VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI



Scheme of Teaching and Examinations (2026)

M.Tech., in Civil Engineering

(Specialization in Environmental Engineering)

Choice-Based Credit System (CBCS) and Outcome-Based Education (OBE)

I SEMESTER (Common to all specialized programmes under one stream)

Sl. No	Course Type	Course Code	Course Title	Teaching & Learning Scheme					Examination				Credits
				CI		LI	TW & SL	Total Hours/Sem	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P							
1	MAT/PCC	1MCV101	Advanced Engineering Mathematics and Data Analytics	42	0	0	48	90	03	50	50	100	3
2	PCC	1MCV102	Sustainable and Climate-Resilient Planning and Design	42	0	0	48	90	03	50	50	100	3
3	PCC	1MCV103	AI, Machine Learning and Emerging Digital Tools	42	0	0	48	90	03	50	50	100	3
4	IPCC	1MCV104X	**Integrated Professional Core Courses (IPCC) -I**	42	0	28	50	120	03	50	50	100	4
5	PEC-I	1MCV105X	Professional Elective–I(Common Elective Basket)	42	0	0	48	90	03	50	50	100	3
6	PEC-II	1MCV106X	Professional Elective–II(Common Elective Basket)	42	0	0	48	90	03	50	50	100	3
7	PCCL	1MCVL107X	Professional Core Course Lab	0	0	28	02	30	03	50	50	100	1
8	NCMC	1MRMI108	Research Methodology and IPR (VTU Online Course)	Online courses (online.vtu.ac.in)									PP
								TOTAL		**350**	**350**	**700**	**20**

Professional Elective Courses (PECs):

Professional Elective Courses – PEC–I and PEC–II – are common to all branches of specialization within a particular Engineering stream. Students may choose the most appropriate elective based on their field of specialization and academic requirements. *Note: The number of courses listed under each PEC group may exceed four, depending on the specializations under one stream.*

Integrated Professional Core Courses (IPCC):

The 1Mxx104x Group comprises specialization-specific core courses that are integrated with a practical component, ensuring application-oriented learning aligned with industry and research needs. The number of courses in the group depends on the number of specializations offered under a particular engineering stream.

Integrated Professional Core Courses (IPCC): The 1Mxx104x Group comprises specialization-specific core courses that are integrated with a practical component, ensuring application-oriented learning aligned with industry and research needs. The number of courses in the group depends on the red under a particular engineering stream.

1MCV104X: Integrated Professional Core Course (IPCC)	
Code	**Title of the Course**
1MCV104A	Building Information Modeling for Structural Systems
1MCV104B	BIM for Construction Sequencing and Resource Modeling
1MCV104C	Remote Sensing and GIS for Transport Modeling
1MCv104D	Geo BIM for Geotechnical Modeling and Underground Infrastructure
1MCV104E	Geospatial Environmental Monitoring and Modeling
1MCV104F	BIM and Hydro-GIS Modeling for River Basin Systems
1MCV104G	BIM for Infrastructure Engineering and Management
1MCV104H	Integrated BIM & Computer Aided Design for Transportation Systems
1MCV104 I	Geospatial Database Management Systems and Programming Skills

1MCV105X: Professional Elective Courses-I	
Code	**Title of the Course**
1MCV105A	Advanced Remote Sensing and GIS
1MCV105B	Applied Statistics & Uncertainty Modelling
1MCV105 C	Climate Change Modelling & Disaster Risk Reduction
1MCV105 D	Sustainable Materials & Circular Economy
1MCV105 E	Project Feasibility and Report Writing
1MCV105 F	Sustainable Infrastructure Planning & Policy
1MCV105 G	Occupational Health and Safety Engineering
1MCV105 H	Sustainable Geo-mechanics and Engineering
1MCV105 I	Geospatial Data Standards and Policy

1MCV106X: Professional Elective Courses-II	
Code	**Title of the Course**
1MCV106A	Digital Twin Technologies
1MCV106B	Optimization Techniques for Civil Systems
1MCV106C	Smart Cities & Urban Analytics
1MCV106D	Robotics & Automation in Construction
1MCV106E	IoT and Smart Sensors for Civil Engineering
1MCV106F	Smart Solid Waste Management and Circular Economy Systems
1MCV106G	Cloud Platforms & Big Data for Geospatial Applications

1MCVL107X: Professional Core Course Lab (PCCL)	
1MCVL107A	Computational Structural Modeling and Analysis Laboratory
1MCVL107B	BIM-based Planning and Scheduling Laboratory
1MCVL107C	GIS-based Alignment and Traffic Analytics Laboratory
1MCVL107D	Geotechnical Engineering Studio
1MCVL107E	Hydraulic and Wastewater Network Modeling Laboratory
1MCVL107F	Watershed and Irrigation Network Modeling Laboratory
1MCVL107G	BIM for Buildings and Infrastructure Modeling
1MCVL107H	Digital Satellite Image Processing Lab

Specialization in –(Environmental Engineering)

II SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching & Learning Scheme					Examination				Credits
				CI		LI	TW & SL	Total Hours /Semester	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P							
1	PCC/ IPCC	1MCEE201	Water Supply, Treatment &Distribution	42	0	28	50	120	03	50	50	100	4
2	PCC	1MCEE202	Wastewater Engineering & Resource, Recovery	42	0	0	48	90	03	50	50	100	3
3	PCC	1MCEE203	Environmental Systems Modelling and Management	42	0	0	48	90	03	50	50	100	3
4	PCC	1MCEE204	Industrial Wastewater Treatment, Prevention and Reuse.	42	0	0	48	90	03	50	50	100	3
5	PEC	1MCEE205X	PEC–III	42	0	0	48	90	03	50	50	100	3
6	PEC	1MCEE206X	PEC–IV	42	0	0	48	90	03	50	50	100	3
7	PCC L	1MCEEL207	Air Quality and Solid Waste Management Laboratory	0	0	28	02	30	03	50	50	100	1
8	PCC	1MCEES208	Minor Project/Skill Development Project	0	0	0	60	60	03	50	50	100	2
									Total	**400**	**400**	**800**	**22**

Professional Elective Courses (PECs)			
PEC-III		**PEC-IV**	
Code	**Title of the Course**	**Code**	**Title of the Course**
1MCEE205A	Environmental Modelling & informatics	1MCEE206A	Air Quality Modelling, Management and Noise Pollution Control
1MCEE205B	Membrane Technologies in Water and wastewater Treatment	1MCEE206B	Geospatial Techniques for Environmental Systems
1MCEE205C	Hydraulics of Environmental Systems	1MCEE206C	AI & ML in Hydrology and Environmental Modelling
1MCEE205D	Environmental Pollution Monitoring & Sensors	1MCEE206D	Urban Green Infrastructure & Nature-Based Solutions

Overview of Courses, Credits, Projects, and Internships under VTU Curriculum

I. Abbreviations used in the Scheme of Teaching and Examinations

Abbreviations	Expanded Form of the Abbreviations
AICTE	**All India Council of Technical Education**
NCrF	**National Credit Framework**
VTU	**Visvesvaraya Technological University**
AEC	Ability Enhancement Course
ASC	Applied Science Course
BSC	Basic Science Course
CIE	Continuous Internal Evaluation
CI	Classroom Instruction
CCA	Continuous Comprehensive Assessment
CGPA	Cumulative Grade Point Average
CUL	Cultural
COE	Centre for Online Education
HSMC	Humanities Studies and Management Course
IPCC	Integrated Professional Core Course
LI	Laboratory Instruction
L	Lecture
NCMC	Non-Credit Mandatory Course

NSS	National Service Scheme
NPTEL	National Programme for Technical Enhanced Learning
OEC	Open Elective (Interdepartmental or interdisciplinary) Course
PCC	Professional Core Course
PCCL	Professional Core Course Laboratory
PEC	Professional Elective Courses
PE	Physical Education
P	Practical
SEC	Skill Enhancement Courses
SEE	Semester End Evaluation
SL	Self-Learning
SGPA	Semester Grade Point Average
SWAYAM	Study Webs of Active-Learning for Young Aspiring Minds
TW	Term Work
T	Tutorial
VTU online Course	VTU online courses offered by Centre for Online Education, Mysuru
YOG	Yoga

II. Credit Representation

1-hour Lecture (L) per week=1Credit

2-hoursTutorial(T) per week=1Credit

2-hours Practical / Drawing (P) per week=1Credit

Teaching & Learning Scheme
As per the new National Credit Framework (NCrF), 30 hours of learning of a student is considered equivalent to 1 credit. A semester is considered as a 14-week period of academic interaction with students. The learning components are categorized as follows: 1. **Classroom Instruction (CI):** Includes different instructional / implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts within the classroom measured in Number of hours per semester. 2. **Laboratory Instruction (LI):** Expressed as number of hours per semester which Includes experiments / practical performances / problem-based experiences in laboratory, workshop, field or other locations using different instructional / Implementation strategies. 3. **Term work (TW):** Includes assignments, seminars, presentations, case studies, micro projects, field activities, industrial visits, academic preparation duration and any other student activities in Number of hours per semester. 4. **Self-Learning (SL):** MOOCs (SWAYAM/NPTEL/Industry certified courses), spoken tutorials, online educational resources, self-initiated projects, Learning through digital resources etc in Number of hours per semester. (If provided in curriculum structure).

