

## Academic Planner

### A. Teaching Plan

Teacher's Name: **RAJ KUMAR**

Department: **MATHEMATICS**

Year: **2016-2017(Odd Semester)**

Course: **B.Sc. (prog.) Analytical Chemistry**

Paper Type: **Theory**

Semester: **III**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	42354302	Algebra	Core	Groups: Definition and examples of abelian and non-abelian groups,	20/07/2016	30/07/2016
2	42354302	Algebra	Core	The group $\mathbb{Z}_n$ of integers under addition modulo n and the group U(n) of units under multiplication modulo n.	01/08/2016	06/08/2016
3	42354302	Algebra	Core	Cyclic groups from sets of numbers, Group of nth roots of unity, The general linear group; Elementary properties of groups. Groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square.	08/08/2016	13/08/2016
4	42354302	Algebra	Core	The permutation group Sym(n), and properties of permutations. Order of	15/08/2016	20/08/2016

				an element, Subgroups and its examples, Subgroup tests, Cyclic subgroup.		
5	42354302	Algebra	Core	Center of a group, Properties of cyclic groups. Cosets and its properties, Lagrange's theorem, Index of a subgroup.	22/08/2016	27/08/2016
6	42354302	Algebra	Core	Normal subgroups: Definition, examples and characterizations, Factor groups. Definition and examples of rings, commutative and noncommutative rings.	29/08/2016	03/09/2016
7	42354302	Algebra	Core	Properties of rings, Subrings and ideals.	05/09/2016	10/09/2016
8	42354302	Algebra	Core	Integral domains and fields, Examples of fields: $\mathbb{Z}_n$ , $\mathbb{Q}$ , $\mathbb{R}$ and $\mathbb{C}$ .	12/09/2016	17/09/2016
9	42354302	Algebra	Core	Definition and examples of vector spaces, Subspaces.	19/09/2016	24/09/2016
10	42354302	Algebra	Core	Linear independence, Basis and dimension of a vector space. Linear transformations.	26/09/2016	01/10/2016
11	42354302	Algebra	Core	Linear transformations.	03/10/2016	10/10/2016
				<b>MID-SEMESTER BREAK</b>	<b>11/10/2016</b>	<b>16/10/2016</b>
12	42354302	Algebra	Core	Linear transformations continued and Null spaces.	17/10/2016	29/10/2016
13	42354302	Algebra	Core	Ranges and illustrations of the rank nullity theorem.	31/10/2016	05/11/2016
14	42354302	Algebra	Core	Revision	07/11/2016	11/11/2016

Year: 2016-2017(Odd Semester)

Course: B.Sc. (Hons.) Mathematics

Paper Type: Theory and Practical

Semester: III

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32353301	Latex and HTML	Sec I	Elements of LaTeX.	20/07/2016	30/07/2016
2	32353301	Latex and HTML	Sec I	Elements of LaTeX continud.	01/08/2016	06/08/2016
3	32353301	Latex and HTML	Sec I	Hands-on-training of LaTeX.	08/08/2016	13/08/2016
4	32353301	Latex and HTML	Sec I	Hands-on-training of LaTeX continud.	15/08/2016	20/08/2016
5	32353301	Latex and HTML	Sec I	graphics in LaTeX.	22/08/2016	27/08/2016
6	32353301	Latex and HTML	Sec I	graphics in LaTeX continud.	29/08/2016	03/09/2016
7	32353301	Latex and HTML	Sec I	PSTricks.	05/09/2016	10/09/2016
8	32353301	Latex and HTML	Sec I	Beamer presentation.	12/09/2016	17/09/2016
9	32353301	Latex and HTML	Sec I	Beamer presentation continud.	19/09/2016	24/09/2016
10				HTML.	26/09/2016	01/10/2016
11	32353301	Latex and HTML	Sec I	HTML continud.	03/10/2016	10/10/2016
				<b>MID-SEMESTER BREAK</b>	<b>11/10/2016</b>	<b>16/10/2016</b>
12	32353301	Latex and HTML	Sec I	creating simple web pages, images and links, design of web pages.	17/10/2016	29/10/2016
13	32353301	Latex and HTML	Sec I	Preparation for the Practical Examinations.	31/10/2016	05/11/2016
14	32353301	Latex and HTML	Sec I	Practical Internal Examination.	07/11/2016	11/11/2016

