FOUR-YEAR UNDERGRADUATE PROGRAM

with

SINGLE MAJOR AND SINGLE MINOR COURSE

&

THREE DISCIPLINE SPECIFIC MULTIDISCIPLINARY COURSE

under

THE NEW CURRICULUM AND CREDIT FRAMEWORK, 2022

REVISED SYLLABUS

F Y U G P

F Y U G P

in

MATHEMATICS

(w.e.f. the academic session 2024-2025)

UNIVERSITY OF NORTH BENGAL

Raja Rammohunpur, P.O. - NBU Campus

District - Darjeeling, Pin - 734013, West Bengal, India

B.SC. MATHEMATICS SYLLABUS

REVISED SYLLABUS	**2024 FOUR-YEAR UNDERGRADUATE PROGRAM (FYUGP)**
NEW SYLLABUS	**2023 FOUR-YEAR UNDERGRADUATE PROGRAM (FYUGP)**
REVISED SYLLABUS	**2023 THREE-YEAR UG HONS/PROG COURSE (CBCS)**
OLD SYLLABUS	**2018 THREE-YEAR UG HONS/PROG COURSE (CBCS)**

SESSION	1ST SEM	2ND SEM	3RD SEM	4TH SEM	5TH SEM	6TH SEM	7TH SEM	8TH SEM
2024-2025 & onwards								
2023-2024								
2022-2023								
2021-2022								
2020-2021								
2019-2020								
2018-2019								

Contents

MATHEMATICS 4-YEAR UNDERGRADUATE PROGRAM

CREDIT AND HOURS			
L	**Lecture**	1 Credit	1 Hour
T	**Tutorial**	1 Credit	1 Hour
P	**Practical**		
PLB	**Practical Lab Based**	1 Credit	2 Hours
PAPER TYPE			
TH	Theory		
TU	Tutorial		
PLB	Practical Lab Based		

CREDIT & MARK DISTRIBUTION

Sl. No.	Course Type		Course Level	Course Credit	Full Marks	Marks Distribution			
						TH	TU	PLB	TU/ PLB
1	Major Course	**MAJ**	100-400	4	80	60	----	----	20
2	Minor Course	**MIN**	100-300	4	80	60	----	----	20
3	Discipline Specific Course	**DSC**	100-400	4	80	60	----	----	20
4	Value Added Course	**VAC**	100	4	80	60	20	----	----
5	Ability Enhancement Course	**AEC**	100	4	80	60	20	----	----
6	Skill Enhancement Course	**SEC**	100-200	3	60	40	----	20	----
7	Interdisciplinary Course	**IDC**	100	3	60	40	20	----	----

⊗ It is mandatory for **Lab Based Subjects** to conduct practical examinations at the end of each semester.

⊗ **Tutorials** are to be conducted by the Colleges throughout the Semester.

⊗ **SEC** should also include a Practical Component which will be evaluated by the College.

⊗ Students opting for NCC as IDC will have to appear for Practical Examinations.

⊗ Internship is to be conducted and certified by respective colleges.

Optional – In case of Certificate Level/ Diploma Level Exit

3/4-Year Undergraduate Mathematics Course Structure

Single Major and Single Minor

SEMESTER-1							
Paper Code	**Paper Level**	**Paper**	**Paper Description**	**Paper Type**	**Full Marks**	**Credit**	
						L	**T/P**
MATHMAJ101	100	MAJ	Classical Algebra and Matrix Theory	TH	80	3	1
MATHMAJ102	100	MAJ	Calculus and Geometry	TH	80	3	1
MATHMIN101	100	MIN	Classical Algebra and Matrix Theory	TH	80	3	1
----------	100	VAC	Environmental Education	TH	80	4	
----------	100	SEC	SEC-POOL-A	TH	60	3	
					Total	**19**	

SEMESTER-2							
Paper Code	**Paper Level**	**Paper**	**Paper Description**	**Paper Type**	**Full Marks**	**Credit**	
						L	**T/P**
MATHMAJ203	100	MAJ	Real Analysis	TH	80	3	1
MATHMAJ204	100	MAJ	Differential Equations	TH	80	3	1
MATHMIN202	100	MIN	Calculus and Geometry	TH	80	3	1
----------	100	AEC	English Compulsory	TH	80	4	
----------	100	IDC	IDC Group Table	TH	60	3	
----------	100	SEC	SEC-POOL-B	TH	60	3	
					Total	**22**	

INTERNSHIP ##	**Credit**	2

Internship is optional.

Students exiting after securing 41 credits at the end of 2nd Semester + 2 credits of Internship will be allowed to exit and provided with a U.G. Certificate

Dr. Paltu Sarkar
Chairperson
UG BOS in Mathematics
University of North Bengal

SINGLE MAJOR AND SINGLE MINOR

Major Courses

Sem.	Paper Code	Paper Description	Paper Type	TH	TU	Credit		Page No.
						L	T	
1	MATHMAJ101	Classical Algebra and Matrix Theory	TH	60	20	3	1	1
	MATHMAJ102	Calculus and Geometry	TH	60	20	3	1	2
2	MATHMAJ203	Real Analysis	TH	60	20	3	1	3
	MATHMAJ204	Differential Equations	TH	60	20	3	1	4

Minor Courses

Sem.	Paper Code	Paper Description	Paper Type	TH	TU	Credit		Page No.
						L	T	
1	MATHMIN101	Classical Algebra and Matrix Theory	TH	60	20	3	1	5
2	MATHMIN202	Calculus and Geometry	TH	60	20	3	1	6

DETAILED SYLLABUS

of

MAJOR COURSES

(semester wise)

Semester-1										
Paper Description	Classical Algebra and Matrix Theory		**Paper Code**				MATHMAJ101			
Paper (Type)	Major Course (Theory)		**Credit**				**Marks**			
Paper Level	**Class Hours**	**Sem. End Exam.**	**L**	**T**	**P**	**Total**	**TH**	**TU**	**PRC**	**Total**
100	4 Hours/week	2 Hr. 30 Min	3	1	---	4	60	20	----	80

CLASSICAL ALGEBRA AND MATRIX THEORY

Classical Algebra:

Unit 1: **8 classes**

Complex numbers: Polar representation, De Moivre's theorem for rational indices and its applications. Logarithm, trigonometric, exponential and hyperbolic functions of complex variable.

Unit 2: **15 classes**

Theory of polynomial equations: Fundamental theorem of Classical Algebra (statement only). Location and nature of roots: Descartes' rule of signs and Sturms' theorem. Relation between roots and coefficients. Solution methods for cubic and biquadratic poly. equations: Cardan's and Ferrari's method. Symmetric functions of roots, transformation of equation, special roots, reciprocal equations.

