GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/ Spec.	ALL
Semester	II	Version	1.0.0.0
Course Code	2BSC1102	Course Name	Mathematics-II
Effective from Academic Year	2026-27	Effective for the batch Admitted in	July 2026
Course Category	BSC		

Teaching, Learning and Examination Scheme

Teaching & Learning Scheme							Examination scheme (Marks)					
Hours (per week)				Cr	SL	TSL	Theory			Practical		
L	TU	P	TTH				CE	SEE	Total	CE	SEE	Total
3	1	0	4	4	60	120	50	50	100	0	0	0

L: Lecture, TU: Tutorial, P: Practical, TTH: Total Teaching Hours/Week, Cr: Credit, SL: Min. Self Learning/Term Work Hours/Sem, TSL: Min. Total Teaching & Learning Hours/Sem, CE: Continuous Evaluation, SEE: Semester End Examination,

Pre-requisites

Basic knowledge of Differentiation and Integration

Course Outcomes

COs	Description
CO1	Develop an understanding of various terms of matrix algebra like inverse of matrix, eigen values & vectors and many more.
CO2	Recognize the concepts of the terms span, linear independence, basis, and dimension, and apply these concepts to various vector spaces and subspaces.
CO3	Apply principles of matrix algebra to linear transformation.
CO4	Evaluate summation of series and determine nature of various infinite series by applying appropriate tests.

Theory Syllabus

Unit	Content	Hrs
1	**Matrix Algebra:** Review of the algebra of matrices & elementary transformations Rank of a matrix, inverse of a matrix by Gauss-Jordan method, normal form of a matrix, Solution of a system of algebraic simultaneous equations, Linear dependent and Linear independent vectors. Eigen values and Eigen vectors, Eigen values and Eigen vectors of: Symmetric, Skew symmetric, Hermitian, Skew Hermitian, Unitary and Normal matrix, Algebraic and Geometric multiplicity, Diagonalization ,Spectral theorem for real symmetric matrices, Application of Quadratic forms.	22
2	**Vector Space:** Vectors in R^n and its properties, Dot product, Norm and Distance properties in R^n, Pythagorean theorem in R^n , Definition and Examples of vector spaces, Vector subspace, Linear Independence and dependence, Linear span of a set of vectors, Basis of subspaces, Extension to basis.	10
3	**Linear Transformation:** Definition and basic properties, Types of linear transformation (Rotation, reflection, expansion, contraction, shear, projection), Matrix of linear transformations, Change of basis and similarity, Rank nullity theorem	08
4	**Infinite Series:** Definition, Comparison test, Cauchy's integral test, ratio test, root test, Leibniz's rule for alternating series, power series, range of convergence, uniform convergence.	05

Practical Content

Tutorials in this course are based on above syllabus.

Text Books

1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2020
2	D. Poole, Linear Algebra: A Modern Introduction, 4th Edition

Reference Books

1	V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East-West

	Press, Latest Edition
2	Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons
3	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 11th Edition.
ICT/MOOCs Reference	
1	https://www.youtube.com/watch?v=C7IOuxSdfOI
2	https://www.youtube.com/watch?v=_6oRqxY6O5w
3	https://www.youtube.com/watch?v=yzuoyA2EJPA
4	https://www.youtube.com/watch?v=pG-IAFOiOw4
5	https://www.youtube.com/watch?v=XC-M-oTVR_0
6	https://www.youtube.com/watch?v=SYqTgfNyr3s
7	https://www.youtube.com/watch?v=88cEEN-_7OI

Mapping of Cos, POs, and PSOs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	3	2	0	2	1	2	1	2	2	3	2	3	2	2
CO2	2	2	1	1	2	1	2	2	2	1	2	1	2	2
CO3	3	1	1	1	1	2	1	2	3	2	2	2	2	2
CO4	2	2	2	2	3	3	2	3	2	2	3	2	3	1

Unit	Unit Title	Aligned COs	Learning Hours	BTL Level
1	Matrix Algebra	CO1	22	R,U,A
2	Vector Space	CO2	10	R,U,N
3	Linear Transformation	CO3	08	U,A,E
4	Infinite Series	CO4	05	U,A,N

Note:

- Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)
- L=Lecture, TU=Tutorial, P= Practical/Lab., TW= Term work, DT= Direct Teaching, Lab.= Laboratory work CE= Continuous Evaluation, SEE= Semester End Examination
- 1 Hour Lecture = 1 Credit, 1 Hour Tutorial = 1 Credit, 2 Hours Practical = 1 Credit, 2 Hours Internship/Project/Seminar = 1 Credit
- As per NCrF/NEP 2020, Minimum Self-Learning or Term Work Hours per Semester should be calculated in such a way that 1 Credit should have minimum 30 Hours of Teaching and Self Learning Engagement per semester