Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC A+ Accredited
Approved by AICTE, New Delhi, Govt. of Maharashtra
(An Autonomous Institute Affiliated to RTM Nagpur University,

Department of Civil Engineering

DEPARTMENT OF CIVIL ENGINEERING

M.Tech (Structural Engineering)

Structure & Curriculum

From

Academic Year 2024-25

As per NEP

Vision of Institute

"To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management"

Mission of Institute

[M1] To strive for rearing standard and stature of the students by practicing high standards of Professional ethics, transparency and accountability.

[M2] To provide facilities and services to meet the challenges of Industry and Society.

[M3] To facilitate socially responsive research, innovation and entrepreneurship.

[M4] To ascertain holistic development of student and staff members by inculcating knowledge and profession as work practices.

Vision of the Department

To forge learning Center of Excellence in the field of Civil Engineering

Mission of the Department

[MD1] To promote academic and ethical development while upholding high standards.

[MD2] To provide advance facilities with the skills needed to face Industry and societal challenges.

[MD3] To promote socially responsible research, innovation, and entrepreneurship in the field of Civil Engineering.

[MD4] To foster the holistic development of both students and faculty members by inculcating a blend of knowledge and professional work methods for overall progress.

Program Education Objectives (PEO)

PEO No	Program Educational Objectives Statements
	The graduates will be able to
PEO 1	Analyze and design civil engineering structures while keeping social awareness and ethical responsibilities in mind.
PEO 2	Demonstrate leadership abilities in supporting sustainable practices in Civil Engineering
PEO 3	Exhibit a commitment to lifelong learning, staying updated on developing technologies and industry trends, and adjusting to the evolving world of Civil Engineering.
PEO 4	Execute proficiency in creative problem-solving and innovation, demonstrating an entrepreneurial attitude within the context of Civil Engineering.

Program Outcomes (PO)

PO1: An ability to independently carry out research /investigation and development work to solve practical problems.

PO2: An ability to write and present a substantial technical report/document.

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

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Scheme of Instructions

Scheme of Instructions for First Year M. Tech. Programme in Structural Engineering

Semester – I (w.e.f.: AY 2024-25)

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs / week	Credits	Exam Scheme				
									CT - 1	CT - 2	TA / CA	ESE	TOTAL
1.	PCC	MSE21101	Theory of Elasticity and Plasticity	4	-	-	4	4	20	20	-	60	100
2.	PCC	MSE21102	Structural Dynamics	4	-	-	4	4	20	20	-	60	100
3.	PEC	MSE21103-06	Professional Elective - I	4	-	-	4	4	20	20	-	60	100
4.	PEC	MSE21107-10	Professional Elective - II	4	-	-	4	4	20	20	-	60	100
5.	PCC	MSE21111	Advanced Matrix Analysis	4	-	-	4	4	20	20	-	60	100
6.	PCC	MSE21112	Structural Dynamics Laboratory	-	-	2	2	1	-	-	25	25	50
			Total	**20**	**-**	**2**	**22**	**21**	**100**	**100**	**25**	**325**	**550**

L- Lecture T-Tutorial P-Practical CT1- Class Test 1 CT2- Class Test 2 TA/CA- Teacher Assessment / Continuous Assessment

ESE- End **Semester** Examination (For Laboratory: End Semester Performance)

*- Professional Elective.

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Scheme of Instructions

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Semester – II (w.e.f.: AY 2024-25)

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs / week	Credits	Exam Scheme				
									CT - 1	CT - 2	TA / CA	ESE	TOTAL
1.	PCC	MSE21201	Finite Element Analysis	4	-	-	4	4	20	20	-	60	100
2.	PCC	MSE21202	Theory of Plates & Shell	4	-	-	4	4	20	20	-	60	100
3.	PEC	MSE21203-06	Professional Elective - III	4	-	-	4	4	20	20	-	60	100
4.	PEC	MSE21207-10	Professional Elective – IV	4	-	-	4	4	20	20	-	60	100
5.	PCC	MSE21211	Advanced R.C.C. Laboratory	-	-	2	2	1	-	-	25	25	50
6.	FC	MSE21212	Research Methodology#	3	-	-	3	3	-	-	25	25	50
			Total	**19**	**-**	**2**	**21**	**20**	**80**	**80**	**50**	**290**	**500**

L- Lecture T-Tutorial P-Practical CT1- Class Test 1 CT2- Class Test 2 TA/CA- Teacher Assessment / Continuous Assessment

ESE- End Semester Examination (For Laboratory: End Semester Performance)

*- Professional Elective.

Students are expected to complete it online by appearing NPTEL/Swayam Certification for 03 credits. Weekly 02 Hrs Theory in which students are expected to work on mathematical modeling, Seminar on IPR, Patent filing, Removing Plagiarisms, etc. will be done.