Year: 2016-2017(Odd Semester)

Course: B.Sc. (Hons.) Mathematics

Paper Type: Theory

Semester: V

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32357611	Linear Programming Problems and Theory of Games	Core	Linear programming problem: Formulation and solution by graphical method.	20/07/2016	30/07/2016
2	32357611	Linear Programming Problems and Theory of Games	Core	Extreme points; Basic solutions, Basic feasible solutions.	01/08/2016	06/08/2016
3	32357611	Linear Programming Problems and Theory of Games	Core	Reduction of any feasible solution to a basic feasible solution; Correspondence between basic feasible solutions and extreme points.	08/08/2016	13/08/2016
4	32357611	Linear Programming Problems and Theory of Games	Core	Algebraic Solution, Simplex Method: Optimal solution, Termination criteria for optimal solution of the linear programming problem, Unique optimal solution.	15/08/2016	20/08/2016
5	32357611	Linear Programming Problems and Theory of Games	Core	Alternate optimal solutions, Unboundedness. Simplex algorithm and its tableau format.	22/08/2016	27/08/2016
6	32357611	Linear Programming Problems and Theory of Games	Core	Continued: Simplex algorithm and its tableau format.	29/08/2016	03/09/2016
7	32357611	Linear Programming Problems and Theory of Games	Core	Artificial variables, Two-phase method, Big-M method.	05/09/2016	10/09/2016

8	32357611	Linear Programming Problems and Theory of Games	Core	Continued: Two-phase method, Big-M method.	12/09/2016	17/09/2016
9	32357611	Linear Programming Problems and Theory of Games	Core	Motivation and formulation of dual problem.	19/09/2016	24/09/2016
10				Primal-dual relationships.	26/09/2016	01/10/2016
11	32357611	Linear Programming Problems and Theory of Games	Core	Statements of the fundamental theorem of duality and complimentary slackness theorem with examples.	03/10/2016	10/10/2016
				<b>MID-SEMESTER BREAK</b>	<b>11/10/2016</b>	<b>16/10/2016</b>
12	32357611	Linear Programming Problems and Theory of Games	Core	Transportation problem. Assignment problem.	17/10/2016	29/10/2016
13	32357611	Linear Programming Problems and Theory of Games	Core	Game Theory: Basic concept, Formulation and solution of two-person zero-sum games. Games with mixed strategies.	31/10/2016	05/11/2016
14	32357611	Linear Programming Problems and Theory of Games	Core	Game Theory: Basic concept, Formulation and solution of two-person zero-sum games. Games with mixed strategies. Dominance Principle. Linear programming method of solving a game.	07/11/2016	11/11/2016

Year: 2016-2017 (Even Semester)

Course: B.Sc. (Prog.) Physical Science

Paper Type: Theory

Semester: IV

Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	42351101	Calculus And Matrices	Core	<b>R, R2, R3 as vector spaces over R. Standard basis for each of them. Concept of Linear Independence and examples of different bases.</b>	02/01/2017	07/01/2017
2	42351101	Calculus And Matrices	Core	<b>Subspaces of R2, R3. Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations.</b>	09/01/2017	14/01/2017
3	42351101	Calculus And Matrices	Core	<b>Interpretation of eigenvalues and eigenvectors for such transformations and eigenspaces as invariant subspaces. Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3.</b>	16/01/2017	21/01/2017
4	42351101	Calculus And Matrices	Core	<b>Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.</b>	23/01/2017	28/01/2017
5	42351101	Calculus And Matrices	Core	<b>Sequences to be introduced through the examples arising in Science beginning with finite sequences, followed by concepts of recursion and difference equations. For instance, the sequence arising from</b>	30/01/2017	11/02/2017