Unit 3: **(5+12) classes**

Inequality: $AM \geq GM \geq HM$, weighted means and m-th power theorem (statement only), Cauchy-Schwarz inequality (statements only) and their applications.

Integers: Well-ordering property of positive integers, division algorithm, Euclidean algorithm, congruence relation between integers, Fundamental Theorem of Arithmetic (statement only), solution of linear congruence, Chinese Remainder Theorem (statement only) and its applications to find a solution of system of linear congruences. Fermat's Little theorem & Wilson theorem (statement only) and their simple problems.

Matrix Theory:

Unit 4: **10 classes**

Matrices: Elementary operations, elementary matrices, row/column equivalent matrix, echelon matrix, row/column reduced echelon matrix, rank of matrix, normal forms, congruence operations, congruence matrices. Signature and index.

Unit 5: **10 classes**

Eigen values and eigen vectors of a square matrix, characteristic equation of a matrix, Cayley-Hamilton theorem (statement only) and its simple applications.

Suggested Reading Books:

- S. Lang, Introduction to Linear Algebra, *Springer.*
- S.K. Mapa, Higher Algebra: Classical, *Levant.*
- S.K. Mapa, Higher Algebra: Abstract & Linear, *Levant.*
- W.S. Burnstine and A.W. Panton, Theory of equations, *Creative Media.*
- S.H. Friedberg, A.J. Insel and L.E. Spence, Linear Algebra, *Pearson Edu. Pub. (Indian).*
- K. Hoffman and R. Kunze, Linear algebra, *Prentice Hall India.*
- V. Sahai and V. Bist, Linear Algebra, *Narosa Pub. House.*

Semester-1										
Paper Description	Calculus and Geometry		**Paper Code**				MATHMAJ102			
Paper (Type)	Major Course (Theory)		**Credit**				**Marks**			
Paper Level	**Class Hours**	**Sem. End Exam.**	**L**	**T**	**P**	**Total**	**TH**	**TU**	**PRC**	**Total**
100	4 Hours/week	2 Hr. 30 Min	3	1	---	4	60	20	----	80

CALCULUS AND GEOMETRY

Calculus:

Unit 1: **15 classes**

Reduction formulae, derivations and illustrations of reduction formulae of the type $\int sin^n x\, dx$, $\int \cos^n x\, dx$, $\int \sec^n x\, dx$, $\int \tan^n x\, dx$, $\int (logx)^n\, dx$, $\int \sin nx \cos^m x\, dx$ etc.

Arc length of a curve including parametric curves, area enclosed by a curve, area between two curves.

Unit 2: **15 classes**

Successive derivatives, Leibnitz rule and its applications. Indeterminate forms, L'Hospital's rule and it's applications.

Concept of simple and closed curves and their parameterizations, Pedal equation, envelopes, evolute, asymptotes, radius of curvature. Concavity, convexity, cusps and inflection points.

Geometry:

Unit 3: **15 classes**

2D: Reflection properties of conics, rotation of axes and second-degree equations, pair of straight lines, classification of conics using the discriminant, polar equations of conics.

Unit 4: **15 classes**

3D: Spheres, cylindrical surfaces, cones, ellipsoids, paraboloids, hyperboloids, plane sections of conicoids, generating lines, classification of quadrics.

Suggested Reading Books:

- G. B. Thomas and R. L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
- M. J. Strauss, G. L. Bradley, and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
- H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
- R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer Verlag, New
- T. Apostol, Calculus, Volumes I, and II.
- S. Goldberg, Calculus and mathematical analysis.
- S. K. Mapa, Introduction to Real Analysis, *Sarat Book House.*
- S. C. Malik and S. Arora, Mathematical Analysis, *New Age International.*
- U. Chatterjee and N. Chatterjee, Advanced Analytical Geometry of Two and Three Dimensions, *Academic Publishers*.
- R.M. Khan, Analytical Geometry of Two and Three Dimensions & Vector Analysis, *New Central Book Agency*

Semester-2										
Paper Description	Real Analysis		**Paper Code**				MATHMAJ203			
Paper (Type)	Major Course (Theory)		**Credit**				**Marks**			
Paper Level	**Class Hours**	**Sem. End Exam.**	**L**	**T**	**P**	**Total**	**TH**	**TU**	**PRC**	**Total**
100	4 Hours/week	2 Hr. 30 Min	3	1	---	4	60	20	----	80

REAL ANALYSIS

Unit 1: **15 classes**

Review of Algebraic and order properties of $\mathbb{R}$, ε-neighborhood of a point in $\mathbb{R}$. Idea of countable and uncountable subsets of $\mathbb{R}$. Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima with their properties and supporting examples. Completeness property of $\mathbb{R}$ and its equivalent properties. Archimedean property, density property of $\mathbb{R}$. Intervals. Limit point and isolated point of a set. Open set, closed set, derived set and their properties. Bolzano-Weierstrass theorem on limit point. Nested interval theorem. Compact sets in $\mathbb{R}$. Heine-Borel Theorem.

Unit 2: **15 classes**

Sequences: Sequence, bounded sequence, convergent sequence. Limit and limit points of a sequence. Uniqueness of limit of convergent sequences. lim inf & lim sup. Limit theorems. Monotone sequences, monotone convergence theorem. Sandwich theorem. Subsequences. Divergence criteria. Monotone subsequence theorem (statement only). Bolzano Weierstrass theorem for sequences. Cauchy sequence, Cauchy's convergence criterion.

Unit 3: **15 classes**

Limits of functions (ε-δ approach), sequential criterion for limits, divergence criteria. Limit theorems. One sided limit. Infinite limits and limits at infinity.

Continuous functions, sequential criterion for continuity. Algebra of continuous functions. Continuous functions on an interval. Intermediate value theorem. Location of roots theorem. Preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.

Unit 4: **15 classes**

Series: Infinite series, convergence and divergence of infinite series, Cauchy criterion. Tests for convergence: comparison test, limit comparison test, D'Alembert's ratio test, Cauchy's nth root test, integral test. Absolutely convergent series (Ratio test, Root test), conditionally convergent series (Leibniz's test) and alternating series. Re-arrangement of terms.

Suggested Reading Books:

- R. Bartle and D.R. Sherbert, Introduction to Real Analysis, John Wiley and Sons, 2003.
- K. A. Ross, Elementary Analysis : The Theory of Calculus, Springer, 2004.
- A. Mattuck, Introduction to Analysis, Prentice Hall, 1999.
- S. R. Ghorpade and B. V. Limaye, a Course in Calculus and Real Analysis, Springer, 2006.
- T. Apostol, Mathematical Analysis, Narosa Publishing House.
- Courant and John, Introduction to Calculus and Analysis, ,Voll II, Springer.
- W. Rudin, Principles of Mathematical Analysis, Tata McGraw-Hill
- T. Tao, Analysis II, Hindustan Book Agency, 2006.

