education that is socially relevant, along with economic benefits.

VISION OF THE DEPARTMENT

To produce adequately trained socially responsible and innovative engineers in the area of Electrical and Electronics Engineering, competent enough to enhance the image of the country in the international arena.

MISSION OF THE DEPARTMENT

M1: Quality Education: Commitment to world-class teaching, mentoring, and intellectual stimulation.

M2: Industry ready: Exposure to latest technologies and industrial practices through industrial interaction and collaboration.

M3: Social responsibility: Inculcating value-based education leading to social awareness.

M4: Entrepreneur: Encouraging Entrepreneurship activities.

PROGRAM OUTCOMES:

Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

1. **Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.
2. **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.
3. **Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.
4. **Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.
5. **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.
6. **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.
7. **Individual and Collaborative Teamwork:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
8. **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
9. **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply

these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

10. **Life-Long Learning:** Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

PEO1: Successful Career Development: Graduates will have flourishing careers in core and allied engineering industries, higher education, entrepreneurship, or research.

PEO2: Continuous Learning and Growth: Graduates will engage in lifelong learning to enhance their professional expertise and adapt to evolving technologies.

PEO3: Sustainable Energy Solutions: Graduates will develop and implement energy-efficient technologies, including renewable energy systems, to minimize environmental impact.

PROGRAM SPECIFIC OUTCOMES (PSOS):

PSO1: Skill Development: Apply advanced science, Electrical and Electronics Engineering concepts and laboratory skills to analyze, design and solve Electrical and Electronics Engineering problems.

PSO2: Exposure in advance technologies: Apply management skills, ethical values, appropriate techniques, and modern engineering tools in Electrical and Electronics Engineering to engage in life-long learning in Electrical and Electronics Engineering and allied fields.

MVJ College of Engineering, Bengaluru (Autonomous)
B.E. in Electrical and Electronics Engineering - Scheme 2025
 Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS)
 (Applicable for 2025-26 admitted students)

Semester - III

Sl. No	Course	Course Code	Course Title	Teaching & Learning Scheme					Examination				Credits
				CI		LI	TW & SL	# TH / S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	ASC	MVJ25EC31	Probability and Transformation Techniques	56	0	0	64	120	3	50	50	100	4
2	IPCC	MVJ25EE32	Electric Circuit Analysis	42	0	28	50	120	3	50	50	100	4
3	PCC	MVJ25EE33	Analog and Digital Electronics	56	0	0	64	120	3	50	50	100	4
4	PCC	MVJ25EE34	Microcontrollers	56	0	0	64	120	3	50	50	100	4
5	PCC	MVJ25EE35	Electrical Power Generation and Distribution	42	0	0	48	90	3	50	50	100	3
6	PCCL	MVJ25EEL36	Microcontrollers Lab	0	0	28	2	30	3	50	50	100	1
7	AEC	MVJ25AECK37	Sustainable Engineering and SDGs	14	0	0	16	30	2	50	50	100	1
8	SDL	MVJ25EE38SL	MATLAB for Electrical Engineering	0	0	28	2	30	3	50	50	100	1
9	NCMC	MVJ25PE39	Physical Education (PE) (Sports and Athletics)	0	0	0	28	28	---	100	---	100	PP
		MVJ25YO39	Yoga										
10	NCMC	MVJ25MATDIP310	Additional Mathematics – I*	28	0	0	28	28	----	100	---	100	PP
TOTAL													22

*Applicable for Lateral entry students only

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Semester – IV

Sl. No	Course	Course Code	Course Title	Teaching & Learning Scheme					Examination				Credits
				CI		LI	TW & SL	# TH / S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	MVJ25EE41	Electrical Machines-I	56	0	0	64	120	3	50	50	100	4
2	IPCC	MVJ25EE42	Signals, Systems and Transforms	42	0	28	50	120	3	50	50	100	4
3	PCC	MVJ25EE43	Introduction to Embedded C	56	0	0	64	120	3	50	50	100	4
4	PCC	MVJ25EE44	Soft computing and application	56	0	0	64	120	3	50	50	100	4
5	PCCL	MVJ25EEL45	Electrical Machines-I Lab	0	0	28	2	30	3	50	50	100	1
6	BSC	MVJ25BI46	Biology for Engineers	28	0	0	32	60	2	50	50	100	2
7	AEC	MVJ25AECK47	Scientific Foundation of Health	14	0	0	16	30	2	50	50	100	1
8	SDL	MVJ25EE48SL	LABVIEW for Electrical Engineering	0	0	28	2	30	3	50	50	100	1
9	NCMC	MVJ25PE49	Physical Education (PE) (Sports and Athletics)	0	0	0	28	28	---	100	---	100	PP
		MVJ25YO49	Yoga										
10	NCMC	MVJ25MATDIP410	Additional Mathematics – II*	28	0	0	0	28	---	100	---	100	PP
TOTAL													21

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Semester – V

Sl. No	Course	Course Code	Course Title	Teaching & Learning Scheme					Examination				Credits
				CI		LI	TW & SL	# TH / S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	HSMC	MVJ25EE51	Technical Management and Economics	42	0	0	48	90	3	50	50	100	3
2	IPCC	MVJ25EE52	Electrical Machines-II	42	0	28	50	120	3	50	50	100	4
3	PCC	MVJ25EE53	Control Systems	42	0	0	48	90	3	50	50	100	3
4	PCC	MVJ25EE54	Electrical Measurements and Instrumentation	42	0	0	48	90	3	50	50	100	3
5	PEC	MVJ25EE55X	Professional Elective Course-I	42	0	0	48	90	3	50	50	100	3
6	BSC	MVJ25RM56	Research Methodology and IPR (Online)	28	0	0	32	60	2	50	50	100	2
7	AEC	MVJ25AECK57	Ability Enhancement Course	14	0	0	16	30	2	50	50	100	1
8	SDL	MVJ25EE58SL	PCB Design	0	0	28	2	30	3	50	50	100	1
9	PCCL	MVJ25EEL57	Control Systems Lab	0	0	28	2	30	3	50	50	100	1
10	SDC	MVJ25HBP58	Hackathon-Based Project	0	0	0	60	60	---	50	50	100	2
TOTAL													23
Professional Elective Course-I													
MVJ25EE55A		Solar PV Technologies		MVJ25EE55C		Object-Oriented Programming							
MVJ25EE55B		Electric Vehicle Powertrain Engineering		MVJ25EE55D		Hydrogen Energy and Fuel Cell Systems							

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VII and VIII semesters for the candidates who opt for a two-semester internship along with Capstone Project (Scheme B)

Sl. No	Course	Course Code	Course Title	Teaching & Learning Scheme					Examination				Credits
				CI		LI	TW & SL	# TH / S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	SL						
1	IPCC	MVJ25EE71	Switchgear and Protection	42	0	28	50	120	3	50	50	100	4
2	PEC	MVJ25EE72X	Professional Elective Course-III (NPTEL/VTU Online Course)	42	0	0	48	90	--	50	50	100	3
3	PEC	MVJ25EE73X	Professional Elective Course-IV (NPTEL/VTU Online Course)	42	0	0	48	90	--	50	50	100	3
4	OEC	MVJ25EE74X	Open Elective Course -I (NPTEL/VTU Online course)	42	0	0	48	90	---	50	50	100	3
5	SDC	MVJ25EE75	Capstone Project - Phase-II	0	0	0	210	210	3	100	100	200	7
6	NCMC	MVJ25IKS76	Indian Knowledge System	14	0	0	14	28	--	100	--	100	PP
7	AEC	MVJ25AECK77	Ability Enhancement Course	14	0	0	16	30	2	50	50	100	1
8	SDL	MVJ25EE78SL	Wiring Harness Design	0	0	28	2	30	3	50	50	100	1
	Total												22
1	PEC	MVJ25EE81X	Professional Elective-V (NPTEL/VTU Online Course)	42	0	0	48	90	---	50	50	100	3
2	OEC	MVJ25EE82X	Open Elective-II (NPTEL/VTU Online Course)	42	0	0	48	90	---	50	50	100	3
3	SDC	MVJ25INT83X	Internship (Two- semester internship for a minimum Period of 180 working days or -30 weeks)	--	--	--	--	360	3	50	50	100	9
	Total												15
	VII semester and VIII semester Credits Total												37

Professional Elective Course-III			
MVJ25EE72A	NPTEL/VTU Online Course	MVJ25EE72C	NPTEL/VTU Online Course
MVJ25EE72B	NPTEL/VTU Online Course	MVJ25EE72D	NPTEL/VTU Online Course
Professional Elective Course-IV			
MVJ25EE73A	NPTEL/VTU Online Course	MVJ25EE73C	NPTEL/VTU Online Course
MVJ25EE73B	NPTEL/VTU Online Course	MVJ25EE73D	NPTEL/VTU Online Course
Open Elective Course-I			
MVJ25EE74A	NPTEL/VTU Online Course	MVJ25EE74C	NPTEL/VTU Online Course
MVJ25EE74B	NPTEL/VTU Online Course	MVJ25EE74D	NPTEL/VTU Online Course
Professional Elective Course-V			
MVJ25EE81A	NPTEL/VTU Online Course	MVJ25EE81C	NPTEL/VTU Online Course
MVJ25EE81B	NPTEL/VTU Online Course	MVJ25EE81D	NPTEL/VTU Online Course
Open Elective Course-II			
MVJ25EE82A	NPTEL/VTU Online Course	MVJ25EE82C	NPTEL/VTU Online Course
MVJ25EE82B	NPTEL/VTU Online Course	MVJ25EE82D	NPTEL/VTU Online Course

Types of Internships (Course Code: MVJ25INT83X)

Students shall undertake one of the following internship types during the eighth semester, as per academic guidelines:

1. **MVJ25INT83A – Industry Internship:** Shall involve practical exposure and training within an industrial or corporate setting.
2. **MVJ25INT83B – Research Internship:** Shall focus on academic or applied research under the guidance of faculty or research institutions.
3. **MVJ25INT83C – Post-Placement Internship:** Shall be undertaken by students who have secured placement, aligning with their future employment domain.
4. **MVJ25INT83D – Societal Internship:** Shall engage students in community-based or social impact projects with NGOs, government bodies, or civic organizations.
5. **MVJ25INT83E – Online Internship:** Shall be conducted through recognized digital platforms offering structured internship modules.
6. **MVJ25INT83F – Skill Enhancement Courses (SEC):** Shall be opted by students unable to secure internships, offering credit equivalence through curated online courses available at [http:// www.online.vtu.ac.in](http://www.online.vtu.ac.in)