				Tower of Hanoi game, the Fibonacci sequence arising from branching habit of trees and breeding habit of rabbits.		
6	42351101	Calculus And Matrices	Core	Convergence of a sequence and algebra of convergent sequences. Graphs of simple concrete functions such as polynomial, trigonometric, inverse trigonometric, exponential, logarithmic and hyperbolic functions arising in problems or chemical reaction, simple pendulum, radioactive decay, temperature cooling/heating problem and biological rhythms.	13/02/2017	18/02/2017
7	42351101	Calculus And Matrices	Core	Successive differentiation. Leibnitz theorem. Recursion formulae for higher derivative.	20/02/2017	25/02/2017
8	42351101	Calculus And Matrices	Core	Functions of two variables. Graphs and Level Curves of functions of two variables. Partial differentiation upto second order.	27/02/2017	04/03/2017
9	42351101	Calculus And Matrices	Core	Computation of Taylor's Maclaurin's series of functions.	06/03/2017	11/03/2017
				<b>MID-SEMESTER BREAK</b>	13/03/2017	19/03/2017
10	42351101	Calculus And Matrices	Core	Estimation. Formation and solution of Differential equations arising in population growth, radioactive decay, administration of medicine and cell division. and its simple applications	20/03/2017	25/03/2017

11	42351101	Calculus And Matrices	Core	Geometrical representation of addition, subtraction, multiplication and division of complex numbers.	27/03/2017	01/04/2017
12	42351101	Calculus And Matrices	Core	Lines half planes, circles, discs in terms of complex variables.	03/04/2017	08/04/2017
13	42351101	Calculus And Matrices	Core	Statement of the Fundamental Theorem of Algebra and its consequences, De Moivre's theorem for rational indices and its simple applications.	10/04/2017	15/04/2017
14	42351101	Calculus And Matrices	Core	Revision.	17/04/2017	26/04/2017

**Year: 2016-2017 (Even Semester)**

**Course: B.A. Economics (Hons)**

**Paper Type: Theory**

**Semester: III**

Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	235686	Linear Algebra and Calculus	Core	The matrix representation of systems of homogeneous and nonhomogeneous linear equations. (ii) Addition, scalar multiplication and multiplication of matrices, Transpose of a matrix. (iii) The types of matrices: zero matrix, identity matrix, symmetric and skew symmetric matrices, upper and	02/01/2017	07/01/2017

				lower triangular matrix, unitary and Hermitian matrix (iv) Transpose of product of matrices, Invertible matrices, Product of invertible matrices.		
2	235686	Linear Algebra and Calculus	Core	Application of the solution set of a linear system to linear systems where the coefficient matrix is a square matrix. Determinant of a matrix, Inverse using the classical adjoint method and the Cramer's rule.	09/01/2017	14/01/2017
3	235686	Linear Algebra and Calculus	Core	System of linear equations, elementary row operations, elementary matrices, Gauss elimination. Rank of a matrix and the solution set of a linear system	16/01/2017	21/01/2017
4	235686	Linear Algebra and Calculus	Core	Axiomatic definition of a vector space, examples, subspaces and linear combination and linear span, finite dimensional vector space, fundamental subspaces associated with a matrix	23/01/2017	28/01/2017
5	235686	Linear Algebra and Calculus	Core	Linear independence and dependence, linear independence and the rank of a matrix, basis of a vector space, constructing a basis of a finite dimensional vector space.	30/01/2017	11/02/2017
6	235686	Linear Algebra and Calculus	Core	Linear transformations, rank-nullity theorem and its application to maps between finite dimensional vector spaces.	13/02/2017	18/02/2017

7	235686	Linear Algebra and Calculus	Core	Ordered bases, standard matrix of a linear transformation and similarity of matrices.	20/02/2017	25/02/2017
8	235686	Linear Algebra and Calculus	Core	Inner product in a vector space, Cauchy Schwartz inequality, angle between two vectors, Projection of a vector onto another vector.	27/02/2017	04/03/2017
9	235686	Linear Algebra and Calculus	Core	Gram-Schmidt orthogonalization process and the QR- decomposition, least square solution of a non-consistent linear system and the orthogonal projections.	06/03/2017	11/03/2017
				<b>MID-SEMESTER BREAK</b>	13/03/2017	19/03/2017
10	235686	Linear Algebra and Calculus	Core	$\epsilon$ - $\delta$ definition of limit of a function, one sided limit, limit at infinity, Infinite Limits, Continuity and Properties of continuous functions including Intermediate value theorem.	20/03/2017	25/03/2017
11	235686	Linear Algebra and Calculus	Core	Differentiability, Rolle's theorem, Lagrange's mean value theorem with geometrical interpretations and simple applications.	27/03/2017	01/04/2017
12	235686	Linear Algebra and Calculus	Core	Taylor's theorem, Taylor's series and Maclaurin's series, Maclaurin's expansion of functions and their use in polynomial approximation and error estimation. Critical values, maxima, minima and saddle points.	03/04/2017	08/04/2017
13	235686	Linear Algebra and Calculus	Core	Functions of two or more variables, Graphs and level curves of functions	10/04/2017	15/04/2017