Semester-2										
Paper Description	Differential Equations		**Paper Code**				MATHMAJ204			
Paper (Type)	Major Course (Theory)		**Credit**				**Marks**			
Paper Level	**Class Hours**	**Sem. End Exam.**	**L**	**T**	**P**	**Total**	**TH**	**TU**	**PRC**	**Total**
100	4 Hours/week	2 Hr. 30 Min	3	1	---	4	60	20	----	80

DIFFERENTIAL EQUATIONS

Unit 1: **30 classes**

Differential equations: General, particular, explicit, implicit and singular solutions of a differential equation. First order and first-degree equations: Existence theorem (statement only). Exact equation, integrating factors and different calculating rules (statement of relevant results). Linear equations and Bernoulli equation. Special integrating factors and transformations. First order but not of first-degree equations: Clairaut's equation.

General solution of homogeneous equation of second order, principle of super position for homogeneous equation. Wronskian: Its properties and applications. Higher order linear equations with constant coefficients: Complementary function and particular integral. Method of undetermined coefficients, method of variation of parameters. Euler's homogeneous equation. Second order linear equations with variable coefficients: Method of variation of parameters. Reduction to normal form. Change of dependent and independent variables.

Unit 2: **12 classes**

Systems of linear differential equations, types of linear systems. Differential operators. An operator method for linear systems with constant coefficients. Basic theory of linear systems in normal form. Homogeneous linear systems with constant coefficients: Two equations in two unknown functions.

Unit 3: **10 classes**

Lipschitz condition and Picard's Theorem (Statement only). Autonomous system. Equilibrium points. Interpretation of phase plane.

Unit 4: **8 classes**

Power series solution of a differential equation about an ordinary point, solution about a regular singular point.

Simple eigen value problems.

Suggested Reading Books:

- B. Barnes and G. R. Fulford, Mathematical Modeling with Case Studies, A Differential Equation Approach using Maple and Matlab, Taylor and Francis, London and New York, 2009.
- C. H. Edwards and D. E. Penny, Differential Equations and Boundary Value problems Computing and Modeling, Pearson Education India, 2005.
- S. L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, India, 2004.
- M. L. Abell, James P Braselton, Differential Equations with MATHEMATICA, 3rd Ed., Elsevier Academic Press, 2004.
- D. Murray, Introductory Course in Differential Equations, Longmans Green and Co.
- Boyce and Diprima, Elementary Differential equations and boundary Value problems, Wiley.
- G. F. Simmons, Differential Equations, Tata McGraw Hill.

DETAILED SYLLABUS

of

MINOR COURSES

(semester wise)

SEMESTER-1										
Paper Description	Classical Algebra and Matrix Theory		**Paper Code**				MATHMIN101			
Paper (Type)	Minor Course (Theory)		**Credit**				**Marks**			
Paper Level	**Class Hours**	**Sem. End Exam.**	**L**	**T**	**P**	**Total**	**TH**	**TU**	**PRC**	**Total**
100	4 Hours/week	2 Hr. 30 Min	3	1	-- -	4	60	20	----	80

CLASSICAL ALGEBRA AND MATRIX THEORY

Classical Algebra:

Unit 1: **10 classes**

Complex numbers: Polar representation, De Moivre's theorem for rational indices and its applications. Logarithm, trigonometric, exponential and hyperbolic functions of complex variable.

Unit 2: **15 classes**

Theory of polynomial equations: Fundamental theorem of Classical Algebra (statement only). Location and nature of roots: Descartes' rule of signs. Relation between roots and coefficients. Solution methods for cubic and biquadratic poly. equations: Cardan's and Ferrari's method. Symmetric functions of roots, transformation of equation.

Unit 3: **8 classes**

Inequality: $AM \geq GM \geq HM$, weighted means and m-th power theorem (statement only), Cauchy-Schwarz inequality (statements only) and their applications.

Matrix Theory:

Unit 4: **15 classes**

Matrices: Elementary operations, elementary matrices, row/column equivalent matrix, echelon matrix, row/column reduced echelon matrix, rank of matrix, normal forms, congruence operations, congruence matrices. Systems of linear equations: Consistency, the matrix equation $AX = B$ of a system of linear equations, solution sets of linear systems, solution of linear systems using row reduced form.

Unit 5: **12 classes**

Eigen values and eigen vectors of a square matrix, characteristic equation of a matrix, Cayley-Hamilton theorem (statement only) and its simple applications.

Suggested Reading Books:

- S. Lang, Introduction to Linear Algebra, *Springer.*
- S.K. Mapa, Higher Algebra: Classical, *Levant.*
- S.K. Mapa, Higher Algebra: Abstract & Linear, *Levant.*
- W.S. Burnstine and A.W. Panton, Theory of equations, *Creative Media.*
- S.H. Friedberg, A.J. Insel and L.E. Spence, Linear Algebra, *Pearson Edu. Pub. (Indian).*
- K. Hoffman and R. Kunze, Linear algebra, *Prentice Hall India.*
- V. Sahai and V. Bist, Linear Algebra, *Narosa Pub. House.*

SEMESTER-2										
Paper Description	Calculus and Geometry		**Paper Code**				MATHMIN202			
Paper (Type)	Minor Course (Theory)		**Credit**				**Marks**			
Paper Level	**Class Hours**	**Sem. End Exam.**	**L**	**T**	**P**	**Total**	**TH**	**TU**	**PRC**	**Total**
100	4 Hours/week	2 Hr. 30 Min	3	1	-- -	4	60	20	----	80

CALCULUS AND GEOMETRY

Calculus:

Unit 1: **15 classes**

Reduction formulae, derivations and illustrations of reduction formulae of the type $\int sin^n x\, dx$, $\int \cos^n x\, dx, \int \sec^n x\, dx, \int \tan^n x\, dx$, $\int (logx)^n\, dx$, $\int \sin^n x \cos^m x\, dx$ etc.

Arc length of a curve including parametric curves, area enclosed by a curve, area between two curves. volume and surface areas of solids formed by revolution of plane curve and areas problems only.

Unit 2: **15 classes**

Successive derivatives, Leibnitz rule and its applications. Indeterminate forms, L'Hospital's rule and it's applications.

Concept of simple and closed curves and their parameterizations, envelopes, asymptotes, radius of curvature. Concavity, convexity, and inflection points.

Geometry:

Unit 3: **15 classes**

2D: Rotation of axes and second-degree equations, pair of straight lines, classification of conics using the discriminant, polar equations of conics.

Unit 4: **15 classes**

3D: Spheres, cylindrical surfaces, cones, ellipsoids, paraboloids, hyperboloids, classification of quadrics.

