

SCHEME OF COMBINED I & II SEMESTERS B.Tech

Code	Subject	Hours/ Week			Marks		Duration of End Semester examination	Credits
		L	T	P/D	Internal	End Semester		
EN14 101	Engineering Mathematics I	2	1	0	50	100	3	4
EN14 102	Engineering Mathematics II	2	1	0	50	100	3	4
EN14 103	Engineering Physics	2	0	0	50	100	3	3
EN14 103(P)	Engineering Physics Lab.	0	0	1	50	-	-	1
EN14 104	Engineering Chemistry	2	0	0	50	100	3	3
EN14 104(P)	Engineering Chemistry Lab.	0	0	1	50	-	-	1
EN14 105	Engineering Mechanics	2	1	0	50	100	3	6
EN14 106	Basics of Civil and Mechanical Engg.	2	0	0	50	100	3	4
EN14 107	Basics of Electrical and Electronics & Communication Engg.	2	0	0	50	100	3	4
EN14 108	Engineering Graphics	1	0	3	50	100	3	6
EN14 109	Humanities and Communication Skills	2	1	0	50	100	3	2
EN14 110 (P)	Mechanical Workshops	0	0	2	100	-	-	2
EN14 111 (P)	Electrical & Civil Workshops	0	0	2	100	-	-	2
	TOTAL	17	4	9	750	900		42

EN14 101 ENGINEERING MATHEMATICS I

(Common for all B.Tech. programmes)

Teaching scheme

2 hours lecture and 1 hour tutorial per week

Credits: 4

Objective

- *To provide an avenue to scientific knowledge which opens new vistas of mental activity.*

A sound knowledge of engineering mathematics is a "sine qua non" for the modern engineer to attain new heights in all aspects of engineering practice

- *To provide the student with plentiful opportunities to work with and apply the concepts, and to build skills and experience in mathematical reasoning and engineering problem solving.*

Module I: Differential Calculus (18 hours)

Indeterminate forms – L'Hopitals rule – Radius of curvature in Cartesian form (No proof)– Center of curvature (No proof) – Evolute – Functions of more than one variables - Idea of Partial Differentiation – Euler's theorem for Homogeneous functions – Chain rule of Partial differentiation – Jacobians – Maxima and Minima of functions of two variables.

Module II: Infinite Series (18 hours)

Definition of Convergence and Divergence of Infinite series – Ratio test – Comparison test – Raabe's test – Root test – Series of positive and negative terms – Absolute convergence – Test for Alternating series – Power series – Interval of Convergence – Taylor's series expansion of functions (No proof) – Maclaurin's series expansion of functions (No proof) – Leibnitz formula for the n^{th} derivative of product of two functions – Its use in Taylor's and Maclaurin's series expansions.

Module III: Matrices (24 hours)

Rank of a matrix – Reduction of a matrix to Echelon form – System of Linear equations – System of non-homogeneous Linear equations; Consistency of system of non-homogeneous Linear equations – System of Homogeneous Linear equations; Consistency of system of homogeneous Linear equations – Gauss's elimination method – Characteristic equation - Cayley-Hamilton Theorem – Characteristic Values and Characteristic Vectors – Diagonalisation of non-symmetric matrices using similarity transformation – Diagonalisation of real-symmetric matrices using orthogonal transformation – Quadratic forms – Definite, Semi-definite and Indefinite forms – Reduction of Quadratic forms to sum of squares by orthogonal transformation.

Module IV: Fourier series and Harmonic Analysis (18 hours)

Fourier series – Euler Formulae – Even and Odd functions – Fourier series of Even and Odd functions – Functions having arbitrary period – Fourier series of Functions having arbitrary period – Half-range expansions – Numerical method for determining Fourier coefficients.