				of two variables. Limit and continuity of functions of two variables.		
14	235686	Linear Algebra and Calculus	Core	Directional derivatives, use Taylor's theorem for several variables. Partial differentiation up to second order.	17/04/2017	26/04/2017

**A. Internal Assessment: House Exam (Test/Presentation etc.) & Assignment\***

Course Code	Course Name	Unique Paper Code	Topic Name	Day and Date	Date/s of Exhibiting the Assessment Sheet to students, Discussing the marks, Returning/Retaining

\*Marks of the Internal Assessment to be submitted to the College 15 days before the last working day of every semester. Documents are available with the college to whom I am submitting this form.

**B. Organization of Department/College Society Meetings by Staff Advisor/Convener**

Department/Society	Meeting Date	Purpose
2016 - 2017		
Tensors-The Mathematical Society	20.02.2017 & 21.02.2017	To discuss about the following: 1. Talk of Prof. Pramod Kanwar, Professor, Department of Mathematics, University of Ohio, USA, regarding Qazi Zameeruddin Memorial Lecture on 09.03.2020. 2. Two day annual festival SUPREMUM 2017 which was to be held on 22 <sup>th</sup> and 23 <sup>th</sup> February 2017.

**C. College Functions**

<b>College Function</b>	<b>Function Date</b>	<b>Role to be played</b>
NA	NA	NA

## Academic Planner

### D. Teaching Plan

Teacher's Name: **RAJ KUMAR**

Department: **MATHEMATICS**

Year: **2017-2018 (Odd Semester)**

Course: **B.Sc. (prog.) Physical Science**

Paper Type: **Theory**

Semester: **III**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	42354302	Algebra	Core	Groups: Definition and examples of abelian and non-abelian groups,	20/07/2017	29/07/2017
2	42354302	Algebra	Core	The group $\mathbb{Z}_n$ of integers under addition modulo n and the group $U(n)$ of units under multiplication modulo n.	31/07/2017	05/08/2017
3	42354302	Algebra	Core	Cyclic groups from sets of numbers, Group of nth roots of unity, The general linear group; Elementary	07/08/2017	12/08/2017

				properties of groups. Groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square.		
4	42354302	Algebra	Core	The permutation group $Sym(n)$ , and properties of permutations. Order of an element, Subgroups and its examples, Subgroup tests, Cyclic subgroup.	14/08/2017	19/08/2017
5	42354302	Algebra	Core	Center of a group, Properties of cyclic groups. Cosets and its properties, Lagrange's theorem, Index of a subgroup.	21/08/2017	26/08/2017
6	42354302	Algebra	Core	Normal subgroups: Definition, examples and characterizations, Factor groups. Definition and examples of rings, commutative and noncommutative rings.	28/08/2017	02/09/2017
7	42354302	Algebra	Core	Properties of rings, Subrings and ideals.	04/09/2017	09/09/2017
8	42354302	Algebra	Core	Integral domains and fields, Examples of fields: $\mathbb{Z}_n$ , $\mathbb{Q}$ , $\mathbb{R}$ and $\mathbb{C}$ .	11/09/2017	16/09/2017
9	42354302	Algebra	Core	Definition and examples of vector spaces, Subspaces.	18/09/2017	29/09/2017
				<b>MID-SEMESTER BREAK</b>	<b>30/09/2017</b>	<b>06/10/2017</b>