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Scheme of Instructions

Scheme of Instructions for Second Year M. Tech. Programme in Structural Engineering

Semester – III (w.e.f.: AY 2024-25)

Sr. No.	Course Category	CourseCode	Course Title	L	T	P	Contact Hrs / week	Credits	Exam Scheme				
									CT - 1	CT - 2	TA / CA	ESE	TOTAL
1	PROJ	MSE22301	Dissertation Phase-I	-	-	20	20	10	-	-	100	100	200
2	PEC	MSE22302	MOOC course (8-12)$	-	-	-	-	3	-	-	-	-	-
3	PEC	MSE22303	Structural Health Monitoring and Rehabilitations of Structures	3	-	-	3	3	20	20	-	60	100
			Total	**3**	**-**	**20**	**23**	**16**	**20**	**20**	**100**	**160**	**300**

Note:

1. MSE2302 will be decided by respective Guide in Consultation with Program Coordinator. Course is mandatory for student and his dissertation phase I will be considered incomplete without this Mandatory MOOC Course.

2. In Case, the course offered online are not completely relevant with the topic of dissertation then any course suggested by NASSCOM on recent technologies can be opted by candidate.

3. $ Programme coordinator will provide list of 03 MOOC courses of minimum 08 weeks duration (as per availability). Students are expected to complete any one out of three courses in order to get the required credits.

L- Lecture T-Tutorial P-Practical
CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment
CT2- Class Test 2 ESE- End Semester Examination (For Laboratory End Semester performance)

PROGRESSIVE TOTAL CREDITS= 41+16 = 57

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Scheme of Instructions

Scheme of Instructions for Second Year M. Tech. Programme in Structural Engineering

Semester – IV (w.e.f.: AY 2024-25)

Sr. No.	Course Category	CourseCode	Course Title	L	T	P	Contact Hrs / week	Credits	Exam Scheme				
									CT - 1	CT - 2	TA / CA	ESE	TOTAL
1.	PROJ	MSE22401	Dissertation Phase- II	-	-	32	32	16	-	-	100	200	300
			Total	-	-	**32**	**32**	**16**	**-**	**-**	**100**	**200**	**300**

TA/CA- Teacher Assessment / Continuous Assessment

ESE- End Semester Examination (For Laboratory: End Semester Performance)

PROGRESSIVE TOTAL CREDITS= 57+16 = 73

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Scheme of Instructions

Scheme of Instructions for First Year/Second Year M. Tech. Programme in Structural Engineering

List of Professional Elective Courses

Semester - I		Semester-II	
Professional Elective - I	**Professional Elective - II**	**Professional Elective- III**	**Professional Elective - IV**
Theory of Structural Stability	Advanced Design of Steel Structures	Advances in Concrete Technology	Design of Advanced Concrete Structures
Theory of Thin Plates and Shells	Design of Composite Construction	Design of Formwork	Advanced Design of Foundations
Structural Optimization	Disaster Management and Mitigation	Design of High-Rise Structures	Soil Structure Interaction
Structural Design of Environmental and Hydraulic Structures	Design of Earthquake Resistant Structures	Earth Retaining Structures	Design of Industrial Structure

BoS Chairman
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Dean Academics (PG)
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Tulsiramji Gaikwad-Patil College
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Program: M. Tech. Structural Engineering

Semester-I | MSE22303: Structural Health Monitoring and Rehabilitations of Structures

Teaching Scheme		Examination Scheme	
Theory	3 Hrs/week	**CT-I**	15 Marks
Tutorial	-	**CT-II**	15 Marks
Total Credits	**3**	**CA**	-----
Duration of ESE: 3Hrs		**ESE**	60 Marks
		Total Marks	**100 Marks**

Pre-Requisites: Concrete Technology, RCC Structures, Advanced steel design

Course Contents

Unit I	Structural Health: Factors affecting Health of Structures, Causes of Distress, Regular Maintenance.
Unit II	Structural Health Monitoring: Concepts, Various Measures, Structural Safety in Alteration. Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.
Unit III	Static Field Testing: Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement.
Unit IV	Dynamic Field Testing: Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.
Unit V	Introduction to Repairs and Rehabilitations of Structures: Case Studies (Site Visits), piezo–electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique.

Text Books

T.1	Structural Health Monitoring: A Machine Learning Perspective Authored by Charles R. Farrar and Keith Worden Wiley Publication 2012
T.2	Structural Health Monitoring: A Non-Deterministic Framework Authored by Ranjan Ganguli Springer-2020
T.3	New Trends in Structural Health Monitoring Authored by K. Alfredo Wiley publication 2012

Reference Books

R.1	Structural Health Monitoring of Aerospace CompositesAuthored by Victor Giurgiutiu AP Publication -2015
R.2	Structural Health Monitoring authored by Daniel Balagieswiley publication - 2006

R.3	Structural Health Monitoring of Large Civil Engineering Structures Authored by Hua-Peng Chen Wiley Blackwell publication -2018
Useful Links	
1	https://nptel.ac.in/courses/105/105/105105162/
2	https://nptel.ac.in/courses/105/105/105105173/
3	https://nptel.ac.in/courses/105/105/105105177/

	Course Outcomes	PO/PSO	CL	Class Sessions
MSE21109.1	Evaluate the factor affecting the Health of Structures.	PO1, PO2	5	9
MSE21109.2	Compare the structural audit for existing building.	PO1, PO2, PO3	4	9
MSE21109.3	Analyze the simulations and loading method.	PO1, PO2, PO3	4	9
MSE21109.4	Demonstrate the stress history data.	PO1, PO2, PO3	3	9
MSE21109.5	Modify on the repair and rehabilitation of structures.	PO1, PO2, PO3,	6	9

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