MVJ COLLEGE OF ENGINEERING
Since 1982
Engineering A Better Tomorrow
An Autonomous Institution

Bachelor of Engineering in Civil Engineering

Scheme and Syllabus

(2025 Scheme)

III Semester

MVJ College of Engineering, Bengaluru (Autonomous)
B.E. in Civil 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 Hours /Week				# TH/S	Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self - Learning		Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	SL						
1	ASC	MVJ25CS31	Probability, Statistics and Stochastic Processes	56	0	0	64	120	3	50	50	100	4
2	IPCC	MVJ25CV32	Surveying and geospatial techniques	42	0	28	50	120	3	50	50	100	4
3	PCC	MVJ25CV33	Mechanics of Materials	56	0	0	64	120	3	50	50	100	4
4	PCC	MVJ25CV34	Building Materials and Sustainable Construction Practices	42	0	0	48	90	3	50	50	100	3
5	IPCC	MVJ25CV35	Engineering Geology and Practice	42	0	28	50	120	3	50	50	100	4
6	PCCL	MVJ25CVL36	Computer Aided Drafting Lab	0	0	28	02	30	2	50	50	100	1
7	AEC	MVJ25AECK37	Sustainable Engineering and SDGs	14	0	0	16	30	2	50	50	100	1
8	SDC	MVJ25CV38SL	MATLAB for Civil Engineering	0	0	28	02	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	MVJ25MATDIP39	Additional Mathematics – I*	14	0	0	14	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 Hours /Week				# TH/S	Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self - Learning		Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	SL						
1	PCC	MVJ25CV41	Analysis of statically determinate and indeterminate structures	56	0	0	64	120	3	50	50	100	4
2	IPCC	MVJ25CV42	Fluid Mechanics and Hydraulics	42	0	28	50	120	3	50	50	100	4
3	IPCC	MVJ25CV43	Concrete Technology	42	0	28	50	120	3	50	50	100	4
4	PCC	MVJ25CV44	Water supply and Wastewater Engineering	56	0	0	64	120	3	50	50	100	4
5	PCCL	MVJ25CVL45	Environmental Engineering lab	0	0	28	2	30	2	50	50	100	1
6	BSC	MVJ25BI46	Biology for Civil Engineers	28	0	0	32	60	3	50	50	100	2
7	AEC	MVJ25AECK47	Scientific Foundation of Health	14	0	0	16	30	2	50	50	100	1
8	SDL	MVJ25CV48SL	LabVIEW for Civil Engineers	0	0	28	2	30	2	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*	14	0	0	14	28	---	100	--	100	PP
			TOTAL										21

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Semester – V

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week				# TH/S	Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self - Learning		Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	SL						
1	HSMC	MVJ25CV51	Construction management and Entrepreneurship	42	0	0	48	90	3	50	50	100	3
2	IPCC	MVJ25CV52	Design of RCC Structures	42	0	28	50	120	3	50	50	100	4
3	PCC	MVJ25CV53	Geotechnical Engineering	42	0	0	48	90	3	50	50	100	3
4	PCC	MVJ25CV54	Highway Engineering	42	0	0	48	90	3	50	50	100	3
5	PEC	MVJ25CV55X	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	SDC	MVJ25CV58SL	AI Based construction Management Techniques	0	0	28	2	30	3	50	50	100	1
9	PCCL	MVJ25CVL59	Soil and highway materials testing 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

MVJ25CV55A	Ground improvement and reinforced Earth	MVJ25CV55C		Urban Air Quality and Noise Management
MVJ25CV55B	Railway, Port, Tunnel and Airport Engineering	MVJ25CV55D		Earthquake Engineering

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Semester - VI

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week				# TH/S	Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self - Learning		Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	SL						
1	IPCC	MVJ25CV61	Design of Steel and composite structures	42	0	28	50	120	3	50	50	100	4
2	PCC	MVJ25CV62	Applied Geotechnical Engineering	42	0	0	48	90	3	50	50	100	3
3	PCC	MVJ25CV63	Circular economy and Smart Waste Management	42	0	0	48	90	3	50	50	100	3
4	PCC	MVJ25CV64	Irrigation Engineering and Hydraulic Structures	42	0	0	48	90	3	50	50	100	3
5	PEC	MVJ25CV65X	Professional Elective Courses-II	42	0	0	48	90	3	50	50	100	3
6	PCCL	MVJ25CVL66	Software Application Lab	0	0	28	02	30	3	50	50	100	1
7	AEC	MVJ25AECK67	Ability Enhancement Course	14	0	0	16	30	2	50	50	100	1
8	SDC	MVJ25CV68SL	Building Information Modelling Lab	0	0	28	02	30	3	50	50	100	1
9	SDC	MVJ25CV69	Capstone Project – Phase I	0	0	0	50	90	3	100	--	100	3
10	NCMC	MVJ25UHV610	Universal Human Value	14	0	0	14	28	---	100	---	100	PP
TOTAL													22

Professional Elective Course-II

MVJ25CV65A	Pavement Engineering	MVJ25CV65C		Remote sensing and GIS
MVJ25CV65B	Ground Water Hydraulics	MVJ25CV65D		Industrial safety and occupational Health Management

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Semester – VII (Swappable VII and VIII SEMESTER) (SCHEME-A)

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week				# TH/S	Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self - Learning		Duration in h ours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	SL						
1	IPCC	MVJ25CV71	Quantity Surveying and construction contracts	42	0	28	50	120	3	50	50	100	4
2	PEC	MVJ25CV72X	Professional Elective Course-III	42	0	0	48	90	3	50	50	100	3
3	PEC	MVJ25CV73X	Professional Elective Course -IV	42	0	0	48	90	3	50	50	100	3
4	OEC	MVJ25CV74X	Open Elective Course-I	42	0	0	48	90	3	50	50	100	3
5	SDC	MVJ25CV75	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	SDC	MVJ25CV78SL	Excel and VBA Applications in Civil Engineering	0	0	28	2	30	2	50	50	100	1
TOTAL													22

Professional Elective Course-III			
MVJ25CV72A	Design Of Prestressed Concrete Structures	MVJ25CV72C	Environmental Impact Assessment
MVJ25CV72B	Structural Health Monitoring	MVJ25CV72D	Urban mobility and smart traffic management
Professional Elective Course-IV			
MVJ25CV73A	Advanced Foundation Engineering	MVJ25CV73C	Traffic Engineering
MVJ25CV73B	Retrofitting And Rehabilitation of Structures	MVJ25CV73D	Design of Earthquake resistant Structure
Open Elective Course-I			
MVJ25CV74A	Air Pollution and Control	MVJ25CV74C	Sustainable Development and goals
MVJ25CV74B	Environmental Protection and Management	MVJ25CV74D	Foreign Language (Nptel/Swayam/Online Vtu)

