



JAI NARAIN VYAS UNIVERSITY, JODHPUR

SYLLABUS

(Three/Four Year Undergraduate Programme)

[B.Sc./B.A.] [Mathematics]

Semester I & II Examination [2026-27]

(As per NEP 2020)

Examination Scheme for the [B.Sc./B.A.] [Mathematics]-2026-27

NHEQF Level	Semester*	Course Type	Course Code	Course Title	L	P	H/W	Total Hours	Credits	Total Credits	CA Marks	EoSE Marks	M.M.
4.5	I	MJR	08/MAT/MJR/101/T	Differential and Integral Calculus	L	-	6	90	6	6	30	120	150
4.5	I	MJR	08/MAT/MJR/102/T	Algebra	L		6	90	6	6	30	120	150
4.5	II	MJR	08/MAT/MJR/151/T	Two-Dimensional Geometry and Vector Calculus	L		6	90	6	6	30	120	150
4.5	II	MJR	08/MAT/MJR/152/T	Three-Dimensional Geometry	L		6	90	6	6	30	120	150

B.Sc. /B.A. (Mathematics) Syllabus, Semester-I		
Session 2026-2027		
Part-A Introduction		
Subject	Mathematics	
Semester	I	
Name of the Course	Differential and Integral Calculus	
Course Code	08/MAT/MJR/101/T	
Course Type:	MJR(Major)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	10+2 with mathematics as one subject.	
Course Learning Outcomes (CLO)	After completing the course, the student will be able to: CLO1: Explain concepts of polar coordinates, curvature, and related properties of curves. CLO2: Apply partial differentiation, Euler’s theorem, and Lagrange’s method to solve optimization problems. CLO3: Analyze curves through asymptotes, singular points, curve tracing, envelopes, and evolutes. CLO4: Apply Beta and Gamma functions to evaluate rectification, volumes, and surfaces of solids of revolution. CLO5: Evaluate double and triple integrals and use them to determine areas and volumes.	
Credits	6	
Total Marks	30+120=150	
Part-B Contents of the Course		
Total lecture per week	6	
Units	Topics	No. of Lecture/Contact Hours
I	Polar Co-ordinates, Angle between radius vector and the tangent, Pedal equation of a curve, Derivatives of an arc, curvature, Centre of curvature and chord of curvature.	18
II	Partial differentiation, Euler’s theorem on homogeneous functions, chain rule of partial differentiation, Maxima and Minima of functions of two independent variables and of three variables connected by a relation, Lagrange’s Method of undetermined Multipliers.	18
III	Asymptotes, Singular points, curve tracing (Cartesian and polar form), Envelopes and evolutes.	18
IV	Theory of Beta and Gamma functions, Rectification, Volumes and Surfaces of solids of revolution. Differentiation and integration under the sign of integration.	18
V	Evaluation of double and triple integrals and their applications in finding areas and volumes. Dirichlet’s integral. Change of order of integration and changing into polar co- ordinates.	18

Activities • Classroom Discussions and Concept Clarification: • Short Written Assignments/Concept Notes:. • Group Discussions and Presentations • Case Study/Contemporary Issue Analysis: • Debates and Interactive Sessions:
Part-C Learning Resources
Recommended Books: • Gorakh Prasad: A Text Book of Differential Calculus; Pothishala Pvt. Ltd. Allahabad. • J.L. Bansal, S.L. Bhargava and S.M. Agarwal: A Text Book of Differential Calculus II (Hindi Ed.) and Integral Calculus, Vol. II (Hindi Ed.); Jaipur Publishing House, Jaipur. • D.C. Gokharoo & S.R. Saini: Differential Calculus (Hindi Ed.); Navkar Prakashan, Ajmer. • O.P. Tandon and K.C. Sharma: Integral Calculus; Jaipur Publishing House, Jaipur. • Gupta, Juneja and Tandon: Differential Calculus (English Ed.); Ramesh Book Depot, Jaipur. • Gorakh Prasad: Integral Calculus; Pothishala Pvt. Ltd. Allahabad. Note: Latest edition of text books and reference books may be used.