To ensure uniformity, quality, and transparency in the internship process, **VTU has launched a centralized web portal** that serves as a **single platform** for all internships opportunities. Reputed **industries, Centers of Excellence, Research Laboratories**, and other recognized bodies will be registered on this portal. **Students must choose internships exclusively through this portal. No other mode of internship selection will be permitted.**

Probability and Transformation Techniques			
Course Code	MVJ25EC31	Scheme	2025
Type of Course	ASC	Semester	III
Teaching Hours/Week (L: T: P)	4:0:0	CIE Marks	50
Total Hours of Pedagogy (L: T: P: SL&TW)	56:0:0:64	SEE Marks	50
Credits	4	Total Marks	100
Examination type (SEE)	Theory	Exam Hours	3
Course Objectives: This course will give the ability to: • Apply discrete and continuous probability distributions in analysing the probability models arising in the engineering field. • Understand the concepts of Complex variables and transformations for solving Engineering Problems. • Demonstrate and present data using statistical methods and fit the best curve for the data.			
Syllabus			
Random variables for discrete and continuous time functions, Probability and Cumulative density functions, Probability distributions. Complex variables and transformations. Fourier series of periodic functions of period 2π ,2c. Practical Harmonic Analysis and Problems. Infinite Fourier transforms, Fourier sine and cosine transform. Z-transforms and Inverse Z-transforms. Correlation, Fitting of curves, Sampling distributions.			
Course Plan			
Module I			
Probability Theory			
S. No	Topics to be covered	Hours required	
1	Random variables for discrete and continuous time functions.	12	
2	Probability density function.		
3	Cumulative density function.		
4	Probability Distributions: Binomial distribution.		
5	Poisson distribution. Normal distribution, Exponential distribution.		
6	Joint probability distributions.		
Module II			
Complex Variables			
S. No	Topics to be covered	Hours required	
1	Functions of complex variables, Analytic function, Properties of analytic functions.	11	
2	Cauchy-Riemann equations in Cartesian form and polar coordinates.		
3	Construction of analytic function by using Milne-Thomson method.		
4	Transformations: Bi-linear Transformation, Conformal Transformation.		
5	Discussion of the transformations: $w = z^2$, $w = e^z$ and $w = z + \frac{1}{z}$ ($z \neq 0$).		
Module III			
Fourier series			
S. No	Topics to be covered	Hours required	
1	Definition of Periodic functions, Dirichlet's condition.	11	
2	Fourier series of periodic functions of period 2π .		
3	Fourier series of periodic functions of arbitrary period 2c.		
4	Half-range Fourier Sine and cosine series.		
5	Practical Harmonic Analysis and Problems.		
Module IV			

Fourier transforms and Z-transforms		
S. No	Topics to be covered	Hours required
1	Infinite Fourier transforms, Fourier sine and cosine transform.	11
2	Inverse Fourier cosine and sine transform.	
3	Definition of Z-transforms, standard z-transforms, Damping, and shifting rules.	
4	Inverse Z-transforms by the partial fraction method.	
5	Solving difference equations by using Inverse Z-transform.	
Module V		
Statistical and Sampling theory		
S. No	Topics to be covered	Hours required
1	Definition of Correlation, Regression coefficients.	11
2	Line of regression problems.	
3	Fitting of curves in the form $y = ax + b$ by the method of least squares.	
4	Sampling, Sampling distributions, Standard error.	
5	Student's t-distribution.	
6	Chi-square distribution.	
Textbooks: 1. B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 43rd Edition, 2013. 2. G.B.Gururajachar, "Engineering Mathematics-III", Academic Excellent Series Publications, 2016.		
Reference Books: 1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley-India Publishers, 10th edition, 2014. 2. B.V. RAMANA , " Higher engineering mathematics", Tata McGraw-Hill. 3. R.K. Jain and S.R.K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, 5th Edition.		
Course Outcomes: At the end of the course, the student will be able to: CO1: Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and Design engineering. CO2: Understand the analytic functions and application of Bi-linear, Conformal Transformation. CO3: Communications, Know the use of periodic signals and Fourier series to analyze circuits and system. CO4: To use and to apply Fourier Transform, Z-Transform techniques to solve difference equations in Engineering. CO5: Fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data.		

CO-PO Mapping

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

High-3: Medium-2: Low-1

The Evaluation Method

Continuous Internal Evaluation (CIE):

- Three Internal Tests will be conducted for 50 marks each, and the average of the three will be taken. The student should score minimum 30% marks of the average of the three tests to avoid NSSR. **(A)**.
- Alternative Assessment Tools (AAT) are used to complete a project / Quiz/Seminar / Presentation/ other suitable alternate assessment method for 30 marks. Two evaluations will be conducted **(B)**.
- Two Assignments for 10 marks each, and the sum of both assignments will be taken for 20 marks **(C)**.

Final CIE Marks will be calculated as $(A+B+ C)/2$ for 50 marks.

Semester End Examination (SEE):

The question paper consists of two parts, A and B.

Part A: Consists of 10 questions (2 questions from each module) of 2 marks each.

Part B: The question paper should have 10 questions. Each question carries 16 marks. There should be 2 questions from each module, with a maximum of 2 subdivisions. Students must answer any 5 questions choosing one full question from each module.

The SEE Theory marks of 100 will be scaled down to 50.

Final mark for the course is sum of the CIE and SEE Marks.

B.E, Electrical and Electronics Engineering

Electric Circuit Analysis			
Course Code	MVJ25EE32	Scheme	2025
Type of Course	IPCC	Semester	III
Teaching Hours/Week (L: T: P)	3:2:0	CIE Marks	50
Total Hours of Pedagogy (L: T: P: SL&TW)	42:0:28:50	SEE Marks	50
Credits	4	Total Marks	100
Examination type (SEE)	Theory	Exam Hours	3
Course Objectives: This course will give the ability to: - Analyse the electrical circuits using different network reduction methods. - Apply various network theorems to solve complex electric circuits. - Analyse the resonance and transient response of electric circuits. - Understand the Laplace transform and the application of the Laplace transform for real-time engineering problems. - Analyse different network topologies and two-port networks.			
Syllabus			
Source transformations, mesh and nodal analysis, Network Theorems, RLC resonance, transient analysis of RL and RC circuits, Application of Laplace Transforms, network topology, and two-port networks.			
Course Plan			
Module I			
Sr.No	Topics to be covered		Hours required
1	Active and passive elements, Concept of ideal and practical sources.		8
2	Source transformation, Numerical problems.		
3	Analysis of networks by Network reduction method (star-to-delta and delta-to-star transformation), Numerical problems.		
4	Mesh and Nodal analysis of DC circuits with independent and dependent sources.		
5	Super mesh and super node analysis of DC circuits, Numerical problems.		
Module II			
Sr.No	Topics to be covered		Hours required
1	Thevenin's theorem (Numerical Problems with independent and dependent DC sources).		8
2	Norton's theorem (Numerical Problems with independent and dependent DC sources)		
3	Millman's theorem (Numerical Problems with independent and dependent DC sources).		
4	Superposition theorem (Numerical Problems with independent and dependent DC sources).		
5	Maximum power transfer theorem (Numerical Problems with independent and dependent DC sources).		
6	Reciprocity theorem (Numerical Problems with independent and dependent DC sources).		
7	Thevenin's theorem (Numerical Problems with independent and dependent DC sources).		

Module III		
Sr.No	Topics to be covered	Hours required
1	Analysis of simple series RLC and parallel RLC circuits under resonances.	8
2	Numerical Problems on Resonant frequency, Bandwidth and Quality factor.	
3	Behaviour of circuit elements under switching action.	
4	Evaluation of initial and final condition.	
5	Transient analysis of RL and RC circuits under DC excitations, Numerical problems.	
6	Analysis of simple series RLC and parallel RLC circuits under resonances.	
Module IV		
Sr.No	Topics to be covered	Hours required
1	Introduction to Laplace transformation (LT) and Laplace transforms of important functions.	9
2	Properties of Laplace Transform, Initial and Final value theorems.	
3	Inverse Laplace Transform and Solution of electrical circuits using Laplace transformation (LT).	
4	Application of waveform synthesis.	
5	Application of Laplace Transform to speech processing and medical science.	
Module V		
Sr.No	Topics to be covered	Hours required
1	Graph of a network, Concept of tree and Co-tree, Incidence matrix,	9
2	tie-set matrix, cut-set matrix, Numerical problems.	
3	Concept of duality and dual networks.	
4	Definition of open circuit impedance, short circuit admittance, numerical problems.	
5	Transmission line parameters and their evaluation for simple circuits, numerical problems.	
6	Model of voltage, current characteristics of complex electrical networks, Hybrid parameters, numerical problems.	
Laboratory Experiments		28 Hrs
1. Verification of Thevenin's and Norton's Theorems. 2. Verification of Maximum Power Transfer Theorem 3. Determination of Resonant Frequency, Bandwidth and Quality Factor of a Series RLC Circuit 4. Determination of Resonant Frequency, Bandwidth and Quality Factor of a Parallel RLC Circuit 5. Determination of Z-Parameters of a Two-Port Network 6. Determination of Y-Parameters of a Two-Port Network 7. Determination of Transmission line (ABCD) Parameters of a Two-Port Network 8. Determination of Hybrid (h) Parameters of a Two-Port Network Along with mandatory experiments students are advised to complete two open ended experiments. The following are some suggestions for open ended experiments. 9. Measurement of Time Constant of an RC Circuit. 10. Verification of Superposition Theorem		
Textbooks: 1. Charles Alexander, Matthew Sadik, "Fundamentals of Electric Circuits," McGraw-Hill Education, Seventh Edition, 2021. 2. Hayt, Kemmerly and Durbin, "Engineering Circuit Analysis", Tata McGraw Hill Education, Eighth Edition, 2005.		

