GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme & Syllabus For

Master of Technology (Structural Design)-2nd year

(Effective from the Session: 2025-26)

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

M.Tech (Structural Design) –3rd Semester

***w.e.f.* 2025-26**

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTSD-201A	Structural Dynamics and Earthquake Engineering	4	0	0	4	4	40	60		100	3
2	Mandatory Learning course	MLC-01	Research Methodology and IPR	3	0	0	3	3	40	60		100	3
3	Professional Elective Courses	Refer Table -II	----------	4	0	0	4	4	40	60		100	3
4	Multidisciplinary Open Elective Courses	Refer Table	----------	3	0	0	3	3	40	60		100	3
5	Lab Courses	LC-MTSD-203A	Computational Laboratory-III	0	0	2	2	1	25		25	50	3
6	Project Courses	PROJ-MTSD-205A	Project Lab	0	0	4	4	2	50		50	100	3
7	Seminar	SM-MTSD-207A	Seminar -III	0	0	2	2	2	50			50	
8	Dissertation (Literature Survey)	DISS-MTSD-209A	Dissertation Phase-I	0	0	4	4	2	100			100	
Total Credits								**21**				**650**	

Note: Each student will undertake their dissertation under the supervision of one or more supervisors. The dissertation topic must be approved by a committee constituted by the Head of the concerned Department.

Students are required to deliver two seminar presentations: the first, at the beginning of Dissertation Phase-I, to outline the scope of the work and finalize the topic; the second, towards the end of the semester, to present the progress and work completed during the semester.

The committee will evaluate both presentations and award Sessional marks out of 100. Students who fail to secure the minimum passing marks must improve their grade before proceeding to the 4th semester. Failure to do so will require the student to repeat Dissertation Phase-I in the next regular 3rd semester.

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.), DELHI-NCR
Scheme of Studies and Examination
M.Tech (Structural Design) –4th Semester
***w.e.f.* 2025-26**

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Dissertation	DISS-MTSD-202A	Dissertation and viva (Dissertation Stage 2)	-	-	-	-	20	250		500	750	
Total Credits								**20**				**750**	

Dissertation Stage-1 will continue as the final dissertation in the 4th semester. Sessional marks, out of 250, will be awarded by an internal committee constituted by the Head of the Department. The assessment will be based on presentations, reports, and related materials submitted to the committee. Failure to appear before the committee will result in disqualification from submitting the dissertation.

If a student scores less than 40% in the sessional assessment, they must revise and resubmit the dissertation after incorporating all required corrections and improvements. The revised dissertation will be evaluated in the next academic session.

At the end of the semester, each student is required to submit three soft-bound copies of their Master's dissertation to the office of the Head of the Department. One copy will be retained for departmental records, one will be provided to the supervisor, and one will be sent by mail to the external examiner, following their appointment and notification from the university.

The dissertation will be evaluated by a committee consisting of the Head of the Department, the dissertation supervisor(s), and one external examiner. The external examiner will be appointed by the Chairman of the Board of Studies. If the appointed examiner is unable to attend, the Director of the Institute, upon the recommendation of the Head of the Department, is authorized to appoint a substitute examiner from another institution or the parent institute.

Students must defend their dissertation through a presentation before the evaluation committee, which will assign marks accordingly.

Note:

- The scheme for awarding grades will be provided by the department to the examiner(s).
- The plagiarism of the dissertation report must be below 10%; otherwise, the report will not be accepted.
- Each student must publish at least one research paper related to their dissertation work in a peer-reviewed journal, IEEE conference, or SCOPUS/SCI-indexed journal before the final submission of Dissertation Stage-2.
- The student must follow the guidelines for the Dissertation report format as per Annexure-I.

