

Programme Specification

Programme: M. Tech. in Transportation Engineering	
Faculty	Engineering and Technology
Department	Civil Engineering
Programme	M.Tech
Dean of Faculty	Dr. M Arulanantham
HOD	Dr. H M Rajashekhar Swamy

	1. Title of the Award
	M. Tech. in Transportation Engineering
	2. Modes of study
	Both Full Time and Part Time
	3. Awarding Institution / Body
	M. S. Ramaiah University of Applied Sciences – Bengaluru, India
	4. Joint Award
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	5. Teaching Institution
	Faculty of Engineering & Technology
	M S Ramaiah University of Applied Sciences - Bengaluru, India
	6. Date of Programme Specification
	30/06/2019
	7. Date of Programme Approval by the Academic Council of MSRUAS
	24/07/2019
	8. Next Review Date
	23/07/2023
	9. Programme Approving Regulatory Body and Date of Approval
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	10. Programme Accrediting Body and Date of Accreditation
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	11. Grade Awarded by the Accreditation Body
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	12. Programme Accreditation Validity
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	13. Programme Benchmark
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14. Rationale for the Programme	
	<p>Civil Engineering is primarily infrastructure development involving planning, design, construction, and operation of facilities essential to modern life, ranging from transit systems to offshore structures to space satellites. Major disciplines within civil engineering that are closely interrelated are Structural, Environmental, Geotechnical, Water Resources, Transportation, Construction and Urban Planning.</p> <p>Until recently Civil Engineering teaching was limited to Planning, Analysis, Design and Execution of different types of infrastructure like buildings, roads, bridges, dams and power plants. However, increasing technological sophistication and demand for higher living standards fueled by economic growth and concerns about environmental impact have changed the scope of Civil Engineering curriculum.</p> <p>Transportation engineering is one of the major branches of civil engineering and it involves planning, design, construction, operation and maintenance of transportation facilities. The facilities support air, highway, railroad, pipeline, water, and even space transportation. Transportation engineering includes sizing of transportation facilities, selection of materials and design of pavement and geometry of roadway.</p> <p>In Transportation Engineering, students acquire advanced know-how concerning the planning, design, operations, performance, evaluation, maintenance and rehabilitation of transportation systems including their economics and social aspects. This field imbues in each student analytic, problem-solving and management skills suitable for public and private sector professional works. Students are trained on the application of various software and programming skills for simulation of traffic flow and Intelligent Transportation System (ITS) to address urban transportation issues. The challenges faced in transportation engineering are developing network links and major terminals to satisfy transportation demands, with due regard for the resultant land-use, environmental and other impacts of these facilities.</p> <p>Primary responsibility of a University is to produce qualified human resource trained to sustain growth of transportation industry by adopting innovative technologies and skilled project handling strategies to overcome these challenges. Even though there are a large number of institutions in India producing Transportation Engineers, there is a shortage of quality Transportation Engineering graduates. The FET at MSRUAS would like to offer Transportation Engineering courses to produce imaginative, creative and innovative Transportation Engineers.</p> <p>MSRUAS is offering Transportation Engineering programme at the postgraduate level. The programme focuses on addressing the professional service needs of the transportation industry like planning, designing, maintenance and evaluation of various transportation facilities. The programme also involves studying, simulation and suggesting remedial measures for various traffic issues. The graduates will get opportunities in well-known infrastructure companies involved in transportation planning and construction where they exhibit effective and efficient problem solving skills to provide economical and sustainable solutions in India and abroad.</p> <p>The faculty of engineering and technology plans further development of Transportation engineering and compete with the best universities in the world and attract high quality graduates as well as teaching talent from all over the country and abroad.</p>

15. Programme Aim

The aim of the programme is to produce postgraduates with advanced knowledge and understanding of Transportation Engineering; higher order critical, analytical, problem solving and transferable skills; ability to think rigorously and independently to meet higher level expectations of transportation industry, academics, research or take up entrepreneurial route.