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Semester – VIII (Swappable VII and VIII SEMESTER) (SCHEME-A)

Sl. No.	Course	Course Code	Course Title	Teaching Hours /Week				# TH / S	Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self - Learning		Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	SL						
1	PEC	MVJ25CV81X	Professional Elective-V (NPTEL/VTU Online Course)	42	0	0	48	90	3	50	50	100	3
2	OEC	MVJ25CV82X	Open Elective-II (NPTEL/VTU Online Course)	42	0	0	48	90	3	50	50	100	3
3	SDC	MVJ25INT83X	Internship (15 weeks or 90 working days)	--	--	--	--	270	3	100	100	200	9
TOTAL													15

Professional Elective-V

MVJ25CV81A	NPTEL/VTU Online Course	MVJ25CV81C	NPTEL/VTU Online Course
MVJ25CV81B	NPTEL/VTU Online Course	MVJ25CV81D	NPTEL/VTU Online Course

Open Elective-II

MVJ25CV82A	NPTEL/VTU Online Course	MVJ25CV82C	NPTEL/VTU Online Course
MVJ25CV82B	NPTEL/VTU Online Course	MVJ25CV82D	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 Internship:** Shall be opted by students unable to secure internships, offering credit equivalence through curated online courses available at http:// www.online.vtu.ac.in

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

Sl. No.	Course	Course Code	Course Title	Teaching Hours /Week					Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self - Learning	# TH / S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	SL						
1	IPCC	MVJ25CV71	Quantity Surveying and construction contracts	42	0	28	50	120	3	50	50	100	4
2	PEC	MVJ25CV72X	Professional Elective Course-III (NPTEL/VTU Online Course)	--	--	--	--		--	50	50	100	3
3	PEC	MVJ25CV73X	Professional Elective Course-IV (NPTEL/VTU Online Course)	--	--	--	--		--	50	50	100	3
4	OEC	MVJ25CV74X	Open Elective Course -I (NPTEL/VTU Online course)	---	---	---	---		---	50	50	100	3
5	SDC	MVJ25CV75	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	SDC	MVJ25CV78SL	Excel and VBA Applications in Civil Engineering	0	0	28	2	30	3	50	50	100	1
			Total										22
1	PEC	MVJ25CV81X	Professional Elective-V (NPTEL/VTU Online Course)	--	--	--	--		---	50	50	100	3
2	OEC	MVJ25CV82X	Open Elective-II (NPTEL/VTU Online Course)	--	--	--	--		---	50	50	100	3
3	SDC	MVJ25INT83X	Internship (Two- semester internship for a minimum Period of 180 working days or -30 weeks)	--	--	--	--		3	50	50	100	9
			Total										15
			7^{th} semester and 8^{th} semester Credits Total										37

Professional Elective Course-III			
MVJ25CV72A	NPTEL/VTU Online Course	MVJ25CV72C	NPTEL/VTU Online Course
MVJ25CV72B	NPTEL/VTU Online Course	MVJ25CV72D	NPTEL/VTU Online Course
Professional Elective Course-IV			
MVJ25CV73A	NPTEL/VTU Online Course	MVJ25CV73C	NPTEL/VTU Online Course
MVJ25CV73B	NPTEL/VTU Online Course	MVJ25CV73D	NPTEL/VTU Online Course
Open Elective Course-I			
MVJ25CV74A	NPTEL/VTU Online Course	MVJ25CV74C	NPTEL/VTU Online Course
MVJ25CV74B	NPTEL/VTU Online Course	MVJ25CV74D	NPTEL/VTU Online Course
Professional Elective Course-V			
MVJ25CV81A	NPTEL/VTU Online Course	MVJ25EA81C	NPTEL/VTU Online Course
MVJ25CV81B	NPTEL/VTU Online Course	MVJ25EA81D	NPTEL/VTU Online Course
Open Elective Course-II			
MVJ25CV82A	NPTEL/VTU Online Course	MVJ25CV82C	NPTEL/VTU Online Course
MVJ25CV82B	NPTEL/VTU Online Course	MVJ25CV82D	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

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**.

I. Option -1: Swappable Semester Scheme - A

To ensure equitable access to internship opportunities, provision has been made to swap seventh and eighth semesters under Scheme A. The details of the Scheme – A are as follows:

- Students who have an offer to enroll for a 15-week internship, before the start of 4th year, shall register for VIII semester courses instead of VII semester courses and take up respective semester examinations.
- Those who have no offer to enroll to a 15-week internship, before the start of 4th year, shall register VII and VIII semesters' courses in the chronological manner and complete the programmed. In this case the internship shall be carried out during VIII semester.

II. Option -2: Two-Semester Internship Scheme – B

- Students who have cleared all the courses up to VI semester in first attempt only (i.e., students having no backlogs) and have an internship offer for a period of 180 working days or 30 working weeks, are only eligible for Scheme – B. The internship commence date should coincide with the 4th year academic calendar of VTU. Such students, shall produce the confirmed internship letter, to the Principal/Academic Authority to get permission to register for the summer semester to opt for Scheme - B.
- Such eligibles students shall register for the course MVJ25xx71 in the summer semester of the same academic year (i.e., after their VI semester) and complete the said course in first attempt only.
- In case, they absent for the examination or fails in the course MVJ25xx71, they shall not be considered eligible for the Scheme – B. However, they shall register for Scheme – A.
- After completing the course MVJ25xx71, students with confirmed internship letter to carry out the internship for a minimum 180 working days or 30 working weeks, shall register for the Scheme – B.
- In case students cannot commence the internship for various reasons, they are not considered for Scheme – B. In such cases, they shall register for

- Scheme –A. However, they will be exempted from studying the course MVJ25xx71 again.
- A request letter with internship permission letter must be submitted to Principal, MVJCE, through concerned authorities of the institution. Only after receiving the approval from the Registrar, students proceed with the internship as mentioned in Option Scheme B.