10	42354302	Algebra	Core	Linear independence, Basis and dimension of a vector space. Linear transformations.	07/10/2017	14/10/2017
11	42354302	Algebra	Core	Linear transformations.	16/10/2017	21/10/2017
12	42354302	Algebra	Core	Linear transformations continued and Null spaces.	23/10/2017	28/10/2017
13	42354302	Algebra	Core	Ranges and illustrations of the rank nullity theorem.	30/10/2017	04/11/2017
14	42354302	Algebra	Core	Revision	06/11/2017	16/11/2017

**Year: 2017-2018 (Odd Semester)**

**Course: B.Sc. (Hons.) Mathematics**

**Paper Type: Theory**

**Semester: V**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32357504	Mathematical Finance	Core	Interest (simple and compound, discrete and continuous), time value of money, inflation.	20/07/2017	29/07/2017
2	32357504	Mathematical Finance	Core	Net present value, internal rate of return (calculation by bisection and Newton-Raphson methods), comparison of NPV and IRR.	31/07/2017	05/08/2017
3	32357504	Mathematical Finance	Core	Bonds, bond prices and yields, Macaulay and modified duration.	07/08/2017	12/08/2017
4	32357504	Mathematical Finance	Core	Term structure of interest rates: spot and forward rates, explanations of term structure, running present value, floating-rate bonds.	14/08/2017	19/08/2017

5	32357504	Mathematical Finance	Core	Immunization, convexity, putable and callable bonds.	21/08/2017	26/08/2017
6	32357504	Mathematical Finance	Core	Asset return, short selling, portfolio return, (brief introduction to expectation, variance, covariance and correlation).	28/08/2017	02/09/2017
7	32357504	Mathematical Finance	Core	Random returns, portfolio mean return and variance, diversification, portfolio diagram, feasible set, Markowitz model (review of Lagrange multipliers for 1 and 2 constraints).	04/09/2017	09/09/2017
8	32357504	Mathematical Finance	Core	Two fund theorem, risk free assets, One fund theorem.	11/09/2017	16/09/2017
9	32357504	Mathematical Finance	Core	Capital market line, Sharpe index. Capital Asset Pricing Model (CAPM), betas of stocks and portfolios.	18/09/2017	29/09/2017
				<b>MID-SEMESTER BREAK</b>	30/09/2017	06/10/2017
10	32357504	Mathematical Finance	Core	Security market line, use of CAPM in investment analysis and as a pricing formula, Jensen's index.	07/10/2017	14/10/2017
11	32357504	Mathematical Finance	Core	Forwards and futures, marking to market, value of a forward/futures contract, replicating portfolios, futures on assets with known income or dividend yield, currency futures.	16/10/2017	21/10/2017

12	32357504	Mathematical Finance	Core	Hedging (short, long, cross, rolling), optimal hedge ratio, hedging with stock index futures.	23/10/2017	28/10/2017
13	32357504	Mathematical Finance	Core	Interest rate futures, swaps. Lognormal distribution, Lognormal model / Geometric Brownian Motion for stock prices, Binomial Tree model for stock prices, parameter estimation. comparison of the models.	30/10/2017	04/11/2017
14	32357504	Mathematical Finance	Core	Options, Types of options: put / call, European / American, pay off of an option, factors affecting option prices, put call parity.	06/11/2017	16/11/2017

**Year: 2017-2018 (Odd Semester)**

**Course: B.Sc. (Hons.) Mathematics**

**Paper Type: Theory and Practical**

**Semester: III**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32353301	Latex and HTML	Sec I	Elements of LaTeX.	20/07/2017	29/07/2017
2	32353301	Latex and HTML	Sec I	Elements of LaTeX continu.	31/07/2017	05/08/2017
3	32353301	Latex and HTML	Sec I	Hands-on-training of LaTeX.	07/08/2017	12/08/2017
4	32353301	Latex and HTML	Sec I	Hands-on-training of LaTeX continu.	14/08/2017	19/08/2017
5	32353301	Latex and HTML	Sec I	graphics in LaTeX.	21/08/2017	26/08/2017
6	32353301	Latex and HTML	Sec I	graphics in LaTeX continu.	28/08/2017	02/09/2017

