Syllabus for Master of Technology

Transportation Engineering

APPLICATION OF NUMERICAL & STATISTICAL METHODS IN TRANSPORTATION ENGINEERING

01TR0109

Objective of the Course:

Objectives of introducing this subject at first year level in Masters of civil engineering are: Enable students to apply the knowledge of numerical methods to solve the real-world problems of civil engineering.

Credit Earned: 3

Students learning outcomes:

After successful completion of the course, it is expected that student will be able to

1. Understand the interpolation techniques in civil engineering problems.
2. Apply the of solution techniques of linear system to frame civil engineering problems
3. Apply Numerical Integration in civil Engineering
4. Analyze the statistical approach in civil engineering
5. Classify and apply the standard methods to solve algebraic and transcendental equations

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (I)	IA (M)	Viva (V)	Term Work (TW)	
3	0	0	3	50	20	30	25	25	150

Detailed Syllabus

Marwadi University

Syllabus for Master of Technology

Transportation Engineering

Sr. No.	Title of the unit	Number of hours
1	**Solution to algebraic non–linear equations**	4
	Bisection Method, Regular Falsi method, Secant method, Newton Raphson iterations.	
2	**Solution of simultaneous Linear systems**	7
	Iterative solutions: Jacobi iteration. Gauss Seidel iteration. , SOR method Gauss elimination, Gauss Jordan elimination with and without pivoting, LU Decomposition	
3	**Finite differences and Interpolation**	6
	Finite differences, Newton's forward interpolation, Newton backward interpolation, Lagrange's interpolation, Newton divided difference method	
4	**Numerical Quadrature:**	4
	Trapezoidal rule, Simpsons Rule, Gauss Quadrature, Romberg integration	
5	**Correlation & Regression**	7
	Types of Correlation, spearman's rank method, Karl Pearson's method, Regression coefficients, Regression lines, Multiple Regression Principle of least squares,.Introduction of R	
6	**Probability & Distribution**	7
	Probability, Conditional Probability, Bayes' theorem, Random variable, Mathematical expectations, Binomial, Poisson & Normal Distribution	
7	**Hypothesis Testing**	7
	Hypothesis testing, significance interval, Chi square test, t-test and F-test.	
	TOTAL HOURS	**42**

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution Serves as guidelines for teachers and students to achieve effective teaching-learning process. Distribution of Theory for course delivery and evaluation

Remember	Understand	Apply	Analyze	Evaluate	Create
10%	15%	10%	35%	20%	10%

Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas

2. Demonstration through power point presentations and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material:

Reference Book:

1. Numerical methods in Engineering - Salvadori& Baron
2. Numerical Methods in Finite Element Analysis - Bathe & Wilson
3. Advanced Mathematics - Kresysig
4. Numerical Analysis – Scarborough
5 Fundamental of mathematical statistics-S.C.Gupta ,V.K.Kapoor,Sultan chand & sons
6. Probability and Statistics for Engineers -Johnson Richard, Prentice India Ltd.

Web Resources

1. www.scilab.org/
2. http://nptel.ac.in/
3. http://ocw.mit.edu/