Probability and Transformation techniques			
Course Code	MVJ25EC31	Scheme	2025
Type of Course	PCC	Semester	III
Teaching Hours/Week (L:T:P)	4:0:0:0	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:

- Apply discrete and continuous probability distributions in analysing the probability models arising in engineering field.
- Understand the concepts of Complex variables and transformation for solving Engineering Problems.
- Demonstrate and present data using statistical method 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 ,2c. Practical Harmonic Analysis and Problems. Infinite Fourier transforms, Fourier sine and cosine transform. Z-transforms and Inverse Z-transforms. Correlation, Fitting of the curves, Sampling distributions.

Course Plan

Module I - Probability Theory

Sr. No	Topics to be covered	Hours required
1	Random variables for discrete and continuous time functions.	**12 Hrs**
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

Sr. No	Topics to be covered	Hours required
1	Functions of complex variables, Analytic function, Properties of analytic functions.	**11 Hrs**
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

Sr. No	Topics to be covered	Hours required
1	Definition of Periodic functions, Dirichlet's condition.	**11 Hrs**
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		
Sr. No	Topics to be covered	Hours required
1	Infinite Fourier transforms, Fourier sine and cosine transform.	**11 Hrs**
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		
Sr. No	Topics to be covered	Hours required
1	Definition of Correlation, Regression coefficients.	**11 Hrs**
2	Line of regression problems.	
3	Fitting of the 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.

Other References: (NPTEL/SWAYAM, Any other)

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 analyse 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	1								2	3	1
CO2	3	2	1								1	2	2
CO3	3	3	1								1	3	
CO4	3	2	1								2	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 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 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 must 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 & SEE
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)		

Surveying and Geospatial Techniques			
Course Code	MVJ25CV32	Scheme	2025
Type of Course	IPCC	Semester	III
Teaching Hours/Week (L:T:P)	3:0:2:0	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 & Practical	Exam Hours	3

Course Objectives:

This course will enable students to:

- **Explain** the fundamental principles, classifications, methods, and terminology of surveying and their applications in civil engineering
- **Develop** the ability to perform basic surveying operations using levelling instruments, theodolites, compass, plane table, and total station.
- **Familiarize** with modern surveying technologies such as Total Station, GNSS/GPS, and their applications in engineering projects.
- **Analyse** survey data and apply appropriate techniques for engineering measurements, topographic mapping, hydrographic surveys, and spatial data collection.
- **Understand** the principles of remote sensing, photogrammetry, and GIS techniques for spatial analysis

Syllabus

Fundamentals and principles of surveying; Types of surveying; Datums and benchmarks; Levelling and differential levelling. Theodolite surveying; Compass and plane table surveying; Total station surveying and measurements. Contour surveying; Area and volume computation; Curves and curve setting. GPS surveying and positioning; GAGAN system; Differential GPS; Hydrographic surveying; Tides and currents. Photogrammetry; Aerial photogrammetry; Drone surveying; Photogrammetric mapping; Drone platforms, flight planning, DGPS and image processing.

Course Plan

Module I

Fundamentals of Surveying and Levelling

Sr. No	Topics to be covered	Hours required
1	Definition, objectives, importance and applications of surveying in Civil Engineering, Principles of surveying	8 Hrs
2	**Types of Surveying** - Control survey, Topographical surveying, Construction Survey, Cadastral survey, Hydrographic survey and Underground Survey.	
3	**Datum and Benchmarks:** Concept of datum; Mean Sea Level (MSL); types of benchmarks – temporary and permanent	
4	**Levelling:** Definition, objectives and applications, Terms used in levelling, Setting up of Dumpy level	
5	**Dumpy Level:** Components, temporary adjustments and setting up of dumpy level	
6	**Differential Levelling:** Principle and procedure; Plane of Collimation method using dumpy level	

Module II

Theodolite and Total Station Surveying

Sr. No	Topics to be covered	Hours required

1	**Theodolite Surveying:** Terms used in theodolite surveying	8 Hrs
2	Setting up a Theodolite, Measurement of horizontal and vertical angles with Theodolite.	
3	**Compass and Plane Table Surveying:** Introduction to compass survey and plane table survey	
4	**Total Station:** Features, parts, accessories and advantages	
5	**Surveying with Total Station:** Measurement of horizontal angle, vertical angle, distance, slope and vertical distance	
6	**Total Station Applications:** Measurement of multiple angles and basic field applications	
Module III Contouring, Area, Volume and Curves		
Sr. No	Topics to be covered	Hours required
1	**Contour Surveying:** Definition, characteristics, methods of contouring and applications	9 Hrs
2	**Determination of Area:** Trapezoidal rule and Simpson's rule (Numerical problems)	
3	**Measurement of Volume:** Prismoidal formula and trapezoidal formula (Numerical problems)	
4	**Curves:** Types of curves, definitions, notations and designation of a curve	
5	**Simple Curves:** Elements of simple curve and numerical problems on curve setting	
Module IV GPS and Hydrographic Surveying		
Sr. No	Topics to be covered	Hours required
1	**GPS Surveying:** Overview and fundamentals of GPS surveying	9 Hrs
2	**GPS Positioning:** Absolute and differential positioning with GPS	
3	**GAGAN and GPS Receivers:** GAGAN system in India; types of GPS receivers	
4	**Differential GPS:** Engineering survey using Differential GPS	
5	**GPS Surveying:** Overview and fundamentals of GPS surveying	
6	**Hydrographic Surveying:** Purpose of hydrographic surveys (nautical charting, port engineering), shore lining, and datum concepts (MSL - Mean Sea Level).	
7	**Tides & Currents:** Tidal observations, tide gauges, and reduction of soundings.	
Module V Photogrammetry and Drone Surveying		
Sr. No	Topics to be covered	Hours required
1	Photogrammetry: Principles of photogrammetry; photographic and map representation; terrestrial and aerial photographs	8 Hrs
2	Aerial Photogrammetry: Vertical and tilted photographs, scale, flying height, relief displacement.	
3	Drone Surveying: Introduction, applications and advantages; photogrammetric mapping methods	
4	Types of Drones and Drone Platforms: Types of drones; drone platforms	
5	Drone Surveying Technologies: Flight planning software, DGPS equipment and image processing software	

Laboratory Experiments

1. Determination of reduced levels of points using dumpy level/auto level (simple levelling)
2. Determination of reduced levels of points using dumpy level/auto level (differential levelling and inverted levelling)
3. Determination of difference in elevation between two points using reciprocal levelling and to determine the collimation error
4. To conduct profile levelling and cross sectioning block levelling, plotting profile and cross sectioning.
5. Measurement of horizontal angle by repetition and reiteration methods and measurement of vertical angles using theodolite.
6. Determination of horizontal distance and vertical height to a base inaccessible object using theodolite by single plane method
7. Determination of distance and elevation using tachometric surveying with horizontal and inclined line of sight.
8. Setting of a Pentagon using Compass.
9. Determination of area using Total Station
10. Determination of height of an inaccessible point using total station

Textbooks:

1. Punima, B. C., Jain, A. K., & Jain, A. K. Surveying (Volumes I, II, and III) (17th Edition). Laxmi Publications.
2. Duggal, S. K. Surveying (Volumes I and II). Tata McGraw-Hill.
3. Kanetkar, T. P., & Kulkarni, S. V. Surveying and Levelling (Volumes I and II). Pune Vidyarthi Griha Prakashan.
4. Bhavikatti, S. S. Surveying and Levelling (Volumes I and II). I.K. International Publishing House.