7	32353301	Latex and HTML	Sec I	PSTricks.	04/09/2017	09/09/2017
8	32353301	Latex and HTML	Sec I	Beamer presentation.	11/09/2017	16/09/2017
9	32353301	Latex and HTML	Sec I	Beamer presentation continu.	18/09/2017	29/09/2017
				<b>MID-SEMESTER BREAK</b>	<b>30/09/2017</b>	<b>06/10/2017</b>
10	32353301	Latex and HTML	Sec I	HTML.	07/10/2017	14/10/2017
11	32353301	Latex and HTML	Sec I	HTML continu.	16/10/2017	21/10/2017
12	32353301	Latex and HTML	Sec I	creating simple web pages, images and links, design of web pages.	23/10/2017	28/10/2017
13	32353301	Latex and HTML	Sec I	Preparation for the Practical Examinations.	30/10/2017	04/11/2017
14	32353301	Latex and HTML	Sec I	Practical Internal Examination.	06/11/2017	16/11/2017

**Year: 2017-2018 (Even Semester)**

**Course: B.Sc. (Hons.) Mathematics**

**Paper Type: Theory**

**Semester: VI**

Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32357607	Probability Theory and Statistics	Core	Sample space, Probability set function and examples, Random variable,	01/01/2018	06/01/2018
2	32357607	Probability Theory and Statistics	Core	Probability mass/density function, Cumulative distribution function and its properties.	08/01/2018	13/01/2018

3	32357607	Probability Theory and Statistics	Core	Discrete and continuous random variables, and Transformations. Expectation of random variables, and some special expectations	15/01/2018	20/01/2018
4	32357607	Probability Theory and Statistics	Core	Mean, Variance, Standard deviation, Moments and moment generating function, Characteristic function.	22/01/2018	27/01/2018
5	32357607	Probability Theory and Statistics	Core	The discrete distributions - Uniform, Bernoulli and binomial.	29/01/2018	03/02/2018
6	32357607	Probability Theory and Statistics	Core	The discrete distributions - negative Binomial, Geometric and Poisson	05/02/2018	10/02/2018
7	32357607	Probability Theory and Statistics	Core	The continuous distributions - Uniform, Gamma, Exponential, Chi-square and Beta.	12/02/2018	17/02/2018
8	32357607	Probability Theory and Statistics	Core	Normal distribution, and normal approximation to the binomial distribution.	19/02/2018	01/03/2018
				<b>MID-SEMESTER BREAK</b>	<b>02/03/2018</b>	<b>07/03/2018</b>
9	32357607	Probability Theory and Statistics	Core	Random vector: Discrete and continuous, Joint cumulative distribution function and its properties.	08/03/2018	17/03/2018
10	32357607	Probability Theory and Statistics	Core	Joint probability mass/density function, Marginal probability mass function, and expectation of two random variables, Joint moment generating function, Conditional distributions and expectations	19/03/2018	24/03/2018
11	32357607	Probability Theory and Statistics	Core	Correlation coefficient, Covariance, Calculation of covariance from joint	26/03/2018	31/03/2018

				moment generating function, Independent random variables.		
12	32357607	Probability Theory and Statistics	Core	Linear regression for two variables, and the method of least squares. Bivariate normal distribution; Chebyshev's theorem.	02/04/2018	07/04/2018
13	32357607	Probability Theory and Statistics	Core	Statement and interpretation of the strong law of large numbers, Central limit theorem and the weak law of large numbers.	09/04/2018	14/04/2018
14	32371208	Probability Theory and Statistics	Core	Markov Chains, Chapman- Kolmogorov equations, classification of states.	16/04/2018	27/04/2018

**Year: 2017-2018 (Even Semester)**

**Course: B.Sc. (Prog.) Physical Science**

**Paper Type: Theory**

**Semester: IV**

Sl. No.	UPC	Paper Name	Core/ AECC/ GE/ SEC	Topic/Unit	Start Date	End Date
1	42351101	Calculus And Matrices	Core	$\mathbb{R}$ , $\mathbb{R}^2$ , $\mathbb{R}^3$ as vector spaces over $\mathbb{R}$ . Standard basis for each of them. Concept of Linear Independence and examples of different bases.	01/01/2018	06/01/2018
2	42351101	Calculus And Matrices	Core	Subspaces of $\mathbb{R}^2$ , $\mathbb{R}^3$ . Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations.	08/01/2018	13/01/2018