Reference Books:

1. A Chakrabarti, "Circuit theory analysis and synthesis", Dhanpat Rai Publishing Co Pvt Ltd, Seventh Edition, 2018.
2. M. E. Van Valkenburg, T.S. Rathore, "Network Analysis," Pearson Education, Third Edition, 2019.

Other References:

1. NPTEL course: Network Analysis, IIT Kharagpur, Prof. Tapas Kumar Bhattacharya
<https://nptel.ac.in/courses/108105159>

Course Outcomes:

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

CO1: Solve the complex electrical circuits containing independent and dependent sources using mesh and nodal analysis techniques.

CO2: Apply fundamental network theorems such as Superposition, Thevenin's, Norton's, Maximum Power Transfer, and Reciprocity theorems to analyze electrical circuits.

CO3: Evaluate the resonance and transient behaviour of RL, RC, and RLC circuits under different operating conditions.

CO4: Apply Laplace transform techniques for the analysis of electrical circuits and the synthesis of basic waveforms.

CO5: Analyze complex electrical networks using network topology concepts and two-port network parameters.

CO-PO Mapping

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

High-3: Medium-2: Low-1

Evaluation Method**Continuous Internal Evaluation (CIE):**

- Three Internal Tests will be conducted for 50 marks each and average of best two will be taken. The student should score minimum 30% marks of the average test score to avoid NSSR. (A).
- Alternative Assessment Tools (AAT) should be a project / Quiz/ Seminar cum Presentation / other suitable alternate assessment methods for 30 marks. Two evaluations will be conducted (B).
- Two Assignments for 10 marks each and the sum of both the assignments will be taken for 20 Marks (C).

Final CIE Marks will be calculated as $(A+B+C)/2$ for 50 marks.

Continuous Internal Evaluation (CIE) for Practical:

- **Weekly Evaluation for 30 Marks:** Weekly evaluation should be conducted for every experiment. Marks of each evaluation include Preparedness / Observation (6 Marks) + Experiment Conduction/ Execution (9 Marks) + Viva Voce (9 Marks) + Record Book (6 Marks) for each experiment. All weekly marks are added and scaled to 30 marks (C).
- Two CIE tests for 20 Marks each should be conducted and averaged to 20 Marks. The student should score minimum 30% in the average test marks (i.e. 6 marks) to avoid NSSR. (D).

Final CIE Marks of practical should be calculated as $C+D$ for 50 marks

For IPCC, Final CIE Marks will be calculated as Sum of Theory CIE and Practical CIE for 100 marks.

Semester End Examination (SEE) for Theory:

The question paper consists of two parts, A and B.

Part A: Consists of 10 questions (2 questions from each module) of 2 marks each.

Part B: The question paper should have 10 questions. Each question carries 16 marks. There should be 2 questions from each module, with a maximum of 2 subdivisions. Students have to answer any 5 questions, choosing one full question from each module.

The SEE Theory marks of 100 will be scaled down to 50 (X).

Semester End Examination (SEE) for Practical:

The SEE of practical is evaluated for 50 marks, distributed as follows:

- Experiment Conduction with Results: 40 marks
- Viva Voce: 10 marks
- Total 50 marks (Y)

The Final mark for the SEE is X+Y of total 100 marks

The Final mark for the course is the sum of CIE and SEE marks, scaled to 100.

The Final mark for the course is sum of the CIE and SEE Marks.:

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests
2	PPT and Videos	2	Open Book Assignments (OBA)/ Lab Project
3	Flipped Classes	3	Lab Test
4	Practice session/Demonstrations in Labs	4	Semester End Examination
5	Virtual Labs (if present)		

B.E, Electrical and Electronics Engineering

Analog and Digital Electronics

Course Code	MVJ25EE33	Scheme	2025
Type of Course	PCC	Semester	III
Teaching Hours/Week (L: T: P)	4:0:0	CIE Marks	50
Total Hours of Pedagogy (L: T: P: SL&TW)	56:0:0:64	SEE Marks	50
Credits	4	Total Marks	100
Examination type (SEE)	Theory	Exam Hours	3

Course Objectives:

This course will give ability to:

- Understand the working of different diode and transistor circuit
- Use transistors as multistage amplifiers, feedback amplifiers and power amplifiers.
- Understand the working of oscillators and conversion of signals.
- Solve different logic equations using Kmap.
- Understand various flip flop applications and implement sequential logic circuits.

Syllabus

Diode Circuits, Transistor construction and working, transistor configurations, Multistage Amplifiers, Power amplifiers, Feedback Amplifiers, Oscillators, Op-amp circuits and its characteristics, A/D and D/A Converters, Combinational Logic Circuits, Karnaugh maps-3,4,5 variables, Binary Comparator, Decoders, Encoders, Multiplexers, Flip-Flops, Shift Registers, Ripple Counters, Synchronous Counters and its design.

Course Plan

Module I

Sr.No	Topics to be covered	Hours required
1	Diode circuits: Diode clipping- series and parallel clipping circuits	10
2	Clamping circuits: positive and negative clamping	
3	Transistor: Construction and working, transistor as an amplifier, CB, CE, CC configurations	
4	Comparison of transistor configurations, the operating point, self-bias or Emitter bias, bias compensation	

Module II

Sr. No	Topics to be covered	Hours required
1	Multistage Amplifiers: Direct-coupled and RC-coupled multi-stage amplifiers	10
2	Power amplifiers -Different modes of operation of amplifiers and their power efficiency: Class A, Class B, Class AB and Class C	
3	Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers	
4	Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations, Numerical problems	

Module III

Sr. No	Topics to be covered	Hours required
1	Oscillators: Condition for Oscillations, RC phase shift oscillators, Crystal oscillators	10
2	Op-amp: Characteristics, Inverting and non-inverting amplifier; summer, difference amplifier, voltage follower	
3	A/D and D/A Converters: Binary weighted and R-2R ladder type DAC	
4	Flash type, single-slope and dual-slope type ADC.	
5	Successive Approximation ADC	

High-3: Medium-2: Low-1

Evaluation Method

Continuous Internal Evaluation (CIE):

- Three Internal Tests will be conducted for 50 marks each, and the average of best two will be taken. The student should score minimum 30% marks of the average test score to avoid NSSR. (A).
- Alternative Assessment Tools (AAT) should be a project / Quiz/ Seminar cum Presentation / other suitable alternate assessment methods for 30 marks. Two evaluations will be conducted (B).
- Two Assignments for 10 marks each and the sum of both the assignments will be taken for 20 Marks (C).

Final CIE Marks will be calculated as $(A+B+C)/2$ for 50 marks.

Semester End Examination (SEE):

The question paper consists of two parts, A and B.

Part A: Consists of 10 questions (2 questions from each module) of 2 marks each.

Part B: The question paper should have 10 questions. Each question carries 16 marks. There should be 2 questions from each module, with a maximum of 2 subdivisions. Students have to answer any 5 questions choosing one question from each module.

The SEE Theory marks of 100 will be scaled down to 50.

Final mark for the course is sum of the CIE and SEE Marks.

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests
2	PPT and Videos	2	Open Book Assignments (OBA)/ Lab Project
3	Flipped Classes	3	Lab Test
4	Practice session/Demonstrations in Labs	4	Semester End Examination
5	Virtual Labs (if present)		

B.E, Electrical and Electronics Engineering

Microcontrollers			
Course Code	MVJ25EE34	Scheme	2025
Type of Course	PCC	Semester	III
Teaching Hours/Week (L: T: P)	4:0:0	CIE Marks	50
Total Hours of Pedagogy (L: T: P: SL&TW)	56:0:0:64	SEE Marks	50
Credits	4	Total Marks	100
Examination type (SEE)	Theory	Exam Hours	3
Course Objectives: This course will give ability to: • Explain the working of different microcontrollers and internal organization of 8051. • Understand the various instructions to write assembly language program for different applications • Understand C data types to develop 8051 timer, counter programs. • Understand the various interrupts and serial port programs. • Explain the interfacing of parallel peripheral devices to 8051.			
Syllabus			
8051 architecture, Arithmetic/logical execution, timer/counter, Serial Communication, Interrupts ,8255 programming and ARM architecture and programming.			
Course Plan			
Module I			
Sr.No	Topics to be covered		Hours required
1	Review of numbering systems		10
2	Architecture and pin configuration of 8051, Special Function Registers		
3	PSW and Flag Bits, 8051 Register Banks		
4	Stack, Stack pointer		
5	Program counter		
6	Data pointer, Internal Memory Organization of 8051		
7	Addressing Modes		
Module II			
Sr. No	Topics to be covered		Hours required
1	Introduction to 8051 assembly programming, Assembling and running an 8051 program, Data types and Assembler directives		10
2	Arithmetic, logic instructions and programs		
3	Jump, loop and call instructions		
4	8051 Programming in C: I/O programming in 8051C		
5	Logic operations in 8051 C		
6	Data conversion program in 8051 C		
7	Accessing code ROM space in 8051C		
Module III			
Sr. No	Topics to be covered		Hours required
1	8051 Timer Programming in Assembly and C: Programming 8051 timers		
2	Programming 8051 timers		
3	Counter programming		
4	Programming timers 0 and 1 in 8051 C		