Reference Books:

1. Schofield, W., & Breach, M. Engineering Surveying (6th Edition). CRC Press.
2. Ghilani, C. D., & Wolf, P. R. Elementary Surveying: An Introduction to Geomatics (15th Edition). Pearson.
3. Burrough, P. A., McDonnell, R., & Lloyd, C. D. Principles of Geographical Information Systems (3rd Edition). Oxford University Press.
4. Lillesand, T., Kiefer, R. W., & Chipman, J. Remote Sensing and Image Interpretation (7th Edition). Wiley.
5. Shan, J., & Toth, C. K. Topographic Laser Ranging and Scanning: Principles and Processing (2nd Edition). CRC Press.
6. IS Codes – IS 1024 (Chain Surveying), IS 1760 (Total Station), Survey of India publications.

Web links and e-Resources:

- NPTEL courses on Surveying (IIT Roorkee, IIT Kharagpur) –https://nptel.ac.in/courses/105107122

Course Outcomes:

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

CO1: Identify and classify different surveying methods, instruments, datums, benchmarks, and fundamental field operations.
CO2: Determine elevations, horizontal and vertical angles, distances, areas, and volumes using appropriate conventional surveying techniques.
CO3: Perform contouring, curve setting, and related computations required for engineering surveying applications.
CO4: Evaluate positional and survey data obtained using GPS/GNSS, GAGAN, Differential GPS, and hydrographic surveying techniques.
CO5: Interpret aerial and terrestrial photographs and utilize photogrammetric and drone-survey data for mapping and geospatial 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	3	1
CO2			2	2	2							2	2
CO3			2		2	2			2			3	
CO4			2		2				2			2	2
CO5			2			2	2	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) are used to complete 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 includes 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 must 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

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

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests & SEE
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, Civil Engineering

Mechanics of Materials

Course Code	MVJ25CV33	Scheme	2025
Type of Course	PCC	Semester	III
Teaching Hours/Week (L:T:P)	4:0:0:0	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 enable students to:

1. Understand the simple stresses, strains, and compound stresses in various structural components
2. Understand the bending moments and shear forces in different types of beams under various loading conditions
3. Know the bending stress, shear stress, and torsional stress in beams and shafts with different cross sections
4. Understand the deflection in beams and the stability of columns under different loading Conditions
5. Understand the behavior and strength of structural elements subjected to compound stresses and stresses in thin and thick cylinders

Syllabus

Simple Stresses and Strains, Bending Moment and Shear Force Diagrams, Bending and Shear Stresses in Beams, Torsion in Circular Shafts, Deflection of Beams, Columns and Struts, Compound Stresses, Thin and Thick Cylinders.

Course Plan

Module I

Sr. No	Simple Stresses and Strains	Hours required
1	**Simple Stresses and Strains**: Introduction, Properties of Materials, Stress, Strain	12 Hrs
2	Hooke's law, Poisson's Ratio, Stress – Strain Diagram for structural steel, Principles of superposition	
3	Total elongation of tapering bars of circular and rectangular cross sections. (Numerical Problems)	
4	Composite section, Volumetric strain, expression for volumetric strain. (Numerical Problems)	
5	Elastic constants, relationship among elastic constants. (Numerical Problems)	

Module II

Sr. No	Bending Moment and Shear Force Diagrams	Hours required
1	**Bending moment and shear force diagrams in beams**: Definition of shear force and bending moment, sign convention, Relationship between loading, shear force and bending moment (Numerical Problems)	12 Hrs
2	Development of Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) with salient values for cantilever, simply supported and overhanging beams for point loads (Numerical Problems)	
3	UDL (Uniformly Distributed Load), UVL (Uniformly Varying Load), Couple and their combinations. (Numerical Problems)	

Module III		
Sr. No	Bending and Shear Stresses in Beams; Torsion in Circular Shafts	Hours required
1	**Bending and Shear Stresses in Beams**: Introduction, pure bending theory, Assumptions, derivation of bending equation	10 Hrs
2	Modulus of rupture, section modulus, flexural rigidity (Numerical Problems)	
3	**Torsion in Circular Shaft**: Introduction, Theory of pure torsion	
4	Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus Power transmitted by a shaft - (Numerical Problems)	
Module IV		
Sr. No	Deflection of Beams; Columns and Struts	Hours required
1	**Deflection of Beams**: Definition of slope, Deflection and curvature, Sign conventions, Derivation of moment- curvature equation.	12 Hrs
2	Double integration method and Macaulay's method: Slope and deflection for standard loading cases and for determinate prismatic beams subjected to point loads, UDL, UVL and couple. (Numerical Problems)	
3	**Columns and Struts**: Introduction, short and long columns.	
4	Derivation of Euler's Buckling load for different end conditions, Limitations of Euler's theory (Euler's theory only) (Numerical Problems)	
Module V		
Sr. No	Compound Stresses; Thin and Thick Cylinder	Hours required
1	**Compound Stresses**: Introduction, state of stress at a point, General two-dimensional stress system	10 Hrs
2	Principal stresses and principal planes. Mohr's circle of stresses. (Numerical Problems)	
3	**Thin and Thick Cylinders**: Introduction, Thin cylinders subjected to internal pressure; Hoop stresses (Numerical Problems)	
4	Longitudinal stress and change in volume. Thick cylinders subjected to both internal and external pressure (Numerical Problems)	
5	Lame's equation, radial and hoop stress distribution. (Numerical Problems)	

Textbooks:

1. B.C Punmia, Ashok Jain, Arun Jain, "Strength of Materials", 10th Edition, Laxmi Publications, New Delhi, 2014.
2. R K Bansal, "A Textbook of Strength of Materials", 4th Edition, Laxmi Publications, New Delhi,2015
3. S S Bhavikatti, "Strength of Materials", 5th Edition, Vikas Publishing, New Delhi,2020.