3	42351101	Calculus And Matrices	Core	Interpretation of eigenvalues and eigenvectors for such transformations and eigenspaces as invariant subspaces. Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3.	15/01/2018	20/01/2018
4	42351101	Calculus And Matrices	Core	Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.	22/01/2018	27/01/2018
5	42351101	Calculus And Matrices	Core	Sequences to be introduced through the examples arising in Science beginning with finite sequences, followed by concepts of recursion and difference equations. For instance, the sequence arising from Tower of Hanoi game, the Fibonacci sequence arising from branching habit of trees and breeding habit of rabbits.	29/01/2018	03/02/2018
6	42351101	Calculus And Matrices	Core	Convergence of a sequence and algebra of convergent sequences. Graphs of simple concrete functions such as polynomial, trigonometric, inverse trigonometric, exponential, logarithmic and hyperbolic functions arising in problems or chemical reaction, simple	05/02/2018	10/02/2018

				pendulum, radioactive decay, temperature cooling/heating problem and biological rhythms.		
7	42351101	Calculus And Matrices	Core	Successive differentiation. Leibnitz theorem. Recursion formulae for higher derivative.	12/02/2018	17/02/2018
8	42351101	Calculus And Matrices	Core	Functions of two variables. Graphs and Level Curves of functions of two variables. Partial differentiation upto second order.	19/02/2018	01/03/2018
				<b>MID-SEMESTER BREAK</b>	<b>02/03/2018</b>	<b>07/03/2018</b>
9	42351101	Calculus And Matrices	Core	Computation of Taylor's Maclaurin's series of functions.	08/03/2018	17/03/2018
10	42351101	Calculus And Matrices	Core	Estimation. Formation and solution of Differential equations arising in population growth, radioactive decay, administration of medicine and cell division. nd its simple applications	19/03/2018	24/03/2018
11	42351101	Calculus And Matrices	Core	Geometrical representation of addition, subtraction, multiplication and division of complex numbers.	26/03/2018	31/03/2018
12	42351101	Calculus And Matrices	Core	Lines half planes, circles, discs in terms of complex variables.	02/04/2018	07/04/2018
13	42351101	Calculus And Matrices	Core	Statement of the Fundamental Theorem of Algebra and its consequences, De Moivre's theorem for rational indices and its simple applications.	09/04/2018	14/04/2018
14	42351101	Calculus And Matrices	Core	Revision.	16/04/2018	27/04/2018

**Year: 2018-2019 (Odd Semester)**

**Course: B.Sc. (prog.) Physical Science**

**Paper Type: Theory**

**Semester: III**

Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	42354302	Algebra	Core	Groups: Definition and examples of abelian and non-abelian groups,	20/07/2018	28/07/2018
2	42354302	Algebra	Core	The group $\mathbb{Z}_n$ of integers under addition modulo n and the group U(n) of units under multiplication modulo n.	30/07/2018	04/08/2018
3	42354302	Algebra	Core	Cyclic groups from sets of numbers, Group of nth roots of unity, The general linear group; Elementary properties of groups. Groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square.	06/08/2018	11/08/2018
4	42354302	Algebra	Core	The permutation group Sym(n), and properties of permutations. Order of an element, Subgroups and its examples, Subgroup tests, Cyclic subgroup.	13/08/2018	18/08/2018
5	42354302	Algebra	Core	Center of a group, Properties of cyclic groups. Cosets and its	20/08/2018	25/08/2018