5	8051 Serial Port Programming in Assembly and C: Basics of serial communication	10
6	connection to RS232, 8051 serial port programming in assembly	
7	serial port programming in 8051 C.	
Module IV		
Sr. No	Topics to be covered	Hours required
1	8051 interrupts, Interrupt priority	13
2	Interrupt programming in C	
3	LCD interfacing, Keyboard interfacing, , DAC interfacing	
4	ADC 0808 interfacing to 8051, Serial ADC Max1112 ADC interfacing to 8051	
5	Sensor interfacing and signal conditioning.	
6	stepper motor interfacing, DC motor interfacing and PWM	
Module V		
Sr. No	Topics to be covered	Hours required
1	Programming the 8255	13
2	8255 interfacing	
3	C programming for 8255	
4	Introduction to the ARM: Instruction set Introduction, Data processing instructions	
5	Load-Store instructions, Software interrupt instructions	
6	Program status register instructions, Loading constants	
7	Conditional Execution. ALP programming	
Textbooks:		
1. Muhammad Ali Mazidi, Janice Gillespie Mazidi, Rollin D. McKinlay, 8051, "Microcontroller and Embedded Systems– using assembly and C", Pearson Education, 2nd Edition,2007.		
2. Andrew.N. Sloss "ARM Systems Developers", Elsevier Publications, 1 st Edition 2004.		
Reference Books:		
1. Dr. Umesh Dutta , Dr. Kamal Kishor Jha, Vikas Sharma , Shivam Gupta , " 8051 Microcontroller Fundamentals and Programming ", Clever Fox Publishing, First Edition 2022.		
2. Kenneth J. Ayala,"The 8051 Microcontroller Architecture Programming &Applications", Penram International, 2 nd Edition, 2004.		
Other References:		
1. Microprocessors and Microcontrollers by Prof. Indranil Sengupta (IIT Kharagpur) https://nptel.ac.in/courses/106105068		
2. Embedded System Design with ARM by Prof. Indranil Sengupta (IIT Kharagpur) https://nptel.ac.in/courses/106105193		
Course Outcomes:		
At the end of the course, the student will be able to:		
CO1: Select microcontrollers for different applications and explain the functional units of 8051.		
CO2: Develop algorithm and formulate assembly language program for a given task.		
CO3: To explain writing assembly language programs using subroutines for generation of delays, counters, configuration of SFRs for serial communication and timers		
CO4: Design interfacing circuitry to interface various peripheral devices to microcontroller		
CO5: Develop program for timers and serial port using C		

CO-PO Mapping

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

High-3: Medium-2: Low-1

Evaluation Method

Continuous Internal Evaluation (CIE):

- Three Internal Tests will be conducted for 50 marks each and average of best two will be taken. The student should score minimum 30% marks of the average test score to avoid NSSR. **(A)**.
- Alternative Assessment Tools (AAT) should be a project / Quiz/ Seminar cum Presentation / other suitable alternate assessment methods for 30 marks. Two evaluations will be conducted **(B)**.
- Two Assignments for 10 marks each and the sum of both the assignments will be taken for 20 Marks **(C)**.

Final CIE Marks will be calculated as $(A+B+C)/2$ for 50 marks.

Semester End Examination (SEE):

The question paper consists of two parts, A and B.

Part A: Consists of 10 questions (2 questions from each module) of 2 marks each.

Part B: The question paper should have 10 questions. Each question carries 16 marks. There should be 2 questions from each module, with a maximum of 2 subdivisions. Students have to answer any 5 questions choosing one full question from each module.

The SEE Theory marks of 100 will be scaled down to 50.

The Final mark for the course is sum of the CIE and SEE Marks.

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests
2	PPT and Videos	2	Open Book Assignments (OBA)/ Lab Project
3	Flipped Classes	3	Lab Test
4	Practice session/Demonstrations in Labs	4	Semester End Examination
5	Virtual Labs (if present)		

B.E, Electrical and Electronics Engineering

Electrical Power Generation and Distribution

Course Code	MVJ25EE35	Scheme	2025
Type of Course	PCC	Semester	III
Teaching Hours/Week (L: T: P)	3:0:0	CIE Marks	50
Total Hours of Pedagogy (L: T: P: SL&TW)	42:0:0:48	SEE Marks	50
Credits	3	Total Marks	100
Examination type (SEE)	Theory	Exam Hours	3

Course Objectives:

This course will give ability to:

- Understand the different types of power generating stations
- Understand power generation economics
- Develop knowledge of overhead line insulators, underground cables, and insulating materials
- Analyse inductance, capacitance, and corona effects in transmission lines
- Understand AC and DC distribution systems

Syllabus

Conventional and non-conventional generation, construction and operation of power plants, power economics, load curves, tariff frameworks, transmission infrastructure and modelling, Corona, voltage drop calculations, distribution system sizing and grid optimization.

Course Plan

Module I

Sr.No	Topics to be covered	Hours required
1	Conventional Sources- construction and working of Hydroelectric power station, Steam Power Plant, Nuclear Power Plant, Gas Turbine Plant.	8
2	Numerical problems on Hydroelectric power station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant	
3	Non-Conventional Sources: Construction and working of Wind Energy, Solar power plant.	
4	Introduction of other Non-Conventional Sources (Ocean Energy, Tidal Energy, Wave Energy).	

Module II

Sr. No	Topics to be covered	Hours required
1	Introduction, definitions of connected load, maximum demand, demand factor	8
2	load factor, diversity factor, Load duration curve	
3	Number and size of generator units	
4	Base load and peak load plants	
5	Cost of electrical energy-fixed cost, running cost	
6	Tariff or charge to customer.	
7	Numerical problems on maximum demand, demand factor, load factor, diversity factor, Load duration curve	

Module III

Sr. No	Topics to be covered	Hours required
1	Insulators, Types of insulators	8
2	Potential distribution over a string of suspension insulators	

3	Methods of equalizing the potential	
4	Insulation, insulating materials, Extra high voltage cables	
5	Insulation resistance of a cable	
6	Capacitance of a single core and three core cables	
7	types of cables, Overhead lines versus underground cables.	

Module IV

Sr. No	Topics to be covered	Hours required
1	Line conductors, inductance of single phase and three phase symmetrical lines.	9
2	Numerical problems on inductance of single phase and three phase symmetrical lines.	
3	Capacitance of single phase and three phase symmetrical lines.	
4	Numerical problems on capacitance of single phase and three phase symmetrical lines.	
5	Composite conductors-transposition, bundled conductors and effect of earth on capacitance.	
6	Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss.	
7	Methods of reducing corona loss, Disadvantages of corona.	

Module V

Sr. No	Topics to be covered	Hours required
1	Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system	9
2	Bus bar arrangement, Selection of site for substation	
3	Voltage Drop Calculations (Numerical Problems) in A.C. Distributors	
4	Classification of Distribution Systems	
5	Comparison of DC vs. AC and Under- Ground vs. Over- Head Distribution Systems	
6	Requirements and Design features of Distribution Systems	

Textbooks:

1. D P Kothari & I J Nagrath – Power System Engineering, Third Edition, MC Graw Hill Education, 2019.
2. V.K Mehta & Rohith Mehta- Principles of Power system, S Chand, Revised Edition, 2022.

Reference Books:

1. C.L. Wadhwa, "Electrical Power Systems", New Age International, Eighth Edition, 2022.
2. M.V. Deshpande, "Elements of Electrical Power Station Design", Wheeler Pub, Third Edition, 2010

Other References:

1. NPTEL Course: Power System Engineering by, Prof. Debapriya Das, IIT Kharagpur
[Preview: Power System Engineering | SWAYAM](#)
2. NPTEL Course: Power System Generation, Transmission and Distribution by, Prof. D.P. Kothari, IIT Delhi.
nptel.ac.in/courses/108102047

Course Outcomes:

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

CO1: Explain the working principles, advantages, disadvantages, and applications of conventional and non-conventional electric power generation systems, power system economics, insulators and types of insulators, capacitance and AC and DC distribution systems

CO2: Apply power system economics by calculating connected load, maximum demand, demand factor, load factor, and energy cost, and analyse tariff structures for consumers and efficiency of generating station.

CO3: Analyse insulators and insulated cables, including potential distribution in insulator strings, methods of voltage equalization, and capacitance and insulation resistance of cables.

CO4: Design and analyse AC and DC distribution systems, perform voltage drop calculations for various load conditions, and compare overhead and underground distribution methods.

CO/PO Mapping

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

High-3: Medium-2: Low-1

Evaluation Method:

Continuous Internal Evaluation (CIE):

- Two Internal Tests will be conducted for 50 marks each and average of best two will be taken. The student should score minimum 30% marks of the average test score to avoid NSSR. **(A)**.
- Alternative Assessment Tools (AAT) should be a project / Quiz/ Seminar cum Presentation / other suitable alternate assessment methods for 30 marks. Two evaluations will be conducted **(B)**.
- Two Assignments for 10 marks each and the sum of both the assignments will be taken for 20 Marks **(C)**.

Final CIE Marks will be calculated as $(A+B+C)/2$ for 50 marks.:

Semester End Examination (SEE):

The question paper consists of two parts, A and B.

Part A: Consists of 10 questions (2 questions from each module) of 2 marks each.

Part B: The question paper should have 10 questions. Each question carries 16 marks. There should be 2 questions from each module, with a maximum of 2 subdivisions. Students have to answer any 5 questions choosing one full question from each module.

The SEE Theory marks of 100 will be scaled down to 50.

The Final mark for the course is sum of the CIE and SEE Marks.:

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests
2	PPT and Videos	2	Open Book Assignments (OBA)/ Lab Project
3	Flipped Classes	3	Lab Test
4	Practice session/Demonstrations in Labs	4	Semester End Examination
5	Virtual Labs (if present)		

B.E, Electrical and Electronics Engineering

Microcontrollers Lab

Course Code	MVJ25EEL36	Scheme	2025
Type of Course	PCCL	Semester	III
Teaching Hours/Week (L: T: P)	0:0:2	CIE Marks	50
Total Hours of Pedagogy (L: T: P: SL&TW)	0:0:28:2	SEE Marks	50
Credits	1	Total Marks	100
Examination type (SEE)	Practical	Exam Hours	3

Course Objectives:

This course will give ability to:

- Understand the architecture, instruction set, and programming concepts of the 8051 microcontroller and its peripheral devices.
- Develop and implement assembly language programs for arithmetic operations, data manipulation, data conversion, sorting, and control applications using the 8051 microcontroller.
- Interface and control external hardware devices such as LCDs, DC motors, stepper motors, DACs, and other embedded system components through microcontroller-based programming.

Sl. No.	Experiments List
1.	Develop an ALP for data movement and block exchange.
2.	Develop an ALP to find (i) The largest and smallest numbers in a series sorting numbers in ascending and descending order.
3.	Develop an ALP for data conversion programs.
4.	Develop an ALP for counters using conditional statements and loop structure.
5.	Develop an ALP to perform 16-bit addition, subtraction, multiplication, and division.
6.	Hardware implementation for controlling the speed of a DC motor using PWM using 8051 microcontrollers.
7.	Hardware implementation of Rotation of the Stepper motor in a specified direction (clockwise or counterclockwise) using 8051 microcontrollers.
8.	Hardware implementation of LCD control using 8051 microcontrollers.
9.	Interface an Elevator with an 8051 Microcontroller.
10.	Generate waveforms using DAC.