Reference Books:

1. S.S. Rattan, "Strength of Materials", 2nd Edition, McGraw Hill Education (India) Pvt Ltd., New Delhi, 2003.
2. Vazirani, V N, Ratwani M M and S K Duggal, "Analysis of Structures Vol. I", 17th Edition, Khanna Publishers, New Delhi.
3. B.S. Basavarajaiah, P. Mahadevappa, "Strength of Materials", 3rd Edition, University Press (India) Pvt Ltd., New Delhi,2014.

Course Outcomes:

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

CO1: Evaluate the simple stresses, strains and compound stresses

CO2: Calculate the Bending moments, shear force and draw BMD, SFD for various types of beams and loadings.

CO3: Analyze the bending stress, shear stress and torsional stress in beams and shafts with different cross sections

CO4: Evaluate the deflection in beams and determine the stability of the columns.

CO5: Evaluate the behaviour and strength of structural elements under the action of compound stresses and stresses in thin and thick cylinders.

CO-PO Mapping

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

High-3: Medium-2: Low-1

Evaluation Method

Continuous Internal Evaluation (CIE):

1. Three Internal Tests will be conducted for 50 marks each and average of three will be taken **(A)**.
2. Three Quizzes will be conducted along with CIE for 10 Marks Each. Sum of three quizzes will be considered for 30 marks **(B)**.
3. 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 & SEE
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)		

BUILDING MATERIALS AND SUSTAINABLE CONSTRUCTION PRACTICES			
Course Code	MVJ25CV34	Scheme	2025
Type of Course	PCC	Semester	III
Teaching Hours/Week (L:T:P)	3:0:0:0	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 enable students to:

- **Explain** the properties, classification, testing methods, and applications of conventional building materials such as stones, bricks, cement-based blocks, timber, metals, and glass.
- **Describe** the principles and practices involved in masonry, lintels, arches, floors, roofs, doors, windows, plastering, pointing, damp-proofing, and painting.
- **Apply** appropriate material selection and construction practices for different building components considering functional and performance requirements.
- **Analyze** the suitability of alternative building materials, including bamboo, earth-based materials, fibre-reinforced materials, and waste-based materials for construction applications.
- **Evaluate** sustainable construction practices, green building rating systems, and low-cost construction technologies for environmentally responsible building development.

Syllabus

Stones and Bricks, Earth, Bamboo, Timber and Metals, Masonry, Lintels and Arches, Floors, Roofs, Doors, Windows and Ventilators, Plastering and Pointing, Damp Proofing, Paints, Green Building Rating Systems, Residential and Functional Planning, Alternate Building Materials, Agro Wastes, Industrial and Mine Wastes.

Module I

STONES, BRICKS AND BUILDING BLOCKS

Sr. No	Topics to be covered	Hours required
1	**Stone**: Requirement of good building stones, Dressing of stones, Deterioration and Preservation of stonework	8 Hrs
2	**Bricks:** Classification, Manufacturing of clay bricks, Requirement of good bricks. Field and laboratory tests on bricks; compressive strength, water absorption, efflorescence, dimension and warpage.	
3	Cement Concrete blocks, Autoclaved Aerated Concrete Blocks, hollow blocks, fly ash bricks, and compressed stabilized earth blocks Sizes, requirement of good blocks. Timber as construction material.	

Module II

EARTH, BAMBOO, TIMBER, METALS AND GLASS

Sr. No	Topics to be covered	Hours required
1	Earth: Global Applications and Typologies, Components, Properties, and Soil Testing for Mud Construction	8 Hrs
2	Bamboo: Introduction to Bamboo as a Building Material, Properties, Types, and Grading of Bamboo, Bamboo Preservation and Treatment Methods, Advantages and Disadvantages of Bamboo Construction	

3	Timber: classification, defects, seasoning, preservation, plywood, veneers, particle boards, and fibre boards	
4	Metals: steel, aluminium, and their common applications. Glass: types, properties, and uses in buildings	
	Module III	
	MASONRY, LINTELS, ARCHES AND FLOORS	
Sr. No	Topics to be covered	Hours required
1	**Masonry:** Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry, Bonds in brick work, Header, Stretcher, English, Flemish bond, Stone masonry, Requirements of good stone masonry, Classification, characteristics of different stone masonry, Joints in stone masonry. Types of walls; load bearing, partition walls, cavity walls.	9 Hrs
2	**Lintels and Arches:** Definition, function and classification of lintels, Balconies, chejja and canopy. Arches; Elements and Stability of an Arch.	
3	**Floors**: Requirement of good floor, Components of ground floor, Selection of flooring material Procedure for laying of Concrete (VDF), Mosaic, Kota, Slate, Marble, Granite, Tile flooring, Cladding of tiles.	
	Module IV	
	BUILDING COMPONENTS AND CONSTRUCTION PRACTICES	
Sr. No	Topics to be covered	Hours required
1	**Roof**: Requirement of good roof, Types of roof, Elements of a pitched roof, Trussed roof, King post Truss, Queen Post Truss, Steel Truss, Different roofing materials, R.C.C. Roof.	8 Hrs
2	**Doors, Windows and Ventilators**: Location of doors and windows, technical terms, Materials for doors and windows: PVC, CPVC and Aluminium. Types of Doors and Windows: Panelled, Flush, Collapsible, rolling shutter, Panelled and glazed Window, Bay Window, French window. Steel windows, Ventilators. Sizes as per IS recommendations.	
3	**Plastering and Pointing**: Mortar and its types. Purpose, materials and methods of plastering and pointing: Sand faced plastering, Stucco plastering, lathe plastering, defects in plastering. Water proofing with various thicknesses.	
4	**Damp proofing**: Causes, effects and methods. Corrosion protection, waterproofing materials, and damp-proofing materials. **Paints:** Purpose, types, technical terms, ingredients and defects, Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces.	
	Module V	
	GREEN BUILDING AND SUSTAINABLE CONSTRUCTION PRACTICES	
Sr. No	Topics to be covered	Hours required
1	**Green Building Rating System:** Introduction to Green Building Certifications, Green building rating systems- LEED, BREEAM and others, Indian Green building rating systems – IGBC & GRIHA	9 Hrs
2	**Residential and Functional Planning**: Ideal placement guidelines for master bedrooms, children's rooms, and guest spaces, kitchens, toilets, and Prayer rooms.	
3	**Alternate Building Materials**: Fibers- metal and synthetic, Properties and applications. Fiber reinforced plastics, Matrix materials	