(Professional Elective Courses): Table I

S. No	Course Code	Course Name
1	PEC-MTSD 112A	Repairs and Rehabilitation of Structures
2	PEC-MTSD 114A	Advance Steel Design
3	PEC-MTSD 116A	Construction Failure
4	PEC-MTSD 118A	Finite Element Method

Table-II

Multidisciplinary open elective-I courses

Students of all M.Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

S.N.	Course Code	Course Name	Offered by Department
1	OEC-130A	Basic of Economics	Management Department
2	OEC-132A	Fundamental of Management	Management Department
3	OEC-134A	Disaster Management	Civil Engineering
4	OEC-136A	Industrial Safety	Fire Technology and Safety
5	OEC-138A	Indian Literature in Translation-I	Applied Sc. & Humanities (English)
6	OEC-140A	Environmental Issues	Applied Sc. & Humanities (Chemistry)
7	OEC-142A	Quantitative Techniques	Applied Sc. & Humanities (Mathematics)
8	OEC-144A	Sources of Energy-I	Electrical Engineering
9	OEC-146A	Operation Research	Mechanical Engineering
10	OEC-148A	Multimedia Communication	Electronics and Communication Engineering
11	OEC-150A	Introduction to Information Technology	Computer Sc. & Applications
12	OEC-152A	Cyber Forensics and Security	Computer Sc. & Engineering
13	OEC-154A	Computer Science and Principles	Computer Sc. & Engineering
14	OEC-156A	Software Engineering Practice	Computer Sc. & Engineering

Table-III Foundation Elective

S.N.	Course Code	Course Name	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-commerce	Management Department
3	FEC-162A	Elements of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Science and Engineering
5	FEC-168A	Communication and Soft Skills	Applied Science and Humanities (English)
6	FEC-170A	Entrepreneurship Development	Management Department
7	FEC-172A	Electronics Engineering	Electronics and Communication Engineering

(Professional Elective Courses): Table II

S. N.	Course Code	Course Name
1	PEC-MTSD 211A	Design of Bridges
2	PEC-MTSD 213A	Design of Hydraulic Systems
3	PEC-MTSD 215A	High Rise Structures

Table

Multidisciplinary open elective- II

courses

S.N.	Course Code	Course Name	Offered by Department
1	OEC-147A	Natural and Manmade Disaster	Civil Engineering

M.Tech (Structural Design) –3rd Semester
***w.e.f.* 2025-26**

Course code	**PCC-MTSD-201A**				
Category	Professional Core Courses				
Course title	Structural Dynamics and Earthquake Engineering				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • To introduce the fundamental principles of structural dynamics and the behavior of structures under dynamic loads. • To develop analytical and computational skills to analyze single and multi-degree of freedom systems. • To impart knowledge about response spectrum and time-history methods of earthquake analysis. • To familiarize students with nonlinear structural behavior, ductility, and software tools for dynamic analysis				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Apply the principles of dynamics to compute the response of single and multi-degree of freedom systems subjected to various types of loads, including base excitation.	Level 3: Applying
CO2	Analyze the dynamic behavior of structures using response spectrum and time history methods under seismic loading conditions.	Level 4: Analyzing
CO3	Evaluate the influence of modal and mass participation factors, modal combination rules, and missing mass correction in the seismic analysis of structures.	Level 5: Evaluating
CO4	Create computational models of structures using software tools to simulate elasto-plastic behavior and predict the response of multi-storey buildings under earthquake loads.	Level 6: Creating

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Equation of Motion for SDOF system subjected to base excitation, Equation of Motion for MDOF system subjected to base excitation, Response spectrum analysis, Time history analysis

Unit-II

Modal superposition for MDOF system, Step-by-step integration for MDOF system, Numerical evaluation of dynamic response, Computer implementation

Unit-III

Modal participation factor, Mass participation factor, Modal combination rules, Missing mass correction, Response spectrum analysis (detailed)

Unit-IV

Analysis of secondary systems, Evaluation of floor response spectra, Response of elasto-plastic system, Effect of yield force, Ductility, Use of NONLIN software, Earthquake response of multistory buildings, Torsional response of building

Suggested Readings:

- Chopra, A. K, "Dynamics of Structures", Prentice Hall, 1995.
- Clough, R.W.; Penzin, J.,"Dynamics of Structures", McGraw Hill, 1993.
- Humar, J. L., "Dynamics of Structures", Prentice Hall, 1990.
- Timoshenko, S., "Advanced Dynamics", McGraw Hill Book Co; NY, 1948.
- Paz M, "Structural Dynamics", CBS Publishers; N-Delhi, 1995.