Reference books

1. Michael D Greenberg, *Advanced Engineering Mathematics*, Pearson Education Asia.
2. Sastry S.S., *Advanced Engineering Mathematics-Vol. I and II.*, Prentice Hall of India.
3. Ahsan Akhtar, Sabiha Ahsan, *Textbook of Differential Calculus*, Prentice Hall of India.
4. Glyn James., *Advanced Engineering Mathematics*, Pearson Education Asia.
5. Dr.ChandraMohan, Dr.Vargheese Philip, *Engineering Mathematics I,II,III & IV* , Sanguine Technical Publishers.
6. Bikas Chandra Bhui, Dipak Chatterjee, Prasun Chatterjee, *Engineering Mathematics Vol.I*, Vikas Publishing House.
7. V.Sundaram, R.Balasubramanian, K.A. Lakshminarayanan, *Engineering Mathematics, 6/e.*, Vikas Publishing House.
8. J.P.Singh, *Calculus, 2/e*, Ane Books Pvt.Ltd.
9. Anthony Croft, Robert Davison, Martin Hargreaves, *Engineering Mathematics*, Pearson Education

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Attendance and Regularity in the class

University Examination Pattern

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

Two questions from each module with choice to answer one question.

Maximum Total Marks: 100

EN14 102 ENGINEERING MATHEMATICS II

(Common for all B.Tech. Programmes)

Teaching scheme

2 hours lecture and 1 hour tutorial per week

Credits: 4

Objective

- *To apply the subject at the proper place and time, while keeping him/her aware to the needs of the society where he/she can lend his/her expert service, and also to those who can be useful to the community without even going through the formal process of drilling through rigorous treatment of mathematics.*

Module I: Ordinary Differential Equations (24 hours)

Equations of first order – Separable, Homogeneous, reducible to Homogeneous and Linear, Bernoulli's and Exact Equations – Orthogonal trajectories – Linear second order equations – Homogeneous Linear equation of second order with constant coefficients – Non-Homogeneous Linear equation of second order with constant coefficients – Solutions of Linear equations of second order with variable coefficients (Only Cauchy's equation) – method of variation of parameters.

Module II: Laplace transforms (18 hours)

Gamma and Beta functions – Definitions and simple properties – Laplace transform – Inverse Laplace transform – shifting theorems – Transforms of derivatives – Transforms of integrals – Differentiation of transforms – Integration of transforms – Convolution theorem (No proof) – Transform of Unit step function – Transform of Impulse function – transforms of periodic functions – Solution of ordinary differential equations using Laplace transform.

Module III: Vector Differential Calculus (18 hours)

Vector function of a Single Variable – Differentiation of vector functions – Scalar and Vector fields – Gradient of Scalar fields – Divergence and Curl of Vector Fields – their properties – Physical meanings – Relations between the vector differential operators.

Module IV: Vector Integral Calculus (18 hours)

Line, Surface and Volume integrals – Line integrals independent of the Path – Green's Theorem in the plane – Gauss Divergence Theorem – Stoke's Theorem (Proofs of these theorems are excluded).

Reference books

1. Wylie C.R and L.C. Barrent, *Advanced Engineering Mathematics*, McGraw Hill.
2. Kreyzig E., *Advanced Engineering Mathematics*, Wiley eastern.
3. Piskunov N., *Differential and Integral calculus*, MIR Publishers.
4. Ayres F., *Matrices*, Schaum's Outline Series, McGraw Hill.
5. Glyn James., *Advanced Engineering Mathematics*, Pearson Education Asia.
6. Peter V O'Neil, *Advanced Engineering Mathematics*, Thomson India Edition.
7. Bikas Chandra Bhui, Dipak Chatterjee, Prasun Chatterjee, *Engineering Mathematics Vol.1*, Vikas Publishing House.
8. Abhimanyu Singh, *Applied Mathematics II*, Ane Books Pvt.Ltd.
9. Thomas A. Garrity, *All the Mathematics you missed*, Cambridge University Press.

Internal Continuous Assessment (*Maximum Marks-50*)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.

10% - Attendance and Regularity in the class

University Examination Pattern

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

Two questions from each module with choice to answer one question.

Maximum Total Marks: 100