4	**Waste-Based Building Materials**: Types of agricultural wastes, industrial wastes and mining wastes; properties and applications of waste materials in construction	

Textbooks:

1. Sustainable Building Design Manual- Volume II", Published by TERI, New Delhi, 2009.
2. Dr. B. C. Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction, Laxmi Publications (P) ltd., New Delhi.
3. S. K. Duggal, "Building Materials", (Fourth Edition)New Age International (P) Limited, 2016 National Building Code(NBC) of India

Reference Books:

1. The Philosophy of Sustainable Design by Jason F. McLennan, Ecotone Publishing Co., 2004.
2. Green Building Fundamentals by Mike Montoya, Pearson, 2nd edition, 2010.
3. Sustainable Construction - Green Building Design and Delivery by Charles J. Kibert, John Wiley & Sons, 2nd edition, 2008.

Other References: (NPTEL/SWAYAM. Any Other) :

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ar18

Course Outcomes:

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

CO1: **Identify and explain** the classification, properties, testing methods, and applications of conventional and alternative building materials.

CO2: **Apply** appropriate construction practices for masonry, lintels, arches, floors, roofs, doors, windows, plastering, pointing, damp-proofing, and painting.

CO3: **Analyze** the suitability of timber, bamboo, metals, glass, and other building materials for specific construction applications based on their properties and performance.

CO4: **Evaluate** building components and construction practices with respect to functionality, quality, durability, safety, and performance.

CO5: **Evaluate and recommend** sustainable building materials, green building practices, rating systems, waste-based materials, and low-cost construction approaches for environmentally responsible buildings.

CO-PO Mapping:

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

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 must answer any 5 questions choosing one full question from each module.

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

Course delivery methods		Assessment methods	
1	Chalk and talk	1	IA tests & SEE
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)		

Engineering Geology and Practice			
Course Code	MVJ25CV35	Scheme	2025
Type of Course	IPCC	Semester	III
Teaching Hours/Week (L:T:P)	3:0:2:0	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 & Practical	Exam Hours	3

Course Objectives:

This course will enable students to:

1. Understand the Earth's interior, plate tectonics, and geological hazards, and their significance in civil engineering projects.
2. Explain the importance of natural resources and their sustainable utilization in civil engineering practices.
3. Analyze geological processes such as weathering, erosion, and rock deformation and evaluate their influence on engineering structures like dams, bridges, tunnels, and highways.
4. Apply the principles of groundwater geology and rainwater harvesting for sustainable water resource management.
5. Apply geophysical methods and geological investigations for subsurface exploration and site characterization.

Syllabus

Introduction to Engineering Geology, Earth's Interior and Plate Tectonics, Geological Hazards, Mineralogy and Petrology, Weathering and Soils, Engineering Significance of Rocks, Bearing Strata and RQD, Geological Investigations, Structural Geology, Geological Maps and Cross-Sections, Folds, Faults, Joints and Unconformities, Geophysical Methods, Groundwater Geology, Borehole Data Analysis, Site Improvement and Rock Mechanics.

Course Plan

Module I

Sr. No	Topics to be covered	Hours required
1	**Introduction**: scope of engineering geology in planning, design and construction of infrastructure.	8 Hrs
2	Earth's internal structure and composition, internal dynamics. Plate tectonics, Earthquakes – types, causes, and effects; seismic lines and seismic zonation; Ring of Fire as a global seismic–volcanic belt;	
3	Richter scale classification and measurement of earthquakes; seismic proof structures and precautions for construction in seismic areas	
4	Volcanic eruptions: types and causes, Landslides-causes and types, preventive measures,	
5	Tsunami-causes, consequences, mitigation. Cyclones - causes and management. Case studies	

Module II

Sr. No	Topics to be covered	Hours required
1	**Mineralogy**: Definition of mineral, Importance, Different methods of study of minerals.	8 Hrs
2	Physical properties of minerals and their advantages	
3	Study of physical properties of rock forming minerals (Quartz Feldspar Mica Olivine and Calcite) and ore-forming minerals - Hematite and Magnetite (for	

	iron) Chalcopyrite (for copper) Chromite (for chromium) Gold and Silver (native metals)	
4	**Petrology**: Definition of rock: Geological classification of rocks, Rocks – classification into igneous, sedimentary and metamorphic; textures and structures; engineering significance of rock types (granite, basalt, sandstone, limestone, shale, gneiss, schist).	
5	Applications - Requirement of Railway ballast, masonry work, monumental/architecture.	

Module III		
Sr. No	Topics to be covered	Hours required
1	**Earth Surface Processes and Site Investigations**: Weathering of rocks – physical, chemical and biological processes; residual and transported soils;	8 Hrs
2	Effect of weathering over the properties of rocks, importance of weathering with reference to dams, reservoirs and tunnels weathering of rock like Granite.	
3	Concept of bearing strata, overburden, rock mass quality (awareness of RQD).	
4	Role of engineering geologist in reconnaissance and detailed site investigations, including surveys and site characterization.	
Module IV		
Sr. No	Topics to be covered	Hours required
1	**Structural Geology**: Dip and strike, and outcrop problems (numerical problem geometrical/ simple trigonometry based)	8 Hrs
2	Topographic maps, geologic maps, Interpretation of geological maps; Cross-section construction;	
3	Classification and origin of folds, faults, joints, unconformities, foliations and lineations; their significance in Civil engineering projects like tunnel project, dam project, Reservoir site.	
4	Case studies of geological structures and their importance.	
Module V		
Sr. No	Topics to be covered	Hours required
1	**Geophysical methods and subsurface investigation**: Principles of gravity, magnetic, electrical, seismic, radiometric, and geothermal methods.	8 Hrs
2	Rocks as aquifers – water-bearing properties of igneous, sedimentary, and metamorphic rocks.	
3	Groundwater resources: springs, wells, boreholes, water table, types of groundwater, and influence of geological formations on yield.	
4	Borehole data analysis and numerical/analytical methods.	
5	Site improvement techniques (e.g., grouting), fundamentals of rock mechanics, and Introduction to environmental geology.	
Laboratory Experiments		**28 Hrs**

1. Study of different groups of minerals.
2. Study of Crystal and Crystal system
3. Identification of physical properties of rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite.
4. Identification of physical properties of ore-forming minerals: Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite. Susceptibility of minerals to alteration, basics of optical mineralogy.