Useful Video links:

Unit No.	Topics	Links
1	Equation of Motion for SDOF system subjected to base excitation,	https://www.youtube.com/watch?v=NrgzRbZMjuA
2	Modal superposition for MDOF system, Step-by-step integration for MDOF system	https://www.youtube.com/watch?v=ositbkD5J2M
3	Mode Participation Factor and Effective Mass	https://www.youtube.com/watch?v=TO0gD-GpTfU
4	Inelastic Seismic Response of Structures	https://www.youtube.com/watch?v=UHV77TS9X1A

Course code	**MLC-01A**				
Category	Mandatory Learning Course				
Course title	**Research Methodology and IPR**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • To enable students to identify and define research problems, formulate objectives and apply appropriate investigative approaches in research methodology. • To impart knowledge of data sources, data collection methods, data processing and the application of statistical tools for research analysis. • To develop awareness of research ethics, plagiarism issues and effective practices in technical writing, report preparation, and research documentation. • To provide a comprehensive understanding of intellectual property rights, patent procedures, technology transfer and international frameworks for innovation protection.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Identify** research problems, objectives, and data sources based on fundamental research methodology principles.	Level 1: Remember
CO2	**Explain** intellectual property rights, patent procedures, and international frameworks for technology transfer and innovation protection.	Level 2: Understand
CO3	**Apply** research ethics to prepare plagiarism-free technical reports, research papers, and proposals using effective writing and presentation techniques.	Level 3: Apply
CO4	**Analyze** research data through classification and tabulation to extract meaningful patterns and conclusions using statistical tools and methods.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit-II

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write the report, Paper, Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit-III

Sampling Methods, Need, Meaning & Type of Sample, Sources of Data, Primary and Secondary, Classification and Tabulation of Data Processing, Analysis and Interpretation of Data, Chi Square Test, significance of statistics in Socio-legal Research, Use of Computer in the Research field work and report writing.

Unit-IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, and development. International Scenario: International cooperation on Intellectual Property, Procedure for grants of patents, Patenting under PCT.Patent Rights: Scope of Patent Rights, Licensing and transfer of technology.

Suggested Readings:

- Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students
- Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
- Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners",Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd., 2007. Mayall, "Industrial Design", McGraw Hill, 1992.
- Niebel, "Product Design", McGraw-Hill, 1974.
- Asimov, "Introduction to Design", Prentice Hall, 1962.
- Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
- T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2000.Communications and Space Technology by Shukla, Preeti, MahaveerPublication 2016.

Useful Video links:

Unit No.	Topics	Links
1	Defining/formulating research problem	https://www.youtube.com/watch?v=oTc4_zjmev0
	Research types, descriptive, analytical, action, empirical, research methodology	https://www.youtube.com/watch?v=tjDBPRoyDJA
2	What is plagiarism	https://www.youtube.com/watch?v=5--ssYqyWoE
	Research Ethics	https://www.youtube.com/watch?v=4tRCov8pVgQ
3	Primary data and Secondary Data,	https://www.youtube.com/watch?v=caUiRsg5M6k
	Sampling techniques	https://www.youtube.com/watch?v=sKtoW5cXt14
4	Patent Trademarks and Copyrights,	https://www.youtube.com/watch?v=XQ8tRdcr0xQ
	What Is Patent | Patent Filing Procedure In India	https://www.youtube.com/watch?v=azMNhrkRzww

Course code	**PEC-MTSD-209A**				
Category	**Professional Elective courses**				
Course title	Design of Bridges				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Apply IRC specifications and general design considerations in the planning and selection of road bridge types. • Analyze load distribution and structural behavior in short-span and long-span bridges including slab, tee-beam, and box girder bridges. • Evaluate design parameters such as prestressing forces, eccentricity, and cable profiles in prestressed concrete bridge girders. • Design prestressed bridge components using Courbon's theory and exact methods, including checks for stress, shear, and deflection.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Apply IRC specifications and standard load considerations to design different types of road bridges.	Level 3: Applying
CO2	Analyze load distribution in short-span and long-span bridges including slab culverts, T-beam, and box girder bridges.	Level 4: Analyzing
CO3	Evaluate the effects of flexural and torsional forces in prestressed bridge girders using Courbon's theory and other methods.	Level 5: Evaluating
CO4	Design prestressed concrete bridge components including girder sections, end blocks, and cable zones with stress and deflection checks.	Level 6: Creating

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Classification, investigations and planning, choice of type, I.R.C. specifications for road bridges, standard live loads, other forces acting on bridges, general design considerations.

Unit-II

Short Span Bridges: Load distribution theories, analysis and design of slab culverts, tee beam and slab bridges. Long Span Girder Bridges: Design principles of continuous bridges, box girder bridges, balanced cantilever bridges.