16. Programme Objectives

Students will be able to apply the knowledge, understanding and skills acquired to carry out design, simulation, analysis and evaluation of transportation projects. Emphasis will be placed on technical and economical approach to address transportation problems.

The objectives of the programme are to enable the students to:

1. Evaluate different modes of transportation based on travel demand forecasting and travel demand distribution models
2. Select appropriate materials and technology to design, construct, maintain and rehabilitate highways
3. Apply artificial intelligence and Intelligent Transportation System (ITS) to solve urban transportation issues
4. Use various software tools to model and simulate traffic flow to manage traffic issues
5. Analyse and design various types of bridges for road and railway projects
6. Develop and administer project budgets, fiscal control, contract and quality control provisions
7. Develop a career in transportation industry
8. Practice teamwork, lifelong learning and continuous improvement

17. Intended Learning Outcomes of the Programme

The Intended Learning Outcomes (ILOs) are listed under four headings:

1. Knowledge and Understanding, 2. Cognitive Skills 3. Practical Skills and 4. Capability / Transferable Skills.

1. Knowledge and Understanding

After undergoing this programme, a student will be able to:

- KU1:** Describe advantages and disadvantages of various pavement materials, construction methods and equipment used in pavement construction
- KU2:** Describe the critical factors in design of pavement to achieve quality, durability, sustainability and economic objectives
- KU3:** Explain principles of travel demand forecasting, modal split and traffic assignment, road safety used in transportation planning
- KU4:** Explain form work, modern construction techniques, properties of modern construction materials and equipment applied to engineering construction for sub, super and special structures, rehabilitation, strengthening and demolition techniques

2. Cognitive Skills

After undergoing this programme, a student will be able to:

- CS1:** Analyze and design various pavement systems, maintenance techniques to meet the overall expectation of the road project
- CS2:** Analyze and propose traffic study, simulation and remedial measure essential for solving a broad set of traffic problems in transportation industry considering societal and economic impacts
- CS3:** Plan surveys to collect and analyze data required for transportation planning
- CS4:** Propose and design various types of bridges for a road/railway project

3. Practical Skills

After undergoing this programme, a student will be able to:

- PS1:** Produce detailed project report along with the ability to carry out various studies essential for the preparation of DPR in different stages
- PS2:** Use appropriate software packages relevant to transportation engineering
- PS3:** Conduct physical tests to evaluate performance of pavement materials and mixes
- PS4:** Perform laboratory tests on model structures to understand their behavior

4. Capability / Transferable Skills

After undergoing this programme, a student will be able to:

- TS1:** Evaluate and appraise the context within which transportation industry operates
- TS2:** Adopt a reflective approach to personal development and embrace the philosophy of continual professional development
- TS3:** Present information concisely in narrative and verbal form
- TS4:** Work effectively in groups and lead the group

18. Programme Structure

The Programme consists of four terms as shown below. A student is required to successfully complete the following modules and earn credits for the award of the degree.

Complete details of each of the modules such as ILO's, content, resources, teaching-learning processes and other related information are outlined in Module Specification of the respective programme.

(Please add course and credit details accordingly : Total 42 credits : 06 core courses total 26 credits and 4 elective courses total 16 credits spread in first two semesters)

SEMESTER 1

Sl.No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19TRC501A	Pavement Engineering	3	--	2	4	100
2	19TRC502A	Traffic Engineering and Transport Planning	3	1	2	5	100
3	19TRC503A	Construction Planning and Contract Management	3	1		4	100
4	19TRE51XA	Refer Elective Course Table	4	--	--	4	100
5	19TRE52XA	Refer Elective Course Table	4	--	--	4	100
6	19FET508A	Research Methodology & IPR	2	--	--	2	50
7	19FET509A	Professional Communication	1	--	--	--	--
Total			20	2	4	23	450
Total number of contact hours per week			26 hours				
Number of credits can be registered			Minimum	15	Maximum	23	