Course Outcomes:

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

CO1: Explain the architecture, instruction set, and peripheral features of the 8051 microcontroller and the principles of interfacing external devices.

CO2: Develop and implement assembly language programs for data manipulation, arithmetic operations, sorting, counting, and control applications using the 8051 microcontrollers.

CO3: Analyze the operation and performance of microcontroller-based systems involving PWM motor control, stepper motor interfacing, LCD interfacing, DAC waveform generation, and embedded control applications.

CO-PO Mapping

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

High-3: Medium-2: Low-1

Evaluation Method

Continuous Internal Evaluation (CIE):

- **Weekly Evaluation for 30 Marks:** Weekly evaluation should be conducted for every experiment. Marks for each evaluation include Preparedness/Observation (6 Marks) + Experiment Conduction/Execution (9 Marks) + Viva Voce (9 Marks) +Record Book (6 Marks) for each experiment. All weekly marks are added and scaled to 30 marks **(A)**.
- Two CIE tests for 20 Marks each should be conducted and averaged to 20 Marks. The student should score minimum 30% in the average test marks (i.e. 6 marks) to avoid NSSR. **(B)**.

Final CIE Marks of practical should be calculated as A+B for 50 marks.

Semester End Examination (SEE):

The SEE of practical is evaluated for 50 marks, distributed as follows:

- Experiment Conduction with Results: 40 marks
- Viva Voce: 10 marks
- Total 50 marks

Final mark for the course is the sum of CIE and SEE Marks.

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests
2	PPT and Videos	2	Open Book Assignments (OBA)/ Lab Project
3	Flipped Classes	3	Lab Test
4	Practice session/Demonstrations in Labs	4	Semester End Examination
5	Virtual Labs (if present)		

B.E, Electrical and Electronics Engineering

Sustainable Engineering and SDG's			
Course Code	MVJ25AECK37	Scheme	2025
Type of Course	AEC	Semester	III
Teaching Hours/Week (L: T: P)	1:0:0	CIE Marks	50
Total Hours of Pedagogy (L: T: P: SL&TW)	14:0:0:16	SEE Marks	50
Credits	1	Total Marks	100
Examination type (SEE)	Theory	Exam Hours	2
Course Objectives: This course will give ability to: • Explain the basic concepts of sustainability, sustainable development and the role of engineers. • Describe the 17 Sustainable Development Goals (SDGs) and relate selected SDGs to engineering disciplines. • Explain basic sustainable-engineering principles including resource efficiency, systems thinking, life cycle thinking and circular economy. • Identify environmental, social and economic impacts associated with engineering products, processes and services. • Apply simple sustainability thinking to propose an improved solution to a real-life engineering problem.			
Syllabus			
Foundations of Sustainability and Role of Engineers, Environmental Pollution, Environmental management standards, Resources and its utilisation, Sustainable design and practices/Case Studies/Student Activity			
Module I			
Topics to be covered			Hours required
Foundations of Sustainability and Role of Engineers: Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs)-Overview of the 17 SDGs, Clean Development Mechanism (CDM), Introduction to the UN 2030 Agenda.			3
Module II			
Topics to be covered			Hours required
Environmental Pollution: Air Pollution and its effects, Water pollution and its sources, Zero waste concept and 3 R concepts in solid waste management; Greenhouse effect, Global warming, Climate change, Ozone layer depletion, Carbon credits, carbon trading and carbon footprint, legal provisions for environmental protection.			3
Module III			
Topics to be covered			Hours required
Environmental management standards: ISO 14001:2015 framework and benefits, Scope and goal of Life Cycle Analysis (LCA), Sustainable Engineering Principles and Circular Economy, Bio-mimicking, Environment Impact Assessment (EIA), Industrial ecology and industrial symbiosis.			3
Module IV			
Topics to be covered			Hours required
Resources and its utilisation: Basic concepts of Conventional and non-conventional energy, Environmental footprints, General idea about solar energy, Fuel cells, Wind energy, Small hydro			3

plants, biofuels, Energy derived from oceans and Geothermal energy.	
Module V	
Topics to be covered	Hours required
Sustainable design and practices/Case Studies/Student Activity: Sustainability practices: Basic concept of sustainable habitat, conventional design Vs sustainable design, Methods for increasing energy efficiency in buildings, Green Engineering, Sustainable Urbanisation, Sustainable cities, Sustainable transport.	2
Textbooks: 1. Toolseeram Ramjeawon, Introduction to Sustainability for Engineers, CRC Press, 1st Edition, 2020. 2. Rag, R. L. and Ramesh Lakshmi Dinachandran, Introduction to Sustainable Engineering, PHI Learning. 3. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall. 4. Bradley. A.S; Adebayo,A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning 5. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-Hill Professional.	
Reference Books: 1. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications- Rating System, TERI Publications - GRIHA Rating System 2. Environment Impact Assessment Guidelines, Notification of Government of India, 2006 3. Allenby, B. R., The Sustainability Engineering Handbook, McGraw-Hill. 4. Mihelcic, J. R. and Zimmerman, J. B., Environmental Engineering: Fundamentals, Sustainability, Design, Wiley. 5. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998 6. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Language Book Society (ELBS). 7. Purohit, S. S., Green Technology - An approach for sustainable environment, Agrobios Publication	
Course Outcomes: At the end of the course, the student will be able to: CO1: Explain sustainability, sustainable development and the role of engineers. CO2: Explain different types of environmental pollution problems, SDGs, relate them to engineering applications, and their sustainable solutions. CO3: Explain life-cycle thinking and environmental footprints. CO4: Apply basic principles of sustainable engineering and circular economy. CO5: Propose a basic sustainable engineering solution to a real-life problem.	

CO-PO Mapping

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

High-3: Medium-2: Low-1

Evaluation Method

Continuous Internal Evaluation (CIE) – 50 Marks

The CIE for the mandatory credit courses common across all disciplines comprises of two components as follows:

Internal Assessment Tests (30 Marks):

Two Internal Assessment tests will be conducted, each comprising 50 multiple choice questions for a total of 50 marks. The average of the two test scores will be scaled down to 30 marks.

Assignments (20 Marks):

Students are required to complete two assignments, each carrying 10 marks. These assignments may include projects*, poster presentations*, seminars*, or similar academic activities. The marks of the two assignments are added to get 20 marks.

*Each assignment will undergo two rounds of evaluation to assess progress and quality

At the beginning of the semester, the instructor/faculty teaching the course has to announce the methods of assignments for the course.

Together, these two components are added to get the Final CIE marks of 50.

Semester End Examination (SEE) – 50 Marks

A Semester End Examination is conducted for 50 marks, comprising multiple-choice questions (MCQ) of one mark each.

The final score for the course out of 100 is the sum total of SEE and CIE.

B.E, Electrical and Electronics Engineering

MATLAB for Electrical Engineering

Course Code	MVJ25EE38SL	Scheme	2025
Type of Course	SDL	Semester	III
Teaching Hours/Week (L: T: P)	0:0:2	CIE Marks	50
Total Hours of Pedagogy (L: T: P: SL&TW)	0:0:28:2	SEE Marks	50
Credits	1	Total Marks	100
Examination type (SEE)	24 Hrs. Practical	Exam Hours	3

Course Objectives:

This course will give the ability to:

- Understand the fundamentals of MATLAB programming and its application in electrical engineering problem solving.
- Apply MATLAB tools for modelling, analysis, and simulation of electrical signals and circuits.
- Analyze the behaviour of AC and DC circuits using electrical laws, circuit theorems, and signal processing techniques.
- Develop simulation-based solutions for electrical and electronic circuits and interpret the obtained results.

Sl. No.	Experiments List
1.	Introduction to MATLAB: variables, matrices, vectors and basic operations.
2.	Generation and analysis of sinusoidal, square and triangular waveforms.
3.	Addition, subtraction and multiplication of electrical signals.
4.	Analysis of R, L and C circuits.
5.	Calculation of impedance, current and phase angle in AC circuits.
6.	Verification of Ohm's Law.
7.	Verification of Kirchhoff's Laws.
8.	Analysis of series and parallel RLC circuits.
9.	Calculation of Fourier series of periodic electrical waveforms.
10.	Fourier Transform analysis of electrical signals.
11.	Simulation of diode rectifier circuits.
12.	Simulation of single-phase bridge rectifier.

Course Outcomes:

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

CO1: Demonstrate proficiency in MATLAB fundamentals including variables, matrices, vectors, and basic programming operations for engineering computations.

CO2: Generate, manipulate, and analyze various electrical signals and waveforms using MATLAB and perform basic signal operations.

CO3: Analyze R, L, C, RL, RC, and RLC circuits and determine electrical parameters such as impedance, current, and phase angle using MATLAB.

CO4: Design and simulate rectifier circuits in MATLAB and assess their operating characteristics for practical electrical engineering applications.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	2		2				2		2	3	2
CO2			2	2	2							3	2
CO3			2		2				2			3	2
CO4			2		2				2			3	2
CO5			2		2					2		3	2

High-3: Medium-2: Low-1

Evaluation Method:

Continuous Internal Evaluation (CIE):

The CIE is evaluated for 50 marks, distributed as follows: Regular Laboratory Performance & Conduct (15 Marks) + Module Project Evaluations (3 Projects) (20 Marks) + Laboratory Record / Logbook & Calculations (10 Marks) + Internal Practical Test / Quizzes (5 Marks)

Final CIE Marks of practical should be calculated for 50 marks.

Semester End Examination (SEE):

The question paper consists of two parts, A and B.

Part A: Consists of 10 questions (2 questions from each module) of 2 marks each.

Part B: The question paper should have 10 questions. Each question carries 16 marks. There should be 2 questions from each module, with a maximum of 2 subdivisions. Students have to answer any 5 questions choosing one full question from each module.