Unit-III

Design Of Prestressed Bridges: Flexural and torsional parameters–Courbon's theory– Distribution co-efficient by exact analysis – Design of girder section – maximum and minimum prestressing forces – Eccentricity – Live load and dead load shear forces–Cable Zone in girder – check for stresses at various sections – check for diagonal tension– Diaphragms – End block –short term and long term deflections.

Unit-IV

Design Of Plate Girder Bridges, Bearings And Substructures: Design of riveted and welded plate girder bridges for highway and railway loading – wind effects – main section, splicing, curtailment, stiffeners – Different types of bearings –Design of earings – Design of masonry and concrete piers and abutments – Types of bridge foundations – Design of foundations.

Suggested Readings:

- Ponnuswamy, S., "Bridge Engineering", Tata McGraw Hill, 2008.
- Johnson Victor, D. "Essentials of Bridge Engineering", Oxford and IBH Publishing Co. New Delhi, 1990
- Jagadeesh.T.R. and Jayaram.M.A., "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd. 2004.
- Raina V.K." Concrete Bridge Practice" Tata McGraw Hill Publishing Company, New Delhi, 1991.
- Bakht, B. and Jaegar, L.G., "Bridge Analysis Simplified", McGraw Hill, 1985.

Useful Video links:

Unit No.	Topics	Links
1	Introduction: Classification, investigations and planning, choice of type, I.R.C. specifications for road bridges	https://www.youtube.com/watch?v=RB2k5hSYO3U&list=PLXKZsEFKU _ HHtsCMaAIPB3tr5Ht2Bdge&index=1
2	Load distribution theories, analysis and design of slab culverts	https://www.youtube.com/watch?v=RX-WImcb73Y
3	Design Of Prestressed Bridges	https://www.youtube.com/watch?v=QCothhObKxM
4	Design Of Plate Girder Bridges	https://www.youtube.com/watch?v=Ch2vAzvXbKI&t=2681s

Course code	**PEC-MTSD-211A**				
Category	**Professional Elective courses**				
Course title	High Rise Structures				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • To explain the behavior of tall building frames under lateral and gravity loads, including the effects of foundation settlement. • To apply structural analysis techniques to shear walls, infilled frames, and coupled frame systems for lateral load resistance. • To analyze structural components such as perforated cores, thin-walled tubes under torsion, and floor systems like Vierendel girders and diagrid floors. • To evaluate the stability of frames and shear walls under elastic and inelastic conditions, including the assessment of thermal stress effects in tall buildings.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Recall fundamental concepts related to tall building frames, lateral load analysis, and foundation settlement effects.	Level 1: Remember
CO2	Describe the behavior and function of various shear wall systems, including infilled frames, coupled frames, and three-dimensional analysis principles.	Level 2: Understand
CO3	Apply appropriate methods to analyze perforated cores, torsional effects in thin tubes, and advanced floor systems such as diagrid and Vierendel girders.	Level 3: Apply
CO4	Analyze the elastic and inelastic stability of structural systems and assess thermal stresses in tall buildings.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Analysis of tall building frames, Lateral load analysis, multi bay frames, gravity loads, settlement of foundation.

Unit-II

Analysis of shear walls - plane shear walls, infilled frames, coupled frames, frames with shear walls. Principle of three dimensional analysis of tall buildings;

Unit-III

Perforated cores, Pure torsion in thin tubes, bending and warping of perforated cores. Analysis of floor system in tall buildings, Vierendal girders, diagrid floors.

Unit-IV

Elastic and inelastic stability of frames and shear walls. Analysis of thermal stresses.

Suggested Readings:

- B S Smith & A Coull, *Tall Building Structures:* - John Wiley & Sons.
- W. Schueller, *High Rise Building Structures*: John Wiley & Sons.