SEMESTER 2

Sl.No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19TRC511A	Intelligent Transport System	3	1	2	5	100
2	19TRC512A	Railway Engineering	3	1	--	4	100
3	19TRC513A	Airports,	3	1	--	4	100
4	19TRE53XA	Refer Elective Course Table / Online Courses / MOOC	4	--	--	4	100
5	19TRE54XA	Refer Elective Course Table / Online Courses / MOOC	4	--	--	4	100
6	19FET510A	Value Education	1	--	--	--	--
7	19TRP502A	Group Project (Start)	--	--	3	--	--
Total			18	3	5	21	400
Total number of contact hours per week			26 hours				
Number of credits can be registered			Minimum	12	Maximum	21	

SEMESTER 3

Sl.No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19TRP501A	Internship / Other activities as specified	--	--	10	4	100
2	19TRP502A	Group Project	--	--	12	8	200
3	19TRP511A	Dissertation and Publication Phase 1					
Total			--	--	22	12	500
Total number of contact hours per week			22 hours				

	Number of credits can be registered	Minimum	12	Maximum	12
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SEMESTER 4

Sl.No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19TRP511A	Dissertation and Publication Phase 2	--	--	24	24	400
		Total	--	--	24	24	400
		Total number of contact hours per week	24 hours				
		Number of credits can be registered	Minimum	24	Maximum	24	

Elective Modules List			
Stream / Specialization	S. No.	Module Code	Module Title
Highway Engineering	E11	19TRES511A	Highway Geometric Design
	E21	19TRES512A	Bridge Engineering and Road Projects
	E31	19TRES513A	Pavement Construction, Evaluation, Maintenance and Management Systems
	E41	19TRES514A	Highway Economics, Finance and Road Safety Management
Allied Transport Systems	E12	19TRES521A	Advanced Concrete technology and modern construction techniques
	E22	19TRES522A	Tunnel Engineering
	E32	19TRES523A	Harbours and Dock Engineering
	E42	19TRES524A	Construction Equipment and Management
Sustainable Transportation Infrastructure	E13	19TRES531A	Green construction and Alternative building materials
	E23	19TRES532A	Smart Cities and Sustainable Infrastructure
	E33	19TRES533A	Transportation Geotechnics
	E43	19TRES534A	Finite Element analysis for transportation Engineers
Artificial Intelligence and Environmental Impact Assessment for Transportation Projects	E14	19TRES541A	Environmental Impact Assessment for Transportation Projects
	E24	19TRES542A	Simulation Techniques in Transportation Engineering
	E34	19TRES543A	Applied Statistics for Transportation Engineers
	E44	19TRES544A	Application of AI in Transportation Engineering

19. Programme Delivery Structure

A Programme is delivered from Monday to Saturday of the week as per the Time-Table for every batch.

20. Teaching and Learning Methods

The module delivery comprises of a combination of few or all of the following:

1. Face to Face Lectures using Audio-Visuals
2. Workshops, Group Discussions, Debates, Presentations
3. Demonstrations
4. Guest Lectures
5. Laboratory/Field work/Workshop
6. Industry Visit
7. Seminars
8. Group Exercises
9. Project Exhibitions
10. Technical Festivals

21. Courses

Programme has six Professional core courses, four Professional elective courses, two audit courses, and one compulsory course followed by Group Project, Internship and Dissertation & Publication courses.

Core courses are Programme Specialization courses which normally include both theory and laboratory sessions. Alternate activities are planned in case of laboratory sessions do not exist in a module.

Compulsory course (CM) is Research Methodology and IPR course which is mandatory.

All courses of the programme are categorized as indicated in the **Annexure I**.

22. Electives**Electives**

There are 4 electives in the programme. The electives are grouped such a way that a student can choose a set of electives to specialize in a chosen field/stream. However, if the student wishes to opt for elective module that spans multiple streams, the case may be considered subject to the affordability of academic logistics and approval by the module leader, HODs and Deans.