Suggested Reading Books:

- G. B. Thomas and R. L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
- H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
- R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer Verlag, New
- S. Goldberg, Calculus and mathematical analysis.
- S. K. Mapa, Introduction to Real Analysis, *Sarat Book House.*
- S. C. Malik and S. Arora, Mathematical Analysis, *New Age International.*
- U. Chatterjee and N. Chatterjee, Advanced Analytical Geometry of Two and Three Dimensions, *Academic Publishers*.
- R.M. Khan, Analytical Geometry of Two and Three Dimensions & Vector Analysis, *New Central Book Agency*.

3/4-Year Undergraduate Mathematics Course Structure

Three Discipline Specific Multidisciplinary Course

SEMESTER-1							
Paper Code	**Paper Level**	**Paper**	**Paper Description**	**Paper Type**	**Full Marks**	**Credit**	
						L	**T**
MATHDSC101	100	DSC	Classical Algebra and Matrix Theory	TH	80	3	1
MATHMIN101	100	MIN	Classical Algebra and Matrix Theory	TH	80	3	1
----------	100	VAC	Understanding India	TH	80	4	
----------	100	SEC	SEC-POOL-A	TH	60	3	
					Total	**19**	

SEMESTER-2							
Paper Code	**Paper Level**	**Paper**	**Paper Description**	**Paper Type**	**Full Marks**	**Credit**	
						L	**T**
MATHDSC202	100	MAJ	Calculus and Geometry	TH	80	3	1
MATHMIN202	100	MIN	Calculus and Geometry	TH	80	3	1
----------	100	AEC	MIL (Bengali/Nepali/Hindi/Urdu/ Sanskrit/Alternative English)	TH	80	4	
----------	100	IDC	IDC Group Table	TH	60	3	
----------	100	SEC	SEC-POOL-B	TH	60	3	
					Total	**22**	
INTERNSHIP ##					**Credit**	2	

Internship is optional.

Students exiting after securing 41 credits at the end of 2nd Semester + 2 credits of Internship will be allowed to exit and provided with a U.G. Certificate

Dr. Paltu Sarkar
Chairperson
UG-BOS in Mathematics
University of North Bengal

THREE DISCIPLINE SPECIFIC MULTI – DISCIPLINARY COURSE

DSC Courses

Sem.	Paper Code	Paper Description	Paper Type	TH	TU	Credit		Page No.
						L	T	
1	MATHDSC101	Classical Algebra and Matrix Theory	TH	60	20	3	1	7
2	MATHDSC202	Calculus and Geometry	TH	60	20	3	1	8

Minor Courses

Sem.	Paper Code	Paper Description	Paper Type	TH	TU	Credit		Page No.
						L	T	
1	MATHMIN101	Classical Algebra and Matrix Theory	TH	60	20	3	1	7
2	MATHMIN202	Calculus and Geometry	TH	60	20	3	1	8

DETAILED SYLLABUS

of

DSC/MINOR COURSES

(semester wise)

SEMESTER-1										
Paper Description	Classical Algebra and Matrix Theory		**Paper Code**				MATHDSC101/ MATHMIN101			
Paper (Type)	DSC Course / Minor Course (Theory)		**Credit**				**Marks**			
Paper Level	**Class Hours**	**Sem. End Exam.**	**L**	**T**	**P**	**Total**	**TH**	**TU**	**PRC**	**Total**
100	4 Hours/week	2 Hr. 30 Min	3	1	-- -	4	60	20	----	80

CLASSICAL ALGEBRA AND MATRIX THEORY

Classical Algebra:

Unit 1: **10 classes**

Complex numbers: Polar representation, De Moivre's theorem for rational indices and its applications. Logarithm, trigonometric, exponential and hyperbolic functions of complex variable.

Unit 2: **15 classes**

Theory of polynomial equations: Fundamental theorem of Classical Algebra (statement only). Location and nature of roots: Descartes' rule of signs. Relation between roots and coefficients. Solution methods for cubic and biquadratic poly. equations: Cardan's and Ferrari's method. Symmetric functions of roots, transformation of equation.

Unit 3: **8 classes**

Inequality: $AM \geq GM \geq HM$, weighted means and m-th power theorem (statement only), Cauchy-Schwarz inequality (statements only) and their applications.

Matrix Theory:

Unit 4: **15 classes**

Matrices: Elementary operations, elementary matrices, row/column equivalent matrix, echelon matrix, row/column reduced echelon matrix, rank of matrix, normal forms, congruence operations, congruence matrices. Systems of linear equations: Consistency, the matrix equation $AX = B$ of a system of linear equations, solution sets of linear systems, solution of linear systems using row reduced form.

Unit 5: **12 classes**

Eigen values and eigen vectors of a square matrix, characteristic equation of a matrix, Cayley-Hamilton theorem (statement only) and its simple applications.

Suggested Reading Books:

- S. Lang, Introduction to Linear Algebra, *Springer.*
- S.K. Mapa, Higher Algebra: Classical, *Levant.*
- S.K. Mapa, Higher Algebra: Abstract & Linear, *Levant.*
- W.S. Burnstine and A.W. Panton, Theory of equations, *Creative Media.*
- S.H. Friedberg, A.J. Insel and L.E. Spence, Linear Algebra, *Pearson Edu. Pub. (Indian).*
- K. Hoffman and R. Kunze, Linear algebra, *Prentice Hall India.*
- V. Sahai and V. Bist, Linear Algebra, *Narosa Pub. House.*

SEMESTER-2										
Paper Description	Calculus and Geometry		**Paper Code**				MATHDSC202/ MATHMIN202			
Paper (Type)	DSC Course / Minor Course (Theory)		**Credit**				**Marks**			
Paper Level	**Class Hours**	**Sem. End Exam.**	**L**	**T**	**P**	**Total**	**TH**	**TU**	**PRC**	**Total**
100	4 Hours/week	2 Hr. 30 Min	3	1	-- -	4	60	20	----	80

CALCULUS AND GEOMETRY

Calculus:

Unit 1: **15 classes**

Reduction formulae, derivations and illustrations of reduction formulae of the type $\int sin^n x\,dx, \int \cos^n x\,dx, \int \sec^n x\,dx, \int \tan^n x\,dx, \int (logx)^n\,dx, \int \sin^n x \cos^m x\,dx$ etc.

Arc length of a curve including parametric curves, area enclosed by a curve, area between two curves. volume and surface areas of solids formed by revolution of plane curve and areas problems only.

Unit 2: **15 classes**

Successive derivatives, Leibnitz rule and its applications. Indeterminate forms, L'Hospital's rule and it's applications.

Concept of simple and closed curves and their parameterizations, envelopes, asymptotes, radius of curvature. Concavity, convexity, and inflection points.

Geometry:

Unit 3: **15 classes**

2D: Rotation of axes and second-degree equations, pair of straight lines, classification of conics using the discriminant, polar equations of conics.