B.Sc./ B.A. (Mathematics) Syllabus, Semester-I		
Session 2026-2027		
Part-A Introduction		
Subject	Mathematics	
Semester	I	
Name of the Course	ALGEBRA	
Course Code	08/MAT/MJR/102/T	
Course Type:	MJR(Major)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	10+2 with mathematics as one subject.	
Course Learning Outcomes (CLO)	After completing the course, the student will be able to: CLO1: Explain concepts of eigenvalues, eigenvectors, characteristic equations, and apply the Cayley–Hamilton theorem to find the inverse of a matrix. CLO2: Apply theorems of polynomial equations and analyze relations between roots and coefficients. CLO3: Solve cubic and bi-quadratic equations using Cardan’s and Ferrari’s methods. CLO4: Determine convergence or divergence of infinite series using standard convergence tests. CLO5: Analyze alternating series and apply different tests for convergence of series.	
Credits	6	
Total Marks	30+120=150	
Part-B Contents of the Course		
Total lecture per week	6	
Units	Topics	No. of Lecture/Contact Hours
I	The characteristic equation of a matrix, Eigen values and Eigen vectors, Cayley-Hamilton theorem and its use in finding the inverse of a matrix.	18
II	Theory of equations: Remainder theorem, factor theorem, Relations between the roots and coefficients of general polynomial equations in one variable. Symmetric function of roots,	18
III	Transformation of equations, Descarte’s rule of signs, Solution of cubic equations (Cardon’s method), Bi-quadratic equations (Ferrari’s Method).	18
IV	Infinite series: Convergent series, tests for convergence of a series, comparison test, convergence of the Hyperharmonic series, Cauchy’s root test, D’Alembert’s Ratio test, Logarithmic Ratio Test. (Derivation of above tests not required).	18
V	Raabe’s test, De Morgen and Bertrand’s test, Cauchy’s condensation test, Gauss’s test. Alternating series, Leibnitz test (Derivation of above tests not required).	18

Activities • Classroom Discussions and Concept Clarification: • Short Written Assignments/Concept Notes: • Group Discussions and Presentations • Case Study/Contemporary Issue Analysis: • Debates and Interactive Sessions:
Part-C Learning Resources
Recommended Books: • M. Ray: A Text Book of Higher Algebra, S. Chand & Co., New Delhi. • J.L. Bansal, S.L. Bhargava and S.M. Agarwal: Algebra (Hindi Ed.), Jaipur Publishing House, Jaipur. • A.R. Vasishta and A.K. Vasistha: Matrices, Krishna Prakashan Ltd. Meerut. • G.C. Sharma: Modern Algebra; Ram Prasad & Sons, Agra. • J.L. Bansal and S.L. Bhargava: Abstract Algebra (Hindi Ed.); Jaipur Publishing House, Jaipur. • R.S. Agarwal: Text Book on Modern Algebra; S. Chand & Co., New Delhi. • D.C. Gokhroo and S.R. Saini: Abstract Algebra (Hindi Ed.) Jaipur Publishing House, Jaipur. Note: Latest edition of text books and reference books may be used.

B.Sc./ B.A. (Mathematics) Syllabus, Semester-II		
Session 2026-2027		
Part-A Introduction		
Subject	Mathematics	
Semester	II	
Name of the Course	Two-Dimensional Geometry and Vector calculus	
Course Code	08/MAT/MJR/151/T	
Course Type:	MJR(Major)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	10+2 with mathematics as one subject.	
Course Learning Outcomes (CLO)	After completing the course, the student will be able to: CLO1: Explain properties of ellipse including tangent, normal, pole–polar, and conjugate diameters. CLO2: Apply polar equations of conics to determine tangents, normals, asymptotes, and related elements. CLO3: Analyze general second degree equations and trace conic sections in Cartesian coordinates. CLO4: Apply concepts of vector calculus including gradient, divergence, curl, and directional derivatives. CLO5: Use Green’s, Stokes’, and Gauss’ theorems in solving vector calculus problems.	
Credits	6	
Total Marks	30+120=150	
Part-B Contents of the Course		
Total lecture per week	6	
Units	Topics	No. of Lecture/Contact Hours
I	Ellipse: tangent, normal, chord of contact of the tangents, pole and polar, eccentric angle, auxiliary circle, director circle, equation of chord in term of middle point, pair of tangents, conjugate lines, diameter and conjugate diameters	18
II	Polar equation of a conic, polar equations of tangent, normal, asymptotes, chord of contact, auxiliary circle, director circle of a conic.	18
III	General equation of second degree: Tracing of conics (Cartesian coordinates).	18
IV	Vector Calculus: Scalar point function, vector point function, differentiation and integration of vector point function, directional derivative, differential operators, Curl, Gradient, Divergence and Identities involving these operators.	18
V	Stoke, Green and Gauss Theorems (Statement, application and verification only).	18