Useful Video links:

Unit No.	Topics	Links
1	Analysis of tall building frames	https://www.youtube.com/watch?v=VpJvgPVhoOs&list=PLjJwBYxz7Cymoiq357zxoxAq-2iENSJRs
2	Analysis of shear walls	https://www.youtube.com/watch?v=EyaqPMzC2SY
3	Pure torsion in thin tubes	https://www.youtube.com/watch?v=TwruPWhc5Q4
4	Elastic and inelastic stability of frames	https://www.youtube.com/watch?v=m5Ig4_9gjUE

Course code	**PEC-MTSD-213A**				
Category	**Professional Elective courses**				
Course title	Design of Hydraulic Systems				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Understand the purpose of hydraulic structures and how to prepare investigation reports. • Learn to design and maintain dams, weirs, and barrages. • Design intake structures and water conveyance systems for irrigation and power. • Analyze and design pressure pipes and distribution systems using CAD and numerical methods.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Explain the functions and components of different hydraulic structures.	Level 2: Understanding
CO2	Apply design methods for dams, barrages, and intake systems	Level 3: Applying
CO3	Analyze canal networks and water conveyance systems for various uses.	Level 4: Analyzing
CO4	Design complete pressure pipe and distribution systems using software tools.	Level 6: Creating

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Objectives of hydraulic structures in Water resources systems, preliminary investigation and preparation of the reports.

Unit-II

Design of water storage structures ; (1)High dams-gravity dams , over flow and non over flow section.(2) Low dams- weirs, earthen dams, vented dams (Barrage), instrumentation and maintenance of dam structures.

Unit-III

Collection and conveyance of water. Design of intakes, conveyance system of Irrigation, drinking and hydro power. Design of canal net work.

Unit-IV

Hydraulic design of pressure pipes, hydrostatic tests on pipes, design of distribution systems- pressure in distribution systems, nomo graphs, Hardy cross and numerical methods, computer added design (CAD).

Suggested Readings:.

- Creager, Justin & Hinds, *Engineering for Dams*, Vols - I, II, III.
- Varshney, *Hydraulic and Irrigation Structures*.
- Varshney, *Hydraullic and Irrigation Structures*.

Useful Video links:

Unit No.	Topics	Links
1	Objectives of hydraulic structures in Water resources systems	https://www.youtube.com/watch?v=jXw5_wSiy20
2	High dams-gravity dams	https://www.youtube.com/watch?v=XfINeCDMEUs
3	Design of canal net work	https://www.youtube.com/watch?v=6uhC0zjb13Y
4	Hydraulic design of pressure pipes	https://www.youtube.com/watch?v=gYGDOwcauiw

Course code	**LC-MTSD-203A**				
Category	**Lab Course**				
Course title	**Computational Laboratory-III**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	2	1	
Course Objectives:	The objectives of this course are to • To introduce the basic 3-D commands and file types used in AutoCAD for structural drafting. • To develop understanding of scripting, customization, and interfacing AutoCAD with programming tools like C++. • To apply Auto LISP programming and DXF file usage for structural detailing and data exchange. • To explore professional structural engineering software and introduce artificial intelligence applications in the structural domain.				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Recall 3-D commands and different AutoCAD file types such as shape, font, and menu files.	Level 1: Remember
CO2	Explain the function and use of AutoCAD script files and their integration with programming languages like C++.	Level 2: Understand
CO3	Apply Auto LISP programming to develop basic structural detailing drawings in AutoCAD.	Level 3: Apply
CO4	Analyze the compatibility of AutoCAD through DXF files with other CAD software for structural applications.	Level 4: Analyze
CO5	Evaluate the features and performance of structural design software like STAAD.Pro and STRAP.	Level 5: Evaluating
CO6	Create AI-assisted solutions for structural engineering problems using intelligent design tools.	Level 6: Creating

List of Experiments

1. Use basic 3-D commands to create structural elements
2. Identify and use shape files, font files, and menu customization in AutoCAD
3. Develop a simple interface between AutoCAD and C++ for automated drafting
4. Export and import DXF files for interoperability between CAD software
5. Write Auto LISP programs to automate reinforcement detailing
6. Model a simple structure in STAAD.Pro and perform structural analysis
7. Use structural software to design a beam or column as per IS codes
8. Demonstrate the basic use of AI tools (like neural networks or optimization techniques) in solving structural problems

Useful Video links:

Exp. No.	Topics	Links
1	Use basic 3-D commands to create structural elements	https://www.youtube.com/watch?v=VubfYE9D7wU
2	Identify and use shape files, font files, and menu customization in AutoCAD	https://www.youtube.com/watch?v=De034khldcY
3	Develop a simple interface between AutoCAD and C++ for automated drafting	https://www.youtube.com/watch?v=dvjfWbvLclk
4	Model a simple structure in STAAD. Pro and perform structural analysis	https://www.youtube.com/watch?v=IONq0phpb3Y&list=PLWtJ8Twb6Z9P69uaaL89XGZabpKzU7Ar5