For every elective offered, there will be a minimum and a maximum number of registrations that is decided by the department.

There is also a provision for the students to choose elective courses through on-line mode such as MOOC's, SWAYAM, NPTEL and other equivalent platforms. The guidelines prescribed by the University for such courses to be adhered to. The student can also earn 3 or 4 credits by participating in the international competitions like technical presentation/ conference/ publications in the journal etc and winning the award in that. In that case he/she can be exempted from one of the elective courses of the programme.

23. Group Project

The main objective of group project is to provide an ambiance to work in groups towards achieving a common goal. A group shall have up to 5 students. In case of Group Project work is based on inter-disciplinary in nature, team can be constituted with members from across departments of the Faculty.

The students are required to develop a report for assessment and also need to demonstrate the working of the product. The IPR rights of all such work lies with the University only. The project should be approved by a committee constituted by respective HoDs before the start of the project. For further details related to the Group Project refer to Module Specification of the respective programmes

24. Industry Internship/Other Activities

A student can opt for an internship in an industry, a business or research organization during the module.

Alternately, can undertake a mini-project requiring self-directed study that can be perused within the affiliated Faculty.

Prior approval of the internship / mini-project by the HoD and Dean is mandatory. It is also necessary for the student to submit a report and make a presentation to the members of the panel constituted by the HoD for assessment.

For further details related to this module, please refer to Module Specification of the respective programmes.

25. Dissertation and Publication

This module has two parts – Dissertation and Publication.

Every student, has to undertake the dissertation work individually on a chosen relevant topic. The topic needs to be approved by the committee constituted by HoD.

Publication is a stage wherein dissertation work of the student is converted into a technical paper to be published in reputed conferences/journals.

For further details related to the this module refer to Module Specifications of the respective programmes

26. Course Assessment

1. Every course will be assessed for a weight of 100%
2. There are two components-Component-1 and Component-2
3. Component-1 carries a weight of 50% and Component -2 carries a weight of 50%
4. Component -1 (CE) is subdivided into Term Tests , Assignments and laboratory examinations/ technical presentation
Test carry 25 Marks
Assignment carry 50 Marks.
Laboratory assessment/ technical presentation carry 25 Marks
Total 100 marks will be reduced to 50 Marks.
5. Component -2 (SEE) is Written Examination for 100 Marks. It will be reduced to 50 Marks.
6. A minimum of overall 40% is required for a pass with 40% in each of the Components
7. The marks distribution for each course is given in the programme structure-section 20. Other flexibilities(exceptions) as per the programme regulations

27. Failure in Course and Makeup Examinations

Makeup Examinations are provided for the students who are not able to meet all pass criteria prescribed for a module during the regular term and fail in the module.

For further details related to makeup examination, please refer to M.Tech. Programme Academic Regulations document.

28. Attendance

Please refer to M.Tech. Programme Academic Regulations document for attendance requirements and condonation related details.

29. Award of Grades

As per the M.Tech. Programme Academic Regulations document.

30. Student Support for Learning

Students are provided with various facilities to support learning such as the following:

1. Course notes

2. Reference books in the library
3. Magazines and Journals
4. Internet facility
5. Computing facility
6. Laboratory facility
7. Workshop facility
8. Staff support
9. Lounges for discussions
10. Any other support that enhances their learning

31. Quality Control Measures

Following are the Quality Control Measures:

1. Review of course notes
2. Review of question papers and assignment questions
3. Student Feedback Analysis
4. Moderation of assessed work
5. Opportunities for the students to see their assessed work
6. Review by external examiners and external examiners reports
7. Staff Student Consultative Committee meetings
8. Student exit feedback analysis