5. Identification of rocks (Igneous Petrology): Granite, Dolerite, Basalt, Pegmatite.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone, Laterite, Limestone, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrology): Marble, slate, Quartzite, Phyllite, Gneiss Schist and its varieties.
8. Study of geological maps and symbols.
9. Interpretation of geological sections and rock strata. (Dip and Strike)
10. Study of borehole data through analytical exercises with provided numerical values

Textbooks:

1. Parthasarathy, V Panchapakesan, R Nagarajan, "Engineering Geology", Wiley publications, 2nd edition 2019.
2. Chenna Kesavulu, "Engineering Geology", Mac Millan India Ltd, New Delhi, 2nd edition, 1993.
3. K.M. Bangar, "Principle of Engineering Geology", Standard publishers, New Delhi, 3rd Edition, 2021.

Reference Books:

1. S.K. Garg, "Physical and Engineering Geology",7th edition Khanna publishers, 1983.
2. KVGK Gokhale, "Principles of Engineering Geology", 2nd edition BS Publications, 2019.
3. Edward A Keller, "Introduction to Environmental Geology", Pearson publications, New Delhi, 5th edition, 2018.
4. B. P. Verma, "Engineering Geology and Rock Mechanics", Khanna publishers, New Delhi, 4th edition 1998.
5. Krynine and Judd, "Principles of Engineering Geology and Geotechnics", 1st edition, CBS Publications 2018.

Other References(NPTEL/SWAYAM, Any other)

1. NPTEL Course on Engineering Geology- https://onlinecourses.nptel.ac.in/noc25_ce129/preview

Course Outcomes:

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

CO1: Apply geological knowledge and principles in various civil engineering practices for safe and sustainable construction.

CO2: Evaluate the durability, strength, and engineering suitability of foundation rocks and construction materials for selecting appropriate building materials.

CO3: Identify and classify minerals and rocks based on their physical, chemical, and engineering properties for their effective use in civil engineering applications.

CO4: Evaluate geological factors, site conditions, and subsurface characteristics for planning, design, and construction of civil engineering projects ensuring safety, stability, economy, and durability.

CO5: Analyze groundwater conditions and geological factors to address challenges encountered during groundwater exploration and the construction of dams, bridges, and tunnels.

CO-PO Mapping

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

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

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 & SEE
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)		

COMPUTER AIDED DRAFTING LAB			
Course Code	MVJ25CVL36	Scheme	2025
Type of Course	PCCL	Semester	III
Teaching Hours/Week (L:T:P)	0:2:0:0	CIE Marks	50
Total Hours of Pedagogy (L:T:P:SL&TW)	0:0:28:02	SEE Marks	50
Credits	1	Total Marks	100
Examination type (SEE)	Practical	Exam Hours	3

Course Objectives:

This course will give ability to:

- Introducing computer aided drafting techniques for civil engineering applications using AutoCAD.
- Develop skills in residential building planning as per building bye-laws and standards.
- Prepare working drawings, sanction drawings, schedules and area statements used in practice.
- Develop basic 3D visualization skills using SketchUp.
- Understand basic quantity estimation from building drawings.

Sl. No.	Experiment List
1	Introduction to CAD environment, drawing units, limits, coordinate systems, scales, line types and conventional symbols.
2	Practice of drawing and modify commands: Line, Circle, Arc, Rectangle, Polygon, Polyline, Ellipse, Spline. Erase, Copy, Move, Rotate, Mirror, Offset, Trim, Extend, Scale, Stretch, Fillet and Chamfer.
3	Annotation tools: Text, Multiline text, Leaders, Tables, Dimensions and Dimension styles.
4	Drawings of building components: Footing, masonry wall
5	Drawings of building components: lintel, Beam
6	Study of planning principles: Orientation, ventilation, lighting, circulation, room sizes, setbacks and plot coverage.
7	Preparation of plan for single bedroom residential building for given plot dimensions as per bye-laws.
8	Preparation of plan for double bedroom residential building for given plot dimensions as per bye-laws.
9	Preparation of elevation and sectional view for building prepared in previous experiments.
10	Preparation of door-window schedule, room area statement, plinth area and basic quantity details.
11	Introduction to SketchUp interface, tools, navigation, drawing and modification commands. Create basic 3D objects.
12	Development of 3D residential building model using SketchUp with walls, roof, openings, materials and perspective view.

Course Outcomes:

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

CO1: Apply computer aided drafting tools for preparation of engineering drawings.

CO2: Plan residential buildings as per standards and building bye-laws.
CO3: Prepare working drawings, elevations, sections and sanction plans.
CO4: Prepare schedules, area statements and basic quantity details from drawings.
CO5: Develop 3D building models for visualization and presentation.

CO-PO Mapping

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

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 of each evaluation includes 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

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

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	
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 Hrs
Module II	
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 Hrs
Module III	
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 Hrs
Module IV	
Resources and its utilisation: Basic concepts of Conventional and non-conventional energy, Environmental footprints, General idea about solar energy, Fuel cells, Wind	3 Hrs

energy, Small hydro plants, biofuels, Energy derived from oceans and Geothermal energy.	
Module V	
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 Hrs

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
CO1	1	-	-	-		2	3	-	-	-	-
CO2	1	-	-	-	1	2	3	-	-	-	-
CO3	-	-	-	-	1	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 Assignment 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 of multiple-choice questions (MCQ) type each of one mark.

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

B.E, Civil Engineering

MATLAB for Civil Engineering			
Course Code	MVJ25CV38SL	Scheme	2025
Type of Course	SDC	Semester	III
Teaching Hours/Week (L:T:P)	0:0:2	CIE Marks	50
Total Hours of Pedagogy (L:T:P:SL&TW)	0:0:28:02	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 MATLAB programming environment, syntax, basic mathematical operators, and vector plotting tools.
- Develop computational scripts using conditional and iterative logic to solve civil engineering problems.
- Apply numerical scripting to structural engineering problems, including beam deflection analysis, shear force and bending moment distributions, and torsional analysis of shafts.
- Automate surveying computations, including leveling field-book data reduction, local attraction adjustments, and irregular boundary area estimations.
- Execute statistical data processing for civil engineering materials, including concrete core compressive strength quality evaluations.