Course Code	**PROJ-MTSD-205A**				
Category	Project				
Course Title	**Project Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	4	2	
Course Objectives	The objectives of this course are to • Identify suitable research topics in Civil Engineering for independent investigation. • Understand research methodologies, documentation, and referencing aligned with existing literature. • Develop technical writing skills using appropriate tools, formats, and referencing techniques. • Analyze, interpret, and synthesize research findings within a defined research scope or topic.				
Assessment	50 Marks				
End Semester Examination	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Identify complex engineering problems relevant to project work based on domain knowledge and real-world challenges.
CO2	Describe the workflow, technical background, and tools required for planning and executing Engineering projects.
CO3	Apply appropriate methods, tools, and techniques to carry out project development and prepare technical documentation.
CO4	Analyze the key stages of project development to ensure systematic execution and identify performance issues.
CO5	Evaluate alternative approaches and select suitable methodologies to achieve optimal and feasible project outcomes.
CO6	Design innovative and practical engineering solutions to address societal and industrial needs.

Each student is required to carry out a hardware-based project and submit a project report on a topic related to Civil Engineering or an interdisciplinary area. The project title and objectives should be chosen by the student in consultation with their allocated Project Guide. The student must present their project in the form of a viva-voce in front of a Project Evaluation Committee. The Head of Department will constitute this committee for evaluation.

Evaluation Criteria (Total: 50 marks)

Sr. No.	Evaluation Parameter	Marks
1	**Problem Definition and Relevancy** — clarity of problem, significance and alignment with discipline	**5**
2	**Proposed Solution and Implementation** — functionality, originality, technical depth	**5**
3	**Project Benefit and Impact** — benefits to society, industry, and environment	**10**
4	**Cost-Effectiveness and Practical Viability** — consideration of cost, resources, and practicality	**10**
5	**Presentation and Communication Skills (Viva-voce)** — ability to explain, answer questions, confidence, and depth of knowledge	**10**
6	**Project Report Quality** — clarity, completeness, format, and technical content	**10**

Course Code	**SM-MTSD-207A**				
Category	Seminar				
Course Title	**Seminar & Technical Writing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	2	**2**	
Course Objectives	The objectives of this course are to • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Identify the trends and advancements in the related field.	Level 1: Remember
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.	Level 2: Understand
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.	Level 3: Apply
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.	Level 4: Analyze

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO4

<table>
<tr><td>Course Code</td><td colspan="5">DISS-MTSD-209A</td></tr>
<tr><td>Category</td><td colspan="5">Dissertation</td></tr>
<tr><td>Course Title</td><td colspan="5">Dissertation (Phase-1)</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-III</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are to
• Introduce students to identifying relevant research topics in Civil Engineering.
• Explain the research process, including literature review, documentation, and structured writing.
• Develop proficiency in using research tools, reference management, and academic writing techniques.
• Enhance ability to analyze, synthesize, and present research findings in a chosen domain.</td></tr>
<tr><td>Assessment</td><td colspan="5">100 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5"></td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Identify the research topic/area relevant to the field of Civil Engineering to carry out independent research.
CO2	Understand the research process, literature review, result formulation and writing conclusions with reference to existing literature.
CO3	Apply appropriate tools, references and writing skills for effective report writing related to research work.
CO4	Analyze and synthesize research findings to the agreed area of research carried out.
CO5	Evaluate the research methods and available knowledge to propose appropriate solutions to the specific research problem.
CO6	Design engineering solutions by developing improved results, properly documenting them in a thesis or report, and publishing them in journals or conferences.

Each student will undertake their dissertation under the supervision of one or more supervisors. The dissertation topic must be approved by a committee constituted by the Head of the concerned Department.

Students are required to deliver two seminar presentations: the first, at the beginning of Dissertation Phase-I, to outline the scope of the work and finalize the topic; the second, towards the end of the semester, to present the progress and work completed during the semester.

The committee will evaluate both presentations and award sessional marks out of 100. Students who fail to secure the minimum passing marks must improve their grade before proceeding to the 4th semester. Failure to do so will require the student to repeat Dissertation Phase-I in the next regular 3rd semester.