32. Curriculum Map

Module Code	Intended Learning Outcomes											
	Knowledge and Understanding				Cognitive (Thinking) Skills (Critical, Analytical, Problem Solving, Innovation)				Practical Skills			
	KU1	KU2	KU3	KU4	CS1	CS2	CS3	CS4	PS1	PS2	PS3	PS4
19TRC501A	X	X		X	X					X	X	X
19TRC502A		X	X			X	X		X	X		X
19TRC503A		X	X	X		X	X			X		
19TRE511A		X		X	X	X			X	X		
19TRE521A	X			X	X			X		X	X	X
19TRE531A	X	X	X		X	X	X		X	X		
19TRE541A		X		X	X	X		X	X	X		X
19TRE512A	X	X		X				X	X	X	X	
19TRE522A	X			X	X		X	X	X	X		X
19TRE532A	X	X	X		X	X	X		X	X		
19TRE542A	X		X			X	X	X	X	X		
19FET508A	X	X	X	X	X	X	X	X	X			
19FET509A	X	X	X	X	X	X	X	X	X			
19TRC511A		X	X			X	X	X	X	X		X
19TRC512A	X	X		X	X	X	X	X	X	X		X
19TRC513A	X	X	X	X	X		X		X	X	X	X
19TRE513A	X	X		X	X		X	X	X	X	X	X
19TRE523A				X			X		X			X
19TRE533A	X	X		X	X			X	X		X	X
19TRE543A		X	X		X	X			X	X		X
19TRE514A	X	X		X	X	X		X	X	X		
19TRE524A	X			X	X	X		X	X	X		
19TRE534A	X	X	X	X	X	X	X		X			
19TRE544A	X	X	X	X	X	X	X	X	X	X		
19FET510A	X	X	X	X	X	X	X	X	X	X	X	X
19TRP502A	X	X	X	X	X	X	X	X	X	X	X	X
19TRP501A	X	X	X	X					X	X	X	X
19TRP511A	X	X	X	X	X	X	X	X	X	X	X	X

33. Capability / Transferable Skills Map

Module Code	Group work	Self-learning	Research Skills	Written Communication Skills	Verbal Communication Skills	Presentation Skills	Behavioural Skills	Information Management	Personal management/ Leadership Skills
19TRC501A		X		X	X	X	X	X	
19TRC502A		X		X	X	X	X	X	
19TRC503A		X		X	X	X	X	X	
19TRE511A		X		X	X	X	X	X	
19TRE521A	X	X		X	X	X	X	X	
19TRE531A		X		X	X	X	X	X	
19TRE541A		X		X	X	X	X	X	
19TRE512A		X		X	X	X	X	X	
19TRE522A		X		X	X	X	X	X	
19TRE532A		X		X	X	X	X	X	
19TRE542A		X		X	X	X	X	X	
19FET508A		X	X	X	X	X	X	X	
19FET509A		X		X	X	X	X	X	
19TRC511A		X		X	X	X	X	X	
19TRC512A		X		X	X	X	X	X	
19TRC513A		X		X	X	X	X	X	
19TRE523A		X		X	X	X	X	X	
19TRE533A		X		X	X	X	X	X	
19TRE543A		X		X	X	X	X	X	
19TRE514A		X		X	X	X	X	X	
19TRE524A		X		X	X	X	X	X	
19TRE534A		X		X	X	X	X	X	
19TRE544A		X		X	X	X	X	X	
19FET510A		X	X	X	X	X	X	X	
19TRP502A		X	X	X	X	X	X	X	X
19TRP501A	X			X	X	X	X	X	X
19TRP511A		X	X	X	X	X	X	X	X

34. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposium, paper writing, attending industry exhibitions, project competitions and related activities to enhance their knowledge and network.

35. Cultural and Literary Activities

To remind and ignite the creative endeavors, annual cultural festivals are held and the students are made to plan and organize the activities.

36. Sports and Athletics

Students are encouraged to develop a habit of taking part in outdoor and indoor games on regular basis.

