MATHEMATICS FOR CIVIL ENGINEERS

B.Tech. First Year, II – Semester

Only for CIVIL Engineering

[R-15 Regulation]

Credits	Periods			Exam Hrs.	Sessional Marks	Exam Marks	Total Marks
	Theory	Tutorial	Lab				
3	3	1	-	3	40	60	100

Purpose :

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

Course Outcomes At the end of the course, the student will be able to	
1	Understand the concepts on fundamental theorems and complex variables.
2	Familiarize with the applications of complex integration.
3	Equip themselves familiar with Numerical techniques and Numerical Integration.
4	Find numerical solution of ordinary differential equations.
5	Examine, analyze and compare probability distributions.

CO – PO Mapping :

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	**3**	**2**										**1**
CO-2	**3**	**2**										**1**
CO-3	**3**	**2**										**1**
CO-4	**3**	**2**										**1**
CO-5	**3**	**2**										**1**

SYLLABUS

UNIT – I : MEAN VALUE THEOREMS & COMPLEX VARIABLES (14 Periods)

Fundamental theorems: Rolle's mean value theorem – Lagrange's mean value theorem – Cauchy's mean value theorem (all theorems without proof but with geometrical interpretations).

Complex functions: Introduction – Limit of a complex function – Derivative of complex function – Cauchy-Riemann equations – Analytic function – Harmonic function – Applications to flow problems.

[4.3(1, 2, 3), 20.1, 20.2, 20.3, 20.4, 20.5, 20.6]

UNIT – II : COMPLEX INTEGRATION (10 Periods)

Complex integration – Cauchy's theorem – Cauchy's integral formula – Series of complex terms (Taylor's and Laurent's series) – Residues – Residue theorem – Calculation of residues.

[20.12, 20.13, 20.14, 20.16, 20.17, 20.18, 20.19]

UNIT – III : NUMERICAL METHODS (12 Periods)

Numerical solution of equations: Solution of algebraic and transcendental equations – Bisection method – Method of false position – Newton-Raphson method.

Numerical Integration: Trapezoidal rule, Simpson's $\frac{1}{3}^{rd}$ −rule, Simpson's $\frac{3}{8}^{th}$ −rule.

[28.2, 28.3, 30.4, 30.6, 30.7, 30.8]

UNIT – IV : NUMERICAL DIFFERENTIATION (12 Periods)

Numerical solution of ordinary differential equations: Picard's Method – Taylor's series method – Euler's method – Runge-Kutta method – Predictor-Corrector methods – Milne's method.

[32.2, 32.3, 32.4, 32.7, 32.8, 32.9]

UNIT – V: PROBABILITY & DISTRIBUTIONS (12 Periods)

Probability and distributions: Basic terminology – Probability and set notations – Addition law of probability – Independent events – Multiplication law of probability – Baye's theorem – Random variables – Discrete probability distribution – Continuous probability distribution – Expectation – Mean, Median, Mode and Variance using probability density function – Binomial distribution – Poisson distribution – Normal distribution.
[26.2, 26.3, 26.4, 26.5, 26.6, 26.7, 26.8, 26.9, 26.10, 26.14, 26.15, 26.16]

TEXT BOOK:

1. **Dr. B.S. Grewal**, "*Higher Engineering Mathematics*", 43rd edition, Khanna Publishers, New Dehli.

REFERENCE BOOKS:

1. **Dr. N.P. Bali, Dr. Ashok Saxena, Dr. N.Ch. S. Narayana**, "*A Text book on Engineering Mathematics*", Laxmi Publications (P)Ltd., New Delhi.
2. **T. Veerajan**, "*Probabiltiy, Statistics & Random process*", Tata McGraw-Hill Educations.
3. **Greenberg M D,** "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
4. **Erwin Kreyszig**. "*Advanced Engineering Mathematics*", John Wiley and Sons, New York.