The SEE Theory marks of 100 will be scaled down to 50.

The Final mark for the course is sum of the CIE and SEE Marks.

B.E, Electrical and Electronics Engineering

Physical Education (Sports & Athletics)			
Course Code	MVJ25PE39	Scheme	2025
Type of Course	NCMC	Semester	III
Teaching Hours/Week (L: T: P)	0:0:0	CIE Marks	100
Total Hours of Pedagogy (L: T: P: SL&TW)	0:0:0:28	SEE Marks	--
Credits	0	Total Marks	100
Examination type (SEE)	--	Exam Hours	--
Course Objectives: the student will be able to			
1	Understand the meaning and importance of the fitness and the benefits of fitness		
2	Types of fitness and fitness tips.		
3	Importance of Sports, and Yoga in a day-to-day life.		
4	Understand the importance of aerobics and other activities for healthy lifestyle.		
5	Know about the different roles of organization and administration in sports events.		
Topics / Activities to be Covered (100Marks)			
Module I		5Hours	
Orientation ➤ Lifestyle ➤ Fitness ➤ Food & Nutrition: Sports diet. ➤ Stress Management			
Module II		5Hours	
General Fitness & Components of Fitness ➤ Warming up (Free Hand Exercises). ➤ Strength—Push-up/Pull-ups ➤ Speed—30MtrDash. ➤ Agility—Shuttle Run ➤ Flexibility—Sit and Reach			
Module III		5Hours	
Specific Games (Anyone to be selected by the student) ➤ Volleyball— Attack, Block, Service, Upper Hand Pass and Lower Hand and Pass. ➤ Throw ball—Service, Receive, Spin attack, Net Drop & Jump throw. ➤ Kabaddi— Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. ➤ Basketball-dribbling, passing, shooting etc. ➤ Table Tennis—Service (Fore Hand & Back Hand) ➤ Receive (Fore Hand & Back Hand) ➤ Smash, Athletics (Track / Field Events) -Running, Jumping, Throwing.			
Module IV		6 Hours	

Role of Organization and administration ➤ Planning. ➤ Organizing. ➤ Staffing. ➤ Directing. ➤ Coordinating & controlling. ➤ Reporting & Recording. ➤ Budgeting.		
Module V		6Hours
Aerobics ➤ Dance Aerobics ➤ Sport Aerobics ➤ Warm up Aerobics ➤ Cardiovascular Aerobics		
Course Outcomes: After completing the course, the students will be able to		
CO1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness.	
CO2	Familiarization of health-related Exercises, Sports for overall growth and development.	
CO3	Create a foundation for the professionals in physical Education and Sports.	
CO4	Participate in the competition at regional / state / national / international levels.	
CO5	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.	
Assessment Details for CIE (both CIE and SEE)		
Weight age	CIE – 100%	• Implementation strategies of the project (PE work). • The last report should be signed by PED, the HOD and principal. • At last report should be evaluated by the PED of the institute. • Finally, the consolidated marks sheet should be sent to the Controller of Examinations office.
Participation of student in all the modules	50 Marks	
Final presentation / exhibition / Participation In competitions / practical on specific tasks Assigned to the students	50 Marks	
Total marks for the course in eachsemester	100 Marks	
Marks scored for 100 by the students should be Scale to 50 marks in each semester.		
Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society		

in general.

CO/PO Mapping													
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO 1	-	-	-	-	-	-	-	2	2	-	-	-	-
CO 2	-	-	-	-	-	-	-	2	2	-	-	-	-
CO 3	-	-	-	-	-	-	-	2	2	-	-	-	-
CO 4	-	-	-	-	-	-	-	2	2	-	-	-	-
CO 5	-	-	-	-	-	-	-	3	3	-	-	-	-

B.E, Electrical and Electronics Engineering

YOGA			
Course Code	MVJ25YO39	Scheme	2025
Type of Course	NCMC	Semester	III
Teaching Hours/Week (L: T: P)	0:0:0	CIE Marks	100
Total Hours of Pedagogy (L: T: P: SL&TW)	0:0:0:28	SEE Marks	--
Credits	0	Total Marks	100
Examination type (SEE)	--	Exam Hours	--
Course Learning Objectives: The students will be able to			
1	Promote Holistic Wellness Practice in Students.		
2	Develop Physical Awareness and Flexibility		
3	Improve Focus and Academic Performance		
4	Encourage Healthy Lifestyle Habits.		
5	Support mental Health and Emotional balance.		
<u>The Health Benefits of Yoga:</u>			
1)Yoga helps with a person-centered approach to well-being offering physical, mental(cognitive), and spiritual(emotional) benefits for students. These benefits can help students cope with the demands of academic journeys, improve their overall health, and promote personal development.			
• Key Benefits of Various Yoga Techniques: • Enhances Physical Well-being. • Boosts Mental Focus. • Promotes Emotional Stability. • Reduce Stress Levels. • Encourages Inner Growth.			
It is also used as an adjunct therapy to support recovery from various physical health conditions such as:			
• Chronic Pain. • Back Pain. • Arthritis. • Cardiovascular Diseases. • Asthma. • Chronic Fatigue Syndrome. • Menstrual Disorders. • Digestive Issues. • Thyroid Imbalances. • Migraine and headache.			
2) Core observations on how yoga functions as a complementary mind-body intervention to support the psychological, physiological and spiritual healing processes associated with various health conditions.			
Psychological Benefits:			

- Stress reduction.
- Anxiety relief.
- Trauma healing.
- Cognitive and clarity focus.
- Emotional Regulation.
- Aid in managing depression.

Physiological Benefits:

- Enhance Blood Circulation.
- Boost Cardiovascular Health.
- Supports Overall Gut Function.
- Promotes Thyroid Function.
- Relief from Headaches.
- Increased Energy level.

Spiritual Benefits:

- Cultivating gratitude and Compassion
- Self –realization
- Balance and Harmony
- Inner Peace
- Sense of oneness.
- Mindfulness

MODULE- I

Discipline and Awareness Reflect Habits s Thoughts:

7 Hrs

- **Basic theory of Yoga, Yamas s Niyamas**
Yoga definition, Aims and Objectives, importance of yoga in students.
- **Introduction to Yoga asana**
Yoga asana meaning, principle and health benefits.
- **Ashtanga yoga**
Meaning, breathing techniques.
- **Four paths of yoga**
Kama yoga, Bhakthi yoga, Raja yoga, Jnana yoga.
- **Surya namaskar**
Surya namaskar prayer and its meaning, benefits and importance.
- **Yoga asanas**
Asanas it's need, importance, name and technique.
Sitting: -Vajrasana, - adasana, Ardachakrasana, **Prone line:** -Advasana, Bhujangasana **Supine line:** -Shavasana, Supta baddhakonasana,
Balancing posture: -Vrikshasana, Garudasana

MODULE -II

Building strength and focus Finding out the obstacle:

7 Hrs

• Kriya Yoga Tapas, Svadhyaya, Ishwarapranidhana • Five Kleshas Obstacles. • Pranayama Introduction to Pranayama. • Pratyahara Preparing mind for meditation, Breathe focus techniques. • Yoga asanas Standing: -Virabhadrasana, Parshvakona Sitting: -Vajrasana, Paschimottanasana Prone Line: -Dhanurasana, Shalabhasana, Supine Line: -Ananda Balasana, Supta Matsyendrasana , Balancing: -Natarajasana (Dancer Pose)	
MODULE -III	
Awareness and inner balance: Finding how focused is the mind • Dharana: Concentration • Dhyana: Meditation • Swasthya, Smriti, Sankalpa. Tool of academic excellence. • Samyama Patanjali's concept of samyama • Yogasanas Standing: - ArdhaChandrasana, Utkatasana Sitting: - Padmasana (or prep), Gomukhasana Prone Line: - Adho Mukha Svanasana, Naukasana Supine Line: - SuptaBaddhaKonasana, Chakrasana Balancing: - Garudasana (Eagle Pose)	7 Hrs
MODULE -IV	
Integrating Yoga in daily Life:	7 Hrs

• Yama niyama Acharam: Practice of ethical Discipline (practicing nonviolence, truth, cleanliness) • Ahara- Vihara Samyama: Practice discipline in diet C lifestyle. • Asana- pranayama sadhana: Daily practice of asanas and pranayama • Yogasanas: Standing: -PrasaritaPadottanasana, ParivrttaTrikonasana Sitting: -Baddha Konasana, Marichyasana Prone Line: -Ustrasana (Camel), Makarasana (relaxation) Supine Line: -Sarvangasana, Shavasana Balancing: - Bakasana (Crow – optional or modified)	
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Course outcomes	
CO1	Identify and reflect on personal habits and thoughts.
CO2	Explain the basic theory of Yoga, including Yamas C Niyama.
CO3	Understand the definition, aims, objectives, and importance of Yoga, especially for students.
CO4	Enhance physical and mental strength through advanced Yog asanas.

CO/PO Mapping											
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1		2						3	2	2	
CO 2	2						2	2			
CO 3	2					2	2	3			
CO 4					2		3	3			

Weekly assessment will be done by the instructor by giving different poses / Asanas.

The final assessment scaled up to 100 marks.