Syllabus

This course on MATLAB for Civil Engineering provides hands-on computational training to model, analyze, and solve core civil engineering problems through scientific programming. The laboratory syllabus encompasses fundamental array and matrix manipulation, conditional flow branching, and 2D function plotting. It progresses into applying numerical algorithms to structural mechanics problems (beam deflections under concentrated loads, SFD and BMD distributions for cantilevers under UDL, and shaft torsional safety parameters). Furthermore, it addresses data automation for plane surveying (Height of Instrument and Rise & Fall leveling reductions, traverse local attraction corrections, and Simpson's/Trapezoidal area mensuration) and statistical quality control evaluations of concrete compressive strength compliance.

Course Plan

Module I

Sr. No	Topics to be covered	Hours required
1	Program to Demonstrate basic algebraic operations and variable assignments.	2
2	Program that Uses standard conditional logic to check if a user-input number is odd or even.	2
3	Program to Generates vector data and plots a standard continuous sine function with titles and gridlines.	2
4	Program to calculate and plots the deflection curve of a simply supported beam subjected to a central point load using standard structural mechanics formulas.	3
5	Program to plot the exact distribution lines of Shear Force (V) and Bending Moment (M) for a cantilever beam subjected to Uniformly distributed load (UDL).	3
6	This program takes the applied torque, shaft length, and material properties, and then calculates the structural parameters for both solid and hollow configurations, evaluating them against safety limits.	3
7	Program to automate a standard leveling field book page. It processes Backsights (BS), Foresights (FS), and Intermediates (IS) to update Reduced Levels (RL) and runs arithmetic page checks.	3

8	This program takes raw field survey data, checks for local attraction by calculating the difference between Forward Bearings and Back Bearings (BB), and automatically applies corrections to output the true adjusted bearings.	3
9	Write a program that analyzes concrete core compression test data. In civil engineering quality control, structural engineers run statistical analyses on cylinder break tests to ensure concrete batches meet or exceed the specified characteristic compressive strength (f'c).	3
10	A chain line/baseline is run through the ground, and perpendicular offsets are taken at regular intervals to map an irregular or curved boundary (like a riverfront or hedge row). Write a program to determine the area using Trapezoidal & Simpson's Rule.	2

Textbooks:

1. Rudra Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Oxford University Press, 2010.
2. Stephen J. Chapman, MATLAB Programming for Engineers, 6th Edition, Cengage Learning, 2019.
3. B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Surveying (Vol. I & II), 17th Edition, Laxmi Publications, 2016.
4. S. Ramamrutham and R. Narayanan, Strength of Materials, 18th Edition, Dhanpat Rai Publishing Company, 2014.

Reference Books:

1. Holly Moore, MATLAB for Engineers, 5th Edition, Pearson, 2017.
2. M.S. Shetty and A.K. Jain, Concrete Technology: Theory and Practice, 8th Edition, S. Chand Publishing, 2019.
3. S.S. Bhavikatti, Structural Analysis - I, 4th Edition, Vikas Publishing House, 2014.

Other References: (NPTEL/SWAYAM, Any other)

1. **NPTEL Course**: MATLAB Programming for Numerical Computation, Prof. Niket Kaisare, IIT Madras
   https://nptel.ac.in/courses/103106118
2. **Virtual Lab**: Virtual Lab for Civil Engineering, IIT Bombay / IIT Kanpur
   https://www.vlab.co.in

Course Outcomes:

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

CO1: Formulate mathematical expressions, conditional operations, and 2D plots using the MATLAB scripting environment.

CO2: Develop numerical algorithms to analyze beam deflection, shear force, bending moment, and torsional behavior in structural members.

CO3: Automate plane surveying calculations, including differential leveling reductions and compass traverse local attraction adjustments.

CO4: Apply computational tools to evaluate concrete compressive test statistics and calculate irregular land areas using numerical integration rules.

CO-PO Mapping

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

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 of each evaluation includes 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

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

Yoga			
Course Code	MVJ25YO39	Scheme	2025
Type of Course	NCMC	Semester	III
Teaching Hours/Week (L:T:P)	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-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.
- Reduces 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: • 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, Ardhachakrasana, Prone line: -Advasana, Bhujangasana Supine line: -Shavasana, Supta baddhakonasana, Balancing posture: -Vrikshasana, Garudasana	7 Hrs
MODULE -II	
Building strength and focus Finding out the obstacle: • Kriya Yoga	7 Hrs

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, 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 Hrs
MODULE -IV	
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 Hrs

• Yogasanas: Standing: -PrasaritaPadottanasana, ParivrttaTrikonasana 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
CO 1		2						3	2	2	
CO 2	2						2	2			
CO 3	2					2	2	3			
CO 4					2		3	3			

Weekley 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 hand book published by SVYASA University, Bengaluru
3	Yamini Muthanna," Yoga for Children –step by step"

PHYSICAL EDUCATION (SPORTS & ATHLETICS)			
Course Code	MVJ25PE39	Scheme	2025
Type of Course	NCMC	Semester	III
Teaching Hours/Week (L:T:P)	0:0:0:1	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 5 Hours

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 6 Hours

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%	
Participation of student in all the modules	50 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.
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.

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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	2	-	-
CO 2	-	-	-	-	-	-	-	2	2	-	-
CO 3	-	-	-	-	-	-	-	2	2	-	-
CO 4	-	-	-	-	-	-	-	2	2	-	-
CO 5	-	-	-	-	-	-	-	3	3	-	-

B.E, (Common to all branches)

Additional Mathematics-I			
Course Code	MVJ25MATDIP310	Scheme	2025
Type of Course	2:0:0:0	Semester	III
Teaching Hours/Week (L:T:P)	0	CIE Marks	100
Total Hours of Pedagogy (L:T:P:SL&TW)	14:0:0:14	SEE Marks	0
Credits	0	Total Marks	100
Examination type (SEE)	------	Exam Hours	3

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 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 - $div(\emptyset \vec{A})$, $curl(\emptyset \vec{A})$, $curl(grad(\emptyset))$, $div(curl \vec{A})$, 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.	Topics to be covered	Hours

No		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 - $div(\emptyset\,\vec{A})$, $curl(\emptyset\,\vec{A})$, $curl(grad(\emptyset))$, $div(curl\,\vec{A})$.	

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:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley-India publishers, 10th edition,2014.
2. G. B. Gururajachar: Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19

Other References:(NPTEL/SWAYAM. Any Other)

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 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)