M.Tech (Structural Design) –4th Semester
***w.e.f.* 2025-26**

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Dissertation	DISS-MTSD-202A	Dissertation and viva (Dissertation Stage 2)	-	-	-	-	20*	250		500	750	
Total Credits								**20***				**750**	

Dissertation Stage-1 will continue as the final dissertation in the 4th semester. Sessional marks, out of 250, will be awarded by an internal committee constituted by the Head of the Department. The assessment will be based on presentations, reports, and related materials submitted to the committee. Failure to appear before the committee will result in disqualification from submitting the dissertation.

If a student scores less than 40% in the sessional assessment, they must revise and resubmit the dissertation after incorporating all required corrections and improvements. The revised dissertation will be evaluated in the next academic session.

At the end of the semester, each student is required to submit three soft-bound copies of their Master's dissertation to the office of the Head of the Department. One copy will be retained for departmental records, one will be provided to the supervisor, and one will be sent by mail to the external examiner, following their appointment and notification from the university.

The dissertation will be evaluated by a committee consisting of the Head of the Department, the dissertation supervisor(s), and one external examiner. The external examiner will be appointed by the Chairman of the Board of Studies. If the appointed examiner is unable to attend, the Director of the Institute, upon the recommendation of the Head of the Department, is authorized to appoint a substitute examiner from another institution or the parent institute.

Students must defend their dissertation through a presentation before the evaluation committee, which will assign marks accordingly.

Note:

- The scheme for awarding grades will be provided by the department to the examiner(s).
- The plagiarism of the dissertation report must be below 10%; otherwise, the report will not be accepted.
- Each student must publish at least one research paper related to their dissertation work in a peer-reviewed journal, IEEE conference, or SCOPUS/SCI-indexed journal before the final submission of Dissertation Stage-2.
- The student must follow the guidelines for the Dissertation report format as per Annexure-I.

Course Code	**DISS-MTSD-202A**				
Category	Lab Courses				
Course Title	Dissertation				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	0	0	20	20	
Course Objectives	The objectives of this course are to • Introduce research fundamentals and help identify relevant topics in Civil Engineering. • Understand structured research methodology, literature review, and documentation of results and conclusions. • Develop skills in using research tools, technical writing, referencing, and report formatting. • Analyze, evaluate, and present research findings through effective report or thesis preparation.				
Assessment	250 Marks				
End Semester Examination	500 Marks				
Total	750 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to:

COs	Skills Demonstrated
CO1	Identify the research topic/area relevant to the field of Civil Engineering to carry out independent research.
CO2	Understand the research process, literature review, result formulation and writing conclusions with reference to existing literature.
CO3	Apply appropriate tools, references and writing skills for effective report writing related to research work.
CO4	Analyze and synthesize research findings to the agreed area of research carried out.
CO5	Evaluate the research methods and available knowledge to propose appropriate solutions to the specific research problem.
CO6	Design engineering solutions by developing improved results, properly documenting them in a thesis or report, and publishing them in journals or conferences.

Dissertation Stage-1 will continue as the final dissertation in the 4th semester. Sessional marks, out of 250, will be awarded by an internal committee constituted by the Head of the Department. The assessment will be based on presentations, reports, and related materials submitted to the committee. Failure to appear before the committee will result in disqualification from submitting the dissertation.

If a student scores less than 40% in the sessional assessment, they must revise and resubmit the dissertation after incorporating all required corrections and improvements. The revised dissertation will be evaluated in the next academic session.

At the end of the semester, each student is required to submit three soft-bound copies of their Master's dissertation to the office of the Head of the Department. One copy will be retained for departmental records, one will be provided to the supervisor, and one will be sent by mail to the external examiner, following their appointment and notification from the university.

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recommendation of the Head of the Department, is authorized to appoint a substitute examiner from another institution or the parent institute.

Students must defend their dissertation through a presentation before the evaluation committee, which will assign marks accordingly.

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- The scheme for awarding grades will be provided by the department to the examiner(s).
- The plagiarism of the dissertation report must be below 10%; otherwise, the report will not be accepted.
- Each student must publish at least one research paper related to their dissertation work in a peer- reviewed journal, IEEE conference, or SCOPUS/SCI-indexed journal before the final submission of Dissertation Stage-2.
- The student must follow the guidelines for the Dissertation report.