	Course Details	
1.	**One Credit Theory Courses:**	
	Teaching-Learning sessions in a semester	14 hours
	Examination pattern for CIE and SEE	Multiple Choice Question (MCQ)
	Teaching hours per week - L:T:P	1:0:0
2.	**One Credit Laboratory Courses:**	
	Teaching-Learning sessions in a semester	28 hours (2 hours session /week)
	Examination pattern for CIE and SEE	Continuous assessments, lab Internal test and SEE
	Teaching hours per week - L:T:P	0:0:2

3.	**Two Credit Theory Courses:**	
	Teaching-Learning Sessions in a semester	28 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week - L:T:P	2:0:0
4.	**Three Credit ESC/ETC/PCC/PEC/OEC Courses:**	
	Teaching-Learning Sessions in a semester	42 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week for theory courses - L:T:P	3:0:0
5.	**Four Credit Program Core Courses (PCC):**	
	Teaching-Learning Sessions in a semester	56 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week for theory courses - L:T:P	4:0:0
6.	**Four Credit Integrated Professional Core Courses (IPCC):**	
	Teaching-Learning Sessions in a semester (Teaching sessions: 42 hours + Practical sessions: 28 hours)	70 hours
	Examination pattern for CIE and SEE	Descriptive
	Practical part of examination	CIE (No SEE).
	Teaching hours per week - L: T: P	3: 0: 2

III. Details of Courses

(1) Integrated Professional Core Course (IPCC): The Integrated Professional Core Course (IPCC) refers to a core theory course that is integrated with a laboratory of the same subject. Each IPCC carries 4 credits, with Teaching–Learning hours structured (L : T : P) as either (3:0:2). The theory component of the IPCC shall be evaluated through both Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). The laboratory part shall be assessed exclusively through CIE, with no SEE. However, questions derived from the laboratory part may be included in the SEE question paper to ensure comprehensive evaluation

(2) Non-Credit Mandatory Courses (NCMC): are aimed at enhancing students' knowledge, skills, and awareness beyond the core curriculum. Successful completion of the NCMC is compulsory for fulfilling the requirements of the academic program. It shall not be considered for the computation of SGPA, CGPA and vertical progression. Each student shall register for the prescribed NCMC(s) in the prescribed semester. A student who fails to qualify in the prescribed NCMC shall not be eligible for the conferment of the degree.

(3) Professional Elective Courses (PEC): A professional elective course (PEC) is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum of the same discipline.

(4) Open Elective Courses (OEC): A open elective course (OEC) is a course offered by departments other than a student's parent department. These interdepartmental /interdisciplinary courses allow students to explore disciplines beyond their core area of study. These courses are intended to promote interdisciplinary learning, broad-based education, thereby enhancing a student's overall knowledge, creativity, and employability. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor/Proctor.

(5) Ability Enhancement Course Laboratory (AEC): An Ability Enhancement Course Laboratory is a practical, skill-oriented lab course designed to strengthen students' practical abilities, professional competencies that support communication, environmental awareness, computational thinking, interdisciplinary learning, and application skills through hands-on learning experiences.

The laboratory may pertain to disciplinary or interdisciplinary involving experiments, design tasks, and mini-projects aligned with current industry practices.

(6) Skill Enhancement Courses (SEC): These courses are intended to develop specific practical skills and competencies that improve students' employability, technical proficiency, and professional readiness to bridge the gap between academic and industry requirements. These courses emphasize hands-on training, application of theoretical knowledge, and development of discipline-relevant and transferable skills required in industry and society, and develop entrepreneurship and start-up skills.

(7) Online Courses: Online courses are educational programs delivered over the Internet through a digital platform, allowing students to access lessons, assignments, and discussions from anywhere at any time. Most online courses offer flexibility, allowing students to access materials and complete assignments on their own schedule. However, students have to pass the course within a stipulated period as per the norms of the university.

(8) VTU Online Courses: VTU Online courses are online courses offered by Centre of Online Education (COE) Mysuru. A wide range of multidisciplinary courses are available to learners anywhere, anytime to earn university-prescribed credits through proctored examination for the award of a degree.

(9) NPTEL/SWAYAM Online Courses: The National Programme on Technology Enhanced Learning (NPTEL)/SWAYAM (Study Webs of Active Learning for Young Aspiring Minds) are the specific Indian platforms to host national Massive Open Online Courses (MOOCs). It offers online courses on a wide range of disciplines to learners anywhere, anytime, to earn university-prescribed credits through proctored examination for the award of a degree. All NPTEL/SWAYAM courses are MOOCs, but not all MOOCs are offered on these specific Indian platforms.

IV. Ability Enhancement Project (AEP) / Skill Development Project (SDP)

An Ability Enhancement Project (AEP) or Skill Development Project (SDP) is a focused project aimed at enhancing specific skills or abilities in a particular domain. It's designed to bridge the gap between theoretical knowledge and practical application.

Key Objectives:

1. Develop practical skills relevant to the industry or field.
2. Enhance problem-solving, critical thinking, and analytical abilities.
3. Improve communication, teamwork, and collaboration skills.
4. Apply theoretical concepts to real-world problems or scenarios.
5. Foster creativity, innovation, and entrepreneurship.

Characteristics:

1. Practical and hands-on approach.
2. Industry-relevant skills and tools.
3. Mentorship and guidance.
4. Opportunity to work on real-world projects or case studies.
5. Emphasis on skill development and enhancement.