Activities

- **Classroom Discussions and Concept Clarification:**
- **Short Written Assignments/Concept Notes:.**
- **Group Discussions and Presentations**
- **Case Study/Contemporary Issue Analysis:**
- **Debates and Interactive Sessions:**

Part-C Learning Resources**Recommended Books:**

- J.L. Bansal & S.L. Bhargava: 2-D Coordinate Geometry (Hindi Ed.) Jaipur Publishing House, Jaipur.
- Sharma, C.L. Varshney : Coordinate Geometry, Pragati Prakashan, Meerut.
- D.C. Gokhroo, S.R. Saini & J.P.N. Ojha : 2-D Geometry (Hindi Ed.), Navkar Publication, Ajmer.
- **D.C. Gokhroo, S.R. Saini, S.S. Bhati** : Vector Calculus (Hindi Ed.); Navkar Prakashan, Ajmer.
- **S.L. Bhargava, Banwari Lal**: Vector Calculus (Hindi Ed.); Jaipur Publishing House, Jaipur.

Note: Latest edition of text books and reference books may be used.

B.Sc./ B.A. (Mathematics) Syllabus, Semester-II		
Session 2026-2027		
Part-A Introduction		
Subject	Mathematics	
Semester	II	
Name of the Course	Three-Dimensional Geometry	
Course Code	08/MAT/MJR/152/T	
Course Type:	MJR(Major)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	10+2 with mathematics as one subject.	
Course Learning Outcomes (CLO)	After completing the course, the student will be able to: CLO1: Explain equations and properties of sphere, cone, and cylinder in rectangular coordinates. CLO2: Analyze central conicoids and determine tangent planes, polar planes, and related elements. CLO3: Apply concepts of normals, conjugate diameters, and diametral planes for ellipsoids. CLO4: Examine plane sections of conicoids and identify special points such as umbilics. CLO5: Analyze properties and generating lines of hyperboloid of one sheet and related surfaces.	
Credits	6	
Total Marks	30+120=150	
Part-B Contents of the Course		
Total lecture per week	6	
Units	Topics	No. of Lecture/Contact Hours
I	Sphere, Cone and Cylinder (Rectangular Coordinates only).	18
II	The Central Conicoids (referred to principal axes). Tangents and tangent planes, Polar planes and polar lines, Section with a given centre, Enveloping cone, Enveloping cylinder and related problems.	18
III	Equations of the normal to an ellipsoid, number of normals from a given point to an ellipsoid, Cone through six normals, Conjugate diameter and diametral planes and their properties. Cone as a Central surface. Paraboloids.	18
IV	Plane Sections of Conicoids, Umbilics.	18
V	Generating lines of hyperboloid of one sheet and its properties.	18
Activities • Classroom Discussions and Concept Clarification: • Short Written Assignments/Concept Notes:. • Group Discussions and Presentations • Case Study/Contemporary Issue Analysis: • Debates and Interactive Session:		

Part-C Learning Resources

Recommended Books:

- R.J.T.Bell,: Coordinate Geometry of Three dimensions; Macmillan India Ltd., New Delhi.
- Vasistha, Agarwal : Analytical Solid Geometry; Pragati Prakashn, Meerut.
- Gokhroo, Saini & Rathi : Analytical 3-D Geometry (Hindi Ed); Jaipur Pub. House, Jaipur.
- J.L.Bansal, S.L. Bhargva & S.M. Agarwal : 3-D Coordinate Geometry II; Jaipur Pub. House, Jaipur.

Note: Latest edition of text books and reference books may be used.