Text Book

1	Ajitkumar, "Yogapravesha in Kannada"
2	BKS Iyengar "Light on Yoga"

Reference Books

1	M L Gharote & Dr. S K Ganguly, "Teaching Methods for Yogic practices"
2	Yoga Instructor Course handbook published by SVYASA University, Bengaluru
3	Yamini Muthanna," Yoga for Children –step by step"

B.E, Electrical and Electronics Engineering

Semester: III			
Additional Mathematics-I			
Course Code	MVJ25MATDIP310	Scheme	2025
Type of Course	NCMC	Semester	III
Teaching Hours/Week (L: T: P)	2:0:0	CIE Marks	100
Total Hours of Pedagogy (L: T: P: SL&TW)	14:0:0:14	SEE Marks	--
Credits	0	Total Marks	100
Examination type (SEE)	--	Exam Hours	--
Course Objectives: This course will give ability to: To familiarize the important and introductory concepts of Differential calculus, Integral calculus, Vector differentiation, Probability, ordinary differential equations of first order, and analyze the engineering problems.			
Syllabus			
Differential calculus-nth derivative, Leibnitz theorem, Polar curves - angle between the radius vector and tangent, angle between two curves pedal equation, Taylor's and Maclaurin's series expansions, Integral Calculus: Statement of reduction formulae for the integrals of $\sin^n(x)$, $\cos^n(x)$, $\sin^n x$, $\cos^m x$, Evaluation of these integrals with standard limits-problems, Double -Simple examples, Triple integrals, Vector Differentiation: Differentiation of vector functions, Velocity and acceleration of a particle moving on a space curve,Scalar and Vector point functions, Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields, Vector identities - $\text{div}(\phi \vec{A})$, $\text{curl}(\phi \vec{A})$, $\text{curl}(\text{grad } \phi)$, $\text{div}(\text{curl } \vec{A})$, Probability: Basic terminology, Sample space and events, Axioms of probability. Addition and multiplication theorems, Conditional probability, Bayes theorem, Introduction – Formation of differential equation, solutions of first order and first-degree differential equations, Variable separable form, homogeneous Exact, linear differential equations, Clairaut's equation.			
Course Plan			
Module I			
Differential calculus			
Sr.No	Topics to be covered	Hours required	
1	Differential calculus: Recapitulation of successive differentiation -nth derivative	5 Hrs	
2	Leibnitz theorem (without proof) and Problems		
3	Polar curves - angle between the radius vector and tangent, angle between two curves		
4	pedal equation		
5	Taylor's and Maclaurin's series expansions- Illustrative examples		
Module II			
Integral Calculus			
Sr. No	Topics to be covered	Hours required	
1	Integral Calculus: Statement of reduction formulae for the integrals of $\sin^n(x)$, $\cos^n(x)$, $\sin^n x$, $\cos^m x$	5 Hr	
2	Evaluation of these integrals with standard limits-problems		
3	Double -Simple examples		
4	Triple integrals-Simple examples		

Module III		
Vector Differentiation		
Sr. No	Topics to be covered	Hours required
1	Vector Differentiation: Differentiation of vector functions	5 Hr
2	Velocity and acceleration of a particle moving on a space curve	
3	Scalar and Vector point functions, Gradient, Divergence, Curl	
4	Solenoidal and Irrotational vector fields	
5	Vector identities - $\text{div}(\phi \vec{A})$, $\text{curl}(\phi \vec{A})$, $\text{curl}(\text{grad}(\phi))$, $\text{div}(\text{curl} \vec{A})$.	
Module IV		
Probability		
Sr. No	Topics to be covered	Hours required
1	Probability: Basic terminology, Sample space and events	5 Hr
2	Axioms of probability. Addition and multiplication theorems	
3	Conditional probability – illustrative examples	
4	Bayes theorem-examples	
Module V		
Ordinary Differential Equations of First Order		
Sr. No	Topics to be covered	Hours required
1	Introduction – Formation of differential equation, solutions of first order and first degree differential equations	5 Hr
2	Variable separable form, homogeneous	
3	Exact, linear differential equations	
4	Some special first order equations: Clairaut’s equation	
5	Some special first order equations: Clairaut’s equation	
Textbooks:		
1. B.S. Grewal, “Higher Engineering Mathematics” Khanna Publishers, 43rd Edition, 2013. 2. Ramana B. V., “Higher Engineering Mathematics”, Tata Mc Graw-Hill, 2006.		
Reference Books:		
3. Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley-India publishers, 10th edition,2014. 4. G. B. Gururajachar: Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19		
Other References:(NPTEL/SWAYAM. Any Other)		
1. https://youtube.com/playlist?list=PL7oBzLzHZ1wXBSiJEgqz_iwVoLiY8qhbv&si=LWY0G3yww0MbHN9G NPTEL course: Mechanics of Materials by Dr. U Saravanan, IIT Madras 1. https://youtu.be/rveuCHNkaC4?si=jIJomstkFZySE0tk Mechanics of Solids by Prof. Priyanka Ghosh, IIT Kanpur. 2. https://youtu.be/U-5tA9ZMsno?si=Wcl7W7JN3Wmg3McP 3. https://youtu.be/COI0BUmNHT8?si=77D82b9BAnf-jVT2 4. https://youtu.be/ES741wg3APA?si=iqR2QZ5xreoVGo1v		

Course Outcomes:

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

- CO1: Apply the knowledge of calculus to solve problems related to polar curves and its applications
- CO2: Apply the concept of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
- CO3: Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
- CO4: Understand the basic Concepts of Probability
- CO5: Recognize and solve first-order ordinary differential equations occurring in different branches of engineering

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3		2						1	1
CO2	3	3		2						1	1
CO3	3	3		3							1
CO4	2	2		3						1	1
CO5	2	2		2							1

High-3: Medium-2: Low-1:

Evaluation Method:**Continuous Internal Evaluation (CIE):**

- Two CIE Will be conducted for 50 marks each and average of two will be taken (A)
- Alternative Assessment Tools (AAT) should be a project / Quiz/ Seminar cum Presentation / other suitable alternate assessment methods for 30 marks. Two evaluations will be conducted (B)
- Two Assignments for 10 marks each and the sum of both the assignments will be taken for 20 Marks (C)

Final CIE Marks will be calculated as (A+B+C) for 100 marks

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests
2	PPT and Videos	2	Open Book Assignments (OBA)/ Project
3	Flipped Classes	3	AAT (Quiz ,Mini project)

B.E, Electrical and Electronics Engineering

Physical Education (Sports & Athletics)			
Course Code	MVJ25PE39	Scheme	2025
Type of Course	NCMC	Semester	III
Teaching Hours/Week (L: T: P)	0:0:0	CIE Marks	100
Total Hours of Pedagogy (L: T: P: SL&TW)	0:0:0:28	SEE Marks	--
Credits	0	Total Marks	100
Examination type (SEE)	--	Exam Hours	--
Course Objectives: the student will be able to			
1	Understand the meaning and importance of the fitness and the benefits of fitness		
2	Types of fitness and fitness tips.		
3	Importance of Sports, and Yoga in a day-to-day life.		
4	Understand the importance of aerobics and other activities for healthy lifestyle.		
5	Know about the different roles of organization and administration in sports events.		
Topics / Activities to be Covered (100Marks)			
Module I		5Hours	
Orientation ➤ Lifestyle ➤ Fitness ➤ Food & Nutrition: Sports diet. ➤ Stress Management			
Module II		5Hours	
General Fitness & Components of Fitness ➤ Warming up (Free Hand Exercises). ➤ Strength—Push-up/Pull-ups ➤ Speed—30MtrDash. ➤ Agility—Shuttle Run ➤ Flexibility—Sit and Reach			
Module III		5Hours	
Specific Games (Anyone to be selected by the student) ➤ Volleyball— Attack, Block, Service, Upper Hand Pass and Lower Hand and Pass. ➤ Throw ball—Service, Receive, Spin attack, Net Drop & Jump throw. ➤ Kabaddi— Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. ➤ Basketball-dribbling, passing, shooting etc. ➤ Table Tennis—Service (Fore Hand & Back Hand) ➤ Receive (Fore Hand & Back Hand) ➤ Smash, Athletics (Track / Field Events) -Running, Jumping, Throwing.			
Module IV		6 Hours	
Role of Organization and administration ➤ Planning. ➤ Organizing. ➤ Staffing. ➤ Directing. ➤ Coordinating & controlling.			

➤ Reporting & Recording. ➤ Budgeting.	
Module V 6Hours	
Aerobics ➤ Dance Aerobics ➤ Sport Aerobics ➤ Warm up Aerobics ➤ Cardiovascular Aerobics	
Course Outcomes: After completing the course, the students will be able to	
CO1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness.
CO2	Familiarisation with health-related Exercises, Sports for overall growth and development.
CO3	Create a foundation for professionals in Physical Education and Sports.
CO4	Participate in the competition at regional / state / national / international levels.
CO5	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.
Assessment Details for CIE (both CIE and SEE)	
Weight age	CIE – 100%
Participation of students in all the modules	50 Marks
Final presentation / exhibition / Participation In competitions / practical on specific tasks Assigned to the students	50 Marks
Total marks for the course in each semester	100 Marks
- Implementation strategies of the project (PE work). - The last report should be signed by PED, the HOD and principal. - At last report should be evaluated by the PED of the institute. - Finally, the consolidated marks sheet should be sent to the Controller of Examinations office.	
Marks scored for 100 by the students should be Scale to 50 marks in each semester.	
Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general.	

CO-PO mapping.

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

B.E, Electrical and Electronics Engineering

YOGA			
Course Code	MVJ25YO39	Scheme	2025
Type of Course	NCMC	Semester	III
Teaching Hours/Week (L: T: P)	0:0:0	CIE Marks	100
Total Hours of Pedagogy (L: T: P: SL&TW)	0:0:0:28	SEE Marks	--
Credits	0	Total Marks	100
Examination type (SEE)	--	Exam Hours	--

Course Learning Objectives: The students will be able to

1	Promote Holistic Wellness Practice in Students.
2	Develop Physical Awareness and Flexibility
3	Improve Focus and Academic Performance
4	Encourage Healthy Lifestyle Habits.
5	Support mental Health and Emotional balance.

The Health Benefits of Yoga:

1) Yoga helps with a person-centred approach to well-being, offering **physical, mental(cognitive), and spiritual(emotional) benefits** for students. These benefits can help students cope with the demands of academic journeys, improve their overall health, and promote personal development.

• Key Benefits of Various Yoga Techniques:

- Enhances Physical Well-being.
- Boosts Mental Focus.
- Promotes Emotional Stability.
- Reduce Stress Levels.
- Encourages Inner Growth.

It is also used as an adjunct therapy to support recovery from various physical health conditions such as:

- Chronic Pain.
- Back Pain.
- Arthritis.
- Cardiovascular Diseases.
- Asthma.
- Chronic Fatigue Syndrome.
- Menstrual Disorders.
- Digestive Issues.
- Thyroid Imbalances.
- Migraine and headache.

2) Core observations on how yoga functions as a complementary mind-body intervention to support the psychological, physiological and spiritual healing processes associated with various health conditions.