Unit 4: **15 classes**

3D: Spheres, cylindrical surfaces, cones, ellipsoids, paraboloids, hyperboloids, classification of quadrics.

Suggested Reading Books:

- G. B. Thomas and R. L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
- H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
- R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer Verlag, New
- S. Goldberg, Calculus and mathematical analysis.
- S. K. Mapa, Introduction to Real Analysis, *Sarat Book House.*
- S. C. Malik and S. Arora, Mathematical Analysis, *New Age International.*
- U. Chatterjee and N. Chatterjee, Advanced Analytical Geometry of Two and Three Dimensions, *Academic Publishers*.
- R.M. Khan, Analytical Geometry of Two and Three Dimensions & Vector Analysis, *New Central Book Agency.*

ANNEXURE

Further List of Suggested Reading Books

Classical Algebra, Abstract Algebra, Linear Algebra, Group Theory, Ring Theory, Boolean Algebra

1. Topics in Algebra: I. N. Herstein (*Wiley Eastern Ltd.*)
2. Abstract Algebra: N. P. Chaudhuri *(Tata McGraw Hill)*
3. Complex Numbers from A to Z: T. Andreescu and D. Andrica (*Birkhause)*
4. Linear Algebra and its Applications : D.C. Lay (*Pearson Edu. Pub. (Indian))*
5. A First Course in Abstract Algebra: J. B. Fraleigh *(Pearson Education)*
6. A course in abstract algebra, V.K. Khanna and S.K. Bhambri, (*Vikas Publishing House*)
7. University Algebra: N. S. Gopala Krishnan (*New Age International*)
8. CBCS Mathematics: D. Chatterjee and B.K. Pal, (*U.N Dhur & Sons*)
9. Algebra: R. M. Khan *(New Central Book Agency)*
10. CBCS Integral Calculus and Differential Equations, D. Chatterjee and B.K. Pal, (*U.N Dhur & Sons*)
11. CBCS Algebra, D. Chatterjee and B.K. Pal, (*U.N Dhur & Sons*)
12. Higher Algebra, J.G. Chakravorty and P.R. Ghosh, (*U.N Dhur & Sons*)
13. Linear Algebra, P.K. Saikia *(Pearson, India)*
14. Linear Algebra, A.R. Vasistha, J.N. Sharma and A.K. Vasistha, *(Krishna Prakashan)*

Integral and Differential Calculus

15. Introduction to Real Analysis: D. R. Sherbert and R. G. Bartle *(Wiley)*
16. Advanced Mathematical Analysis: Utpal Chatterjee *(Academic Publishers)*
17. Mathematical Analysis: Problems and Solutions: S. Bandyopadhyay *(Academic Publishers)*
18. Mathematical Analysis: S. N. Mukhopadhyay and A. K. Layek (*U. N. Dhur and Sons*)
19. A Course of Mathematical Analysis: S. Narayan *(S. Chand & Co.)*
20. Problems in Mathematical Analysis: B. P. Demidovich *(Mir Publication)*
21. An Introduction to Analysis-Differential Calculus, Part I & II: R. K. Ghosh and K. C. Maity *(New Central Book Agency)*
22. Integral Calculus & Differential Equations: B. C. Das and B. N. Mukherjee *(U.N. Dhur and Sons)*
23. Differential Calculus: B. C. Das & B. N. Mukherjee *(U.N. Dhur and Sons)*
24. Differential Calculus: S. Narayan (*S. Chand & Co.)*
25. Application of Calculus: S. K. Maity & S. Bandyopadhyay *(Academic Publishers)*
26. Application of Calculus: D. Sengupta *(Books & Allied)*
27. Calculus and its Applications: Goldstein, Lay, Schneider, Asmar *(Pearson Education)*
28. Integral Calculus: S. Narayan *(S. Chand & Co.)*
29. An Introduction to Analysis-Integral Calculus: R. K. Ghosh and K. C. Maity *(New Central Book Agency)*
30. Integral Calculus and Differential Equations: D. Chatterjee *(Tata McGraw Hill)*
31. Calculus: Volume I and II: T. Apstol *(Narosa Publishing House)*

Analytical Geometry (Two & Three Dimension)

32. Analytical Geometry and Vector Algebra: N. Datta and R. N. Jana *(Shreedhar Prakashani)*
33. Co-ordinate Solid Geometry: B. Nand, B. S. Tyagi and B. D. Sharma (*Kedar Nath Ram Nath*)
34. Analytical Geometry of two and three Dimensions: A. N. Das *(New Central Book Agency)*
35. Vector Geometry & Elements of Calculus, A. Dey, (*Pearson India*)

Discrete Mathematics and Graph Theory

36. Discrete Mathematics: J. K. Sharma *(Macmillan)*
37. Introduction to Discrete Mathematics: M. K. Sen and B. C. Chakraborty *(Books & Allied)*
38. Discrete Mathematics with Graph Theory: E. G. Goodaire and M. M. Parmenter (*Pearson Education)*
39. Discrete Mathematics, S. Lipschutz and M.L. Lipson, *(Tata McGraw Hill)*
40.

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QUESTION PATTERN

⋕ MAJ, DSC, MIN & AEC PAPER (THEORITICAL EXAM.)

For 60 Marks:

Group	Total Questions	Question to be answered	Mark of each Question	Total Marks
A	6	4	3	$12 = 4 \times 3$
B	6	4	6	$24 = 4 \times 6$
C	4	2	12	$24 = 2 \times 12$
			Total Marks	60

⋕ SEC PAPER (THEORITICAL EXAM.)

For 40 Marks paper:

Group	Total Questions	Question to be answered	Mark of each Question	Total Marks
A	8	5	1	$5 = 5 \times 1$
B	5	3	5	$15 = 3 \times 5$
C	4	2	10	$20 = 2 \times 10$
			Total Marks	40

Outlines of 3/4-year Undergraduate Program in Mathematics

⁕ A student taking **Mathematics as a Major subject** in Single Major and Single Minor Course has to opt

1. **Any one** from the following Science group as a Minor Course:

SCIENCE							
1	Botany	2	Chemistry	3	Computer Science	4	Economics
5	Food Technology	6	Geology	7	Geography	8	Microbiology
9	Physics	10	Physiology	11	Statistics	12	Tea Science
13	Zoology						

2. **Ability Enhancement Courses (AEC):**

I. For Semesters 2:

Sem.	Paper Levels	Paper Description	Credit	Full Marks
2	100	English Compulsory	4	80

II. For Semester 3, a student has to choose one paper from the following:

Sl. No.	Sem.	Paper Levels	Paper Description	Credit	Full Marks
1	**3**	100	Alternative English	4	80
2	**3**	100	MIL Bengali	4	80
3	**3**	100	MIL Hindi	4	80
4	**3**	100	MIL Nepali	4	80
5	**3**	100	MIL Sanskrit	4	80
6	**3**	100	MIL Urdu	4	80

3. **Value-Added Courses (VAC):**

Sem.	Paper Levels	Paper Description	Credit	Full Marks
1	100	Environmental Education	4	80
4	100	Understanding India	4	80

4. **Skill Enhancement Courses (SEC):**

Sem.	Paper Levels	Paper Description	Credit	Full Marks
1	100	SEC-POOL A	3	60
2	100	SEC-POOL B	3	60
3	200	SEC-POOL C	3	60

5. **Interdisciplinary Courses (IDC):**

Sem.	Paper Levels	Paper Description	Credit	Full Marks
2	100	choose **any one** entire group #	3	60
3	100		3	60
4	100		3	60
# depending on the eligibility condition				

⁕ For **Mathematics as a DSC** in Three Discipline Specific Multi-Disciplinary Course (FYUGP),

1. Students should choose any **two subjects** from any **two Combination** as DSC subject in which **one subject** must be **Mathematics** and choose the **third subject** from any one of the remaining two Combinations as Minor subject.

Combination-A	Combination-B	Combination-C	Combination-D
Botany	Microbiology	Chemistry	Zoology
Physics	Physiology	Computer Science	Statistics
Geography	Mathematics	Economics	Geology

2. Ability Enhancement Courses (AEC):

I. For Semester 2, a student has to choose one paper from the following:

Sl. No.	Sem.	Paper Levels	Paper Description	Credit	Full Marks
1	**2**	100	Alternative English	4	80
2	**2**	100	MIL Bengali	4	80
3	**2**	100	MIL Hindi	4	80
4	**2**	100	MIL Nepali	4	80
5	**2**	100	MIL Sanskrit	4	80
6	**2**	100	MIL Urdu	4	80

II. For Semesters 3:

Sem.	Paper Levels	Paper Description	Credit	Full Marks
3	100	English Compulsory	4	80

3. Value-Added Courses (VAC):

Sem.	Paper Levels	Paper Description	Credit	Full Marks
1	100	Understanding India	4	80
4	100	Environmental Education	4	80

4. Skill Enhancement Courses (SEC):

Sem.	Paper Levels	Paper Description	Credit	Full Marks
1	100	SEC-POOL A	3	60
2	100	SEC-POOL B	3	60
3	200	SEC-POOL C	3	60

5. Interdisciplinary Courses (IDC):

Sem.	Paper Levels	Paper Description	Credit	Full Marks
2	100	choose **any one** entire group #	3	60
3	100		3	60
4	100		3	60
# depending on the eligibility condition				

TENTATIVE LIST OF INTER-DISCIPLINARY COURSES

A student has to **choose any one entire group** as IDC depending on the eligibility condition from the following IDC Group Table:

(IDC GROUP TABLE)

PHYSICAL SCIENCES		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Chemistry in Daily Life	Chemistry
III	Physics in Daily Life	Physics
IV	Introduction to Basic Astronomy	Physics

LIFE SCIENCES 1		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Conservation Biology	Zoology
III	Basic Bioinformatics	Bioinformatics
IV	Pharmacognosy and Medicinal Plants	Botany

LIFE SCIENCES 2		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Basic Microbiology	Microbiology
III	Environmental Microbiology	Microbiology
IV	Dairy Microbiology	Microbiology

MATHEMATICAL SCIENCES		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Mathematics in Daily Life	Mathematics
III	Statistics in Daily Life	Statistics
IV	Basic Algebra	Mathematics

EARTH SCIENCES		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Climatology	Geography
III	Introduction to Himalayan Studies	Centre for Himalayan Studies
IV	Remote Sensing	Geography

SOCIAL SCIENCES 1		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Basics of Economics	Economics
III	Indian Economy	Economics
IV	Micro Finance & Financial Inclusions	Economics

SOCIAL SCIENCES 2		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Public Administration	Political Science
III	Human Rights	Political Science
IV	International Relations	Political Science

SOCIAL SCIENCES 3		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Behavioral Science	Philosophy
III	Ethical Values	Philosophy
IV	Yoga Education	Philosophy

SOCIAL SCIENCES 4		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Great Indian Educators	Education
III	Mental Health and Hygiene	Education
IV	Guidance and Counselling	Education

SOCIAL SCIENCES 5		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Social Work	Sociology
III	Rural Studies	Sociology
IV	Gender Studies	Sociology

INFORMATION AND COMMUNICATION TECHNOLOGY		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Fundamentals of ICT	Computer Science
III	Introduction to Web Technology	Computer Science
IV	Open Educational Resources & E-Learning	Computer Science

COMMERCE AND MANAGEMENT		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	Basics of Accounting	Commerce
III	Human Resource Management	Commerce
IV	Business Operations of MSMEs	Commerce

NCC		
SEMESTER	**SUBJECT**	**BOARD OF STUDIES**
II	NCC Organization, National Integration, Personality Development & Leadership	NCC
III	Indian Army, Heath & Hygiene, Environmental Awareness	NCC
IV	Disaster Management, SSCD, JDFS & Weapon Training	NCC

TENTATIVE LIST OF INTERDISCIPLINARY COURSES (IDC)

SL	SEM	PAPER	PAPER CODE	PAPER LEVELS	PAPER DESCRIPTION	CREDIT	PAPER TYPE	FULL MARKS	MARKS IN THEO	MARKS IN Tutorial
1	2	IDC	PHSCIDC201	100	Chemistry in Daily Life	3	T	60	40	20
2	2	IDC	LSC1IDC202	100	Conservation Biology	3	T	60	40	20
3	2	IDC	LSC2IDC203	100	Basic Laboratory Technique and Management	3	T	60	40	20
4	2	IDC	MASCIDC204	100	Mathematics in Daily Life	3	T	60	40	20
5	2	IDC	EASCIDC205	100	Climatology	3	T	60	40	20
6	2	IDC	SOC1IDC206	100	Basics of Economics	3	T	60	40	20
7	2	IDC	SOC2IDC207	100	Public Administration	3	T	60	40	20
8	2	IDC	SOC3IDC208	100	Behavioral Science	3	T	60	40	20
9	2	IDC	SOC4IDC209	100	Great Indian Educators	3	T	60	40	20
10	2	IDC	SOC5IDC210	100	Social Work	3	T	60	40	20
11	2	IDC	IACTIDC211	100	Fundamentals of ICT	3	T	60	40	20
12	2	IDC	COMMIDC212	100	Basics of Accounting	3	T	60	40	20
13	2	IDC	NCC0IDC213	100	NCC Organization, National Integration, Personality Development & Leadership	3	T	60	40	20
1	3	IDC	PHSCIDC314	100	Physics in Daily Life	3	T	60	40	20
2	3	IDC	LSC1IDC315	100	Basic Bioinformatics	3	T	60	40	20
3	3	IDC	LSC2IDC316	100	Dairy Microbiology	3	T	60	40	20
4	3	IDC	MASCIDC317	100	Statistics in Daily Life	3	T	60	40	20
5	3	IDC	EASCIDC318	100	Introduction to Himalayan Studies	3	T	60	40	20
6	3	IDC	SOC1IDC319	100	Indian Economy	3	T	60	40	20
7	3	IDC	SOC2IDC320	100	Human Rights	3	T	60	40	20
8	3	IDC	SOC3IDC321	100	Ethical Values	3	T	60	40	20
9	3	IDC	SOC4IDC322	100	Mental Health and Hygiene	3	T	60	40	20
10	3	IDC	SOC5IDC323	100	Rural Studies	3	T	60	40	20
11	3	IDC	IACTIDC324	100	Introduction to Web Technology	3	T	60	40	20
12	3	IDC	COMMIDC325	100	Human Resource Management	3	T	60	40	20
13	3	IDC	NCC0IDC326	100	Indian Army, Heath & Hygiene, Environmental Awareness	3	T	60	40	20