Psychological Benefits:

- Stress reduction.
- Anxiety relief.

- Trauma healing.
- Cognitive and clarity focus.
- Emotional Regulation.
- Aid in managing depression.

Physiological Benefits:

- Enhance Blood Circulation.
- Boost Cardiovascular Health.
- Supports Overall Gut Function.
- Promotes Thyroid Function.
- Relief from Headaches.
- Increased Energy level.

Spiritual Benefits:

- Cultivating gratitude and Compassion
 - Self –realization
 - Balance and Harmony
 - Inner Peace
 - Sense of oneness.
- Mindfulness

MODULE- I

Topics to be covered	Hours required
Discipline and Awareness Reflect Habits s Thoughts: • Basic theory of Yoga, Yamas s Niyamas Yoga definition, Aims and Objectives, importance of yoga in students. • Introduction to Yoga asana Yoga asana meaning, principle and health benefits. • Ashtanga yoga Meaning, breathing techniques. • Four paths of yoga Karma yoga, Bhakthi yoga, Raja yoga, Jnana yoga. • Surya namaskar Surya namaskar prayer and its meaning, benefits and importance. • Yoga asanas Asanas it's need, importance, name and technique. Sitting: -Vajrasana, - adasana, Ardhashakrasana, Prone line: -Advasana, Bhujangasana Supine line: -Shavasana, Supta baddhakonasana, Balancing posture: -Vrikshasana, Garudasana	7

MODULE -II

Topics to be covered	Hours required
Building strength and focus Finding out the obstacle: • Kriya Yoga Tapas, Svadhyaya, Ishwarapranidhana • Five Kleshas Obstacles.	7

• Pranayama Introduction to Pranayama. • Pratyahara Preparing mind for meditation, Breathe focus techniques. • Yoga asanas Standing: -Virabhadrasana, Parshvakona Sitting: -Vajrasana, Paschimottanasana Prone Line: -Dhanurasana, Shalabhasana, Supine Line: -Ananda Balasana, Supta Matsyendrasana, Balancing: -Natarajasana (Dancer Pose)	
MODULE -III	
Topics to be covered	Hours required
Awareness and inner balance: Finding how focused is the mind • Dharana: Concentration • Dhyana: Meditation • Swasthya, Smrithi, Sankalpa. Tool of academic excellence. • Samyama Patanjali's concept of samyama • Yogasanas Standing: - ArdhaChandrasana, Utkatasana Sitting: - Padmasana (or prep), Gomukhasana Prone Line: - Adho Mukha Svanasana, Naukasana Supine Line: - SuptaBaddhaKonasana, Chakrasana Balancing: - Garudasana (Eagle Pose)	7
MODULE -IV	
Topics to be covered	Hours required
Integrating Yoga in daily Life: • Yama niyama Acharam: Practice of ethical Discipline (practicing nonviolence, truth, cleanliness) • Ahara- Vihara Samyama: Practice discipline in diet C lifestyle. • Asana- pranayama sadhana: Daily practice of asanas and pranayama	7

• Yogasanas: Standing: -Prasarita Padottanasana, Parivrtta Trikonasana Sitting: -Baddha Konasana, Marichyasana Prone Line: -Ustrasana (Camel), Makarasana (relaxation) Supine Line: -Sarvangasana, Shavasana Balancing: - Bakasana (Crow – optional or modified)	
Course outcomes	
CO1	Identify and reflect on personal habits and thoughts.
CO2	Explain the basic theory of Yoga, including Yamas C Niyama.
CO3	Understand the definition, aims, objectives, and importance of Yoga, especially for students.
CO4	Enhance physical and mental strength through advanced Yog asanas.

CO-PO mapping

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO1	PSO2
CO 1	-	2	-	-	-	-	-	3	2	2	-	-	-
CO 2	2	-	-	-	-	-	2	2	-	-	-	-	-
CO 3	2	-	-	-	-	2	2	3	-	-	-	-	-
CO 4	-	-	-	-	2	-	3	3	-	-	-	-	-

Weekly assessment will be done by the instructor by giving different poses / Asanas.

The final assessment scaled up to 100 marks.

Text Book

1	Ajitkumar, "Yogapravesha in Kannada"
2	BKS Iyengar "Light on Yoga"

Reference Books

1	M L Gharote & Dr. S K Ganguly, "Teaching Methods for Yogic practices"
2	Yoga Instructor Course handbook published by SVYASA University, Bengaluru
3	Yamini Muthanna, "Yoga for Children –step by step"

B.E, Electrical and Electronics Engineering

Semester: III			
Additional Mathematics-I			
Course Code	MVJ25MATDIP310	Scheme	2025
Type of Course	NCMC	Semester	III
Teaching Hours/Week (L: T: P)	2:0:0	CIE Marks	100
Total Hours of Pedagogy (L: T: P: SL&TW)	28:0:0:0	SEE Marks	--
Credits	0	Total Marks	100
Examination type (SEE)	--	Exam Hours	--
Course Objectives: This course will give ability to: To familiarize the important and introductory concepts of Differential calculus, Integral calculus, Vector differentiation, Probability, ordinary differential equations of first order, and analyze the engineering problems.			
Syllabus			
Differential calculus-nth derivative, Leibnitz theorem, Polar curves - angle between the radius vector and tangent, angle between two curves pedal equation, Taylor's and Maclaurin's series expansions, Integral Calculus: Statement of reduction formulae for the integrals of $\sin^n(x)$, $\cos^n(x)$, $\sin^n x$, $\cos^m x$, Evaluation of these integrals with standard limits-problems, Double -Simple examples, Triple integrals, Vector Differentiation: Differentiation of vector functions, Velocity and acceleration of a particle moving on a space curve,Scalar and Vector point functions, Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields, Vector identities - $\text{div}(\phi \vec{A})$, $\text{curl}(\phi \vec{A})$, $\text{curl}(\text{grad}(\phi))$, $\text{div}(\text{curl} \vec{A})$, Probability: Basic terminology, Sample space and events, Axioms of probability. Addition and multiplication theorems, Conditional probability, Bayes theorem, Introduction – Formation of differential equation, solutions of first order and first-degree differential equations, Variable separable form, homogeneous Exact, linear differential equations, Clairaut's equation.			
Course Plan			
Module I			
Differential calculus			
Sr.No	Topics to be covered	Hours required	
1	Differential calculus: Recapitulation of successive differentiation -nth derivative	6	
2	Leibnitz theorem (without proof) and Problems		
3	Polar curves - angle between the radius vector and tangent, angle between two curves		
4	pedal equation		
5	Taylor's and Maclaurin's series expansions- Illustrative examples		
Module II			
Integral Calculus			
Sr. No	Topics to be covered	Hours required	
1	Integral Calculus: Statement of reduction formulae for the integrals of $\sin^n(x)$, $\cos^n(x)$, $\sin^n x$, $\cos^m x$	6	
2	Evaluation of these integrals with standard limits-problems		
3	Double -Simple examples		
4	Triple integrals-Simple examples		

Module III		
Vector Differentiation		
Sr. No	Topics to be covered	Hours required
1	Vector Differentiation: Differentiation of vector functions	6
2	Velocity and acceleration of a particle moving on a space curve	
3	Scalar and Vector point functions, Gradient, Divergence, Curl	
4	Solenoidal and Irrotational vector fields	
5	Vector identities - $\text{div}(\phi \vec{A})$, $\text{curl}(\phi \vec{A})$, $\text{curl}(\text{grad}(\phi))$, $\text{div}(\text{curl} \vec{A})$.	
Module IV		
Probability		
Sr. No	Topics to be covered	Hours required
1	Probability: Basic terminology, Sample space and events	5
2	Axioms of probability. Addition and multiplication theorems	
3	Conditional probability – illustrative examples	
4	Bayes theorem-examples	
Module V		
Ordinary Differential Equations of First Order		
Sr. No	Topics to be covered	Hours required
1	Introduction – Formation of differential equation, solutions of first order and first-degree differential equations	5
2	Variable separable form, homogeneous	
3	Exact, linear differential equations	
4	Some special first order equations: Clairaut's equation	
5	Some special first order equations: Clairaut's equation	
Textbooks:		
1. B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 43rd Edition, 2013.		
2. Ramana B. V., "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006.		
Reference Books:		
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley-India publishers, 10th edition,2014.		
4. G. B. Gururajachar: Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19		
Other References:(NPTEL/SWAYAM. Any Other)		
1. https://youtube.com/playlist?list=PL7oBzLzHZ1wXBSiJEgqz_iwVoLiY8qhbv&si=LWY0G3yww0MbHN9G NPTEL course: Mechanics of Materials by Dr. U Saravanan, IIT Madras		
1. https://youtu.be/rveuCHNkaC4?si=jIJomstkFZySE0tk Mechanics of Solids by Prof. Priyanka Ghosh, IIT Kanpur.		
2. https://youtu.be/U-5tA9ZMsno?si=Wcl7W7JN3Wmg3McP		
3. https://youtu.be/COI0BUmNHT8?si=77D82b9BAnf-jVT2		
4. https://youtu.be/ES741wq3APA?si=iqR2QZ5xreoVGo1v		

Course Outcomes:

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

- CO1: Apply the knowledge of calculus to solve problems related to polar curves and its applications
- CO2: Apply the concept of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
- CO3: Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
- CO4: Understand the basic Concepts of Probability
- CO5: Recognize and solve first-order ordinary differential equations occurring in different branches of engineering

CO-PO Mapping:

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

High-3: Medium-2: Low-1:

Evaluation Method:**Continuous Internal Evaluation (CIE):**

- Two CIE Will be conducted for 50 marks each and average of two will be taken (A)
- Alternative Assessment Tools (AAT) should be a project / Quiz/ Seminar cum Presentation / other suitable alternate assessment methods for 30 marks. Two evaluations will be conducted (B)
- Two Assignments for 10 marks each and the sum of both the assignments will be taken for 20 Marks (C)

Final CIE Marks will be calculated as (A+B+C) for 100 marks

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests
2	PPT and Videos	2	Open Book Assignments (OBA)/ Project
3	Flipped Classes	3	AAT (Quiz, Mini project)