TENTATIVE LIST OF INTERDISCIPLINARY COURSES (IDC)

SL	SEM	PAPER	PAPER CODE	PAPER LEVELS	PAPER DESCRIPTION	CREDIT	PAPER TYPE	FULL MARKS	MARKS IN THEO	MARKS IN Tutorial
1	4	IDC	PHSCIDC427	100	Introduction to Basic Astronomy	3	T	60	40	20
2	4	IDC	LSC1IDC428	100	Pharmacognosy and Medicinal Plants	3	T	60	40	20
3	4	IDC	LSC2IDC429	100	Basic Microbiology	3	T	60	40	20
4	4	IDC	MASCIDC430	100	Basic Algebra	3	T	60	40	20
5	4	IDC	EASCIDC431	100	Remote Sensing	3	T	60	40	20
6	4	IDC	SOC1IDC432	100	Micro Finance & Financial Inclusions	3	T	60	40	20
7	4	IDC	SOC2IDC433	100	International Relations	3	T	60	40	20
8	4	IDC	SOC3IDC434	100	Yoga Education	3	T	60	40	20
9	4	IDC	SOC4IDC435	100	Guidance and Counselling	3	T	60	40	20
10	4	IDC	SOC5IDC436	100	Gender Studies	3	T	60	40	20
11	4	IDC	IACTIDC437	100	Open Educational Resources & E-Learning	3	T	60	40	20
12	4	IDC	COMMIDC438	100	Business Operations of MSMEs	3	T	60	40	20
13	4	IDC	NCC0IDC439	100	Disaster Management, SSCD, JDFS & Weapon Training	3	T	60	40	20

TENTATIVE LIST OF SKILL ENHANCEMENT COURSES (SEC)

	SL. No.	SEM	PAPER	PAPER CODE	PAPER LEVELS	PAPER DESCRIPTION	CREDIT	PAPER TYPE	FULL MARKS	MARKS IN THEO	MARKS IN PRC
POOL-A											
A student has to choose one SEC from the pool for Semester I	1	1	SEC	POOASEC101	100	Communication Skill in Bengali	3	P	60	40	20
	2	1	SEC	POOASEC102	100	Basics of Script Writing in English	3	P	60	40	20
	3	1	SEC	POOASEC103	100	Bhasha Kaushal Vividh Aayam	3	P	60	40	20
	4	1	SEC	POOASEC104	100	Sanchar Vidhi Ra Sampresan Kaushal	3	P	60	40	20
	5	1	SEC	POOASEC105	100	Basic Programming in Python	3	P	60	40	20
	6	1	SEC	POOASEC106	100	MS PowerPoint	3	P	60	40	20
	7	1	SEC	POOASEC107	100	Modern Office Management	3	P	60	40	20
	8	1	SEC	POOASEC108	100	Website Design and Content Management System	3	P	60	40	20
	9	1	SEC	POOASEC109	100	Training in Youth Parliament	3	P	60	40	20
	10	1	SEC	POOASEC110	100	Media Production Basics	3	P	60	40	20
	11	1	SEC	POOASEC111	100	Tourism & Entrepreneurship	3	P	60	40	20
	12	1	SEC	POOASEC112	100	Nutrition & Diet	3	P	60	40	20
	13	1	SEC	POOASEC113	100	Biofertilizers	3	P	60	40	20
POOL-B											
A student has to choose one SEC	1	2	SEC	POOBSEC214	100	Editing and Publishing in Bengali	3	P	60	40	20
	2	2	SEC	POOBSEC215	100	Proof Reading in English	3	P	60	40	20
	3	2	SEC	POOBSEC216	100	Media Samagri Nirman	3	P	60	40	20
	4	2	SEC	POOBSEC217	100	Nepali Chalchitra Adhayan	3	P	60	40	20
	5	2	SEC	POOBSEC218	100	Cyber Security	3	P	60	40	20
	6	2	SEC	POOBSEC219	100	HTML Programming	3	P	60	40	20
	7	2	SEC	POOBSEC220	100	Digital Marketing	3	P	60	40	20

TENTATIVE LIST OF SKILL ENHANCEMENT COURSES (SEC)

	SL. No.	SEM	PAPER	PAPER CODE	PAPER LEVELS	PAPER DESCRIPTION	CREDIT	PAPER TYPE	FULL MARKS	MARKS IN THEO	MARKS IN PRC
from the pool for Semester II	8	2	SEC	POOBSEC221	100	RFID and Library Automation	3	P	60	40	20
	9	2	SEC	POOBSEC222	100	Developing Teaching Skills	3	P	60	40	20
	10	2	SEC	POOBSEC223	100	Studying the Architecture and Artefacts of North Bengal	3	P	60	40	20
	11	2	SEC	POOBSEC224	100	Financial Literacy and Banking	3	P	60	40	20
	12	2	SEC	POOBSEC225	100	Type Setting in LATEX	3	P	60	40	20
	13	2	SEC	POOBSEC226	100	Maternal and Child Nutrition	3	P	60	40	20
	14	2	SEC	POOBSEC227	100	Horticulture	3	P	60	40	20
POOL-C											
A student has to choose <u>one SEC</u> from the pool for Semester III	1	3	SEC	POOCSEC328	200	Bengali Creative Writing & Application	3	P	60	40	20
	2	3	SEC	POOCSEC329	200	Creative Writing in English	3	P	60	40	20
	3	3	SEC	POOCSEC330	200	Shaikshik Takniki	3	P	60	40	20
	4	3	SEC	POOCSEC331	200	Nepali Sahitik Patrakarita	3	P	60	40	20
	5	3	SEC	POOCSEC332	200	Fundamentals of Computer Networking	3	P	60	40	20
	6	3	SEC	POOCSEC333	200	MS Excel	3	P	60	40	20
	7	3	SEC	POOCSEC334	200	Entrepreneurship Development & Startups	3	P	60	40	20
	8	3	SEC	POOCSEC335	200	Information Marketing and Digital Library	3	P	60	40	20
	9	3	SEC	POOCSEC336	200	Determining Capacity of Memorisation	3	P	60	40	20
	10	3	SEC	POOCSEC337	200	Community Development	3	P	60	40	20
	11	3	SEC	POOCSEC338	200	Media Literacy	3	P	60	40	20
	12	3	SEC	POOCSEC339	200	Pharmaceutical Chemistry	3	P	60	40	20
	13	3	SEC	POOCSEC340	200	Poultry Farming	3	P	60	40	20
	14	3	SEC	POOCSEC341	200	Mushroom Culture Technology	3	P	60	40	20

(Annexure –A1)

Course Structure for Single Major and Single Minor together with allied courses (FYUGP).

Semester	Level of Course for Major & Minor	Major DSC (4 credit each)	Minor DSC (4 credit each)	AEC (4 credit each)	VAC (4 credit each)	IDC (3 credit each)	SEC (3 credit each)	Internship (2 credits)	Total Credit hours/total papers
		Paper	Paper	Paper	Paper	Paper	Paper	Paper	
I	100	1,2	1,	X	1 / 2 #	X	1		19 (5)
II	100	3,4	2	1 / 2 #	X	1	2		22 (6)
							I*	2 #	
Students exiting after securing 41 credits at the end of 2nd Semester + 2 credits of Internship will be allowed to exit and provided with a U.G. Certificate									
III	200	5,6	3	2 / 1 #	X	2	3		22 (6)
IV	200	7,8	4	X	2 /1 #	3	X		19 (5)
							I*	2 #	2(1)
Students exiting after securing 82 credits at the end of 4th Semester + 2 credits of Internship will be allowed to exit and provided with a U.G. Diploma									
V	300 / 200@	9, 10, 11,12	5 @	X	X	X	X		20 (5)
VI	300 / 200@	13, 14, 15, 16	6 @	X	X	X	X		20 (5)
Students exiting after securing 122 credits at the end of 6nd Semester + 2 credits of Internship will be allowed to exit and provided with a U.G. Degree in the relevant Major subject with a Minor subject									
VII	400/300@	17**, 18***, 19	7@	X	X	X	X		16 (4)
VIII	400/300@	20, 21, 22*** & 23 ***	8@	X	X	X	X		20 (5)
Students exiting after securing 158 credits at the end of 8th Semester + 2 credits of Internship shall exit and provided with a U.G. Honours Degree with Research/without Research in the relevant Major subject with a Minor subject									
		92	32	8	8	9	9		160 (42)

* Students have the option to complete their internship at the end of 2nd semester or 4th semester during the summer recess.

** Paper 17 shall be a compulsory major paper or Research Methodology.

*** Paper 18, 22 & 23 shall be major papers on Research Project/Dissertation for students taking up Honours with Research.

**** Paper 18, 22, 23 shall be three core major papers for students taking up Honours without Research.

Ability Enhancement Course

Single Major/Single Minor Course: Compulsory English to be studied in 2nd Semester and one from MIL (Bengali/Nepali/Hindi/Urdu/Sanskrit/Alternative English) to be studied in 3rd Semester.
Three Discipline Specific Multi – Disciplinary Course: One from MIL (Bengali/Nepali/Hindi/Urdu/Sanskrit/Alternative English) to be studied in 2nd Semester and Compulsory English to be studied in 3rd Semester.

Value Added Course

Single Major/Single Minor Course: Environmental Education to be studied in the 1st Semester and Understanding India to be studied in the 4th Semester.
Three Discipline Specific Multi – Disciplinary Course: Understanding India to be studied in 1st Semester and Environmental Education to be studied in 4th Semester.

(Annexure –A2)

Course Structure for Three Discipline Specific Multidisciplinary Course

Semester	Level of Course for DSC & Minor	DSC (4 credit each)		Minor (4 credit each)	AEC (4 credit each)	VAC (4 credit each)	IDC (3 credit each)	SEC (3 credit each)	Internship (2 credits)	Total Credit hours / total papers
		DSC Subject A	DSC Subject B							
		Paper	Paper	Paper	Paper	Paper	Paper	Paper	Paper	
I	100	1	1	1	X	1 / 2 #	X	1		19 (5)
II	100	2	2	2	1 /2 #	X	1	2		22 (6)
								I*	2 #	
Students exiting after securing 41 credits at the end of 2nd Semester + 2 credits of Internship will be allowed to exit and provided with a U.G. Certificate										
III	200	3	3	3	2 / 1#	X	2	3		22 (6)
IV	200	4	4	4	X	2 / 1 #	3	X		19 (5)
								I*	2 #	2(1)
Students exiting after securing 82 credits at the end of 4nd Semester + 2 credits of Internship will be allowed to exit and provided with a U.G. Diploma										
V	300/200*	5, 6	5, 6	5*	X	X	X	X		20 (5)
VI	300/200*	7, 8	7,8	6*	X	X	X	X		20 (5)
Students exiting after securing 122 credits at the end of 6nd Semester + 2 credits of Internship will be allowed to exit and provided with a U.G. Degree in the relevant Major subject with a Minor subject										
VII	400/300@	12**		7@	X	X	X	X		16 (4)
		9	9							
VIII	400/300@	10 & 11	10 &11	8@	X	X	X	X		20 (5)
Students exiting after securing 158 credits at the end of 8nd Semester + 2 credits of Internship shall exit and provided with a U.G. Honours Degree with Research/without Research in the relevant Multidisciplinary course of study										
		44+4**	44+4**	32	8	8	9	9		160 (42)

* Students have the option to complete their internship at the end of 2nd semester or 4th semester during the summer recess.

** Paper 12 shall be a compulsory major paper or Research Methodology.

*** Paper 09,10,11 of the other subject shall re-numbered 13, 14 & 15 as (one Research project from either of the two courses) shall be major papers on Research Project/ Dissertation for students taking up Honours with Research in any one major core subject.

Ability Enhancement Course

Three Discipline Specific Multi – Disciplinary Course: One from MIL (Bengali/Nepali/Hindi/Urdu/Sanskrit/Alternative English) to be studied in 2nd Semester and Compulsory English to be studied in 3rd Semester.

Value Added Course

Three Discipline Specific Multi – Disciplinary Course: Understanding India to be studied in 1st Semester and Environmental Education to be studied in 4th Semester.

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THE END

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