				properties, Lagrange's theorem, Index of a subgroup.		
6	42354302	Algebra	Core	Normal subgroups: Definition, examples and characterizations, Factor groups. Definition and examples of rings, commutative and noncommutative rings.	27/08/2018	01/09/2018
7	42354302	Algebra	Core	Properties of rings, Subrings and ideals.	03/09/2018	08/09/2018
8	42354302	Algebra	Core	Integral domains and fields, Examples of fields: $\mathbb{Z}_n$ , $\mathbb{Q}$ , $\mathbb{R}$ and $\mathbb{C}$ .	10/09/2018	15/09/2018
9	42354302	Algebra	Core	Definition and examples of vector spaces, Subspaces.	17/09/2018	22/09/2018
10	42354302	Algebra	Core	Linear independence, Basis and dimension of a vector space.	24/09/2018	29/09/2018
11	42354302	Algebra	Core	Linear transformations.	01/10/2018	12/10/2018
				<b>MID-SEMESTER BREAK</b>	<b>13/10/2018</b>	<b>21/10/2018</b>
12	42354302	Algebra	Core	Linear transformations continued and Null spaces.	22/10/2018	27/10/2018
13	42354302	Algebra	Core	Ranges and illustrations of the rank nullity theorem.	29/10/2018	03/11/2018
14	42354302	Algebra	Core	Revision	05/11/2018	16/11/2018

**Year: 2018-2019 (Odd Semester)**

**Course: B.Sc. (Hons.) Mathematics**

**Paper Type: Theory**

**Semester: V**

Sl. No.	UPC	Paper Name	Core/AECC/	Topic/Unit	Start Date	End Date
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			<b>GE/ SEC</b>			
1	32357504	Mathematical Finance	Core	Interest (simple and compound, discrete and continuous), time value of money, inflation.	20/07/2018	28/07/2018
2	32357504	Mathematical Finance	Core	Net present value, internal rate of return (calculation by bisection and Newton-Raphson methods), comparison of NPV and IRR.	30/07/2018	04/08/2018
3	32357504	Mathematical Finance	Core	Bonds, bond prices and yields, Macaulay and modified duration.	06/08/2018	11/08/2018
4	32357504	Mathematical Finance	Core	Term structure of interest rates: spot and forward rates, explanations of term structure, running present value, floating-rate bonds.	13/08/2018	18/08/2018
5	32357504	Mathematical Finance	Core	Immunization, convexity, puttable and callable bonds.	20/08/2018	25/08/2018
6	32357504	Mathematical Finance	Core	Asset return, short selling, portfolio return, (brief introduction to expectation, variance, covariance and correlation).	27/08/2018	01/09/2018
7	32357504	Mathematical Finance	Core	Random returns, portfolio mean return and variance, diversification, portfolio diagram, feasible set, Markowitz model (review of Lagrange multipliers for 1 and 2 constraints).	03/09/2018	08/09/2018

8	32357504	Mathematical Finance	Core	Two fund theorem, risk free assets, One fund theorem.	10/09/2018	15/09/2018
9	32357504	Mathematical Finance	Core	Capital market line, Sharpe index. Capital Asset Pricing Model (CAPM), betas of stocks and portfolios.	17/09/2018	22/09/2018
10	32357504	Mathematical Finance	Core	Security market line, use of CAPM in investment analysis and as a pricing formula, Jensen's index.	24/09/2018	29/09/2018
11	32357504	Mathematical Finance	Core	Forwards and futures, marking to market, value of a forward/futures contract, replicating portfolios, futures on assets with known income or dividend yield, currency futures.	01/10/2018	12/10/2018
				<b>MID-SEMESTER BREAK</b>	13/10/2018	21/10/2018
12	32357504	Mathematical Finance	Core	Hedging (short, long, cross, rolling), optimal hedge ratio, hedging with stock index futures.	22/10/2018	27/10/2018
13	32357504	Mathematical Finance	Core	Interest rate futures, swaps. Lognormal distribution, Lognormal model / Geometric Brownian Motion for stock prices, Binomial Tree model for stock prices, parameter estimation. comparison of the models. .	29/10/2018	03/11/2018
14	32357504	Mathematical Finance	Core	Options, Types of options: put / call, European / American, pay off of an option, factors affecting option prices, put call parity.	05/11/2018	16/11/2018

**Year: 2018-2019 (Even Semester)**

**Course: B.Sc. (Hons.) Mathematics**

**Paper Type: Theory**

**Semester: VI**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32357607	Probability Theory and Statistics	Core	Sample space, Probability set function and examples, Random variable,	01/01/2019	05/01/2019
2	32357607	Probability Theory and Statistics	Core	Probability mass/density function, Cumulative distribution function and its properties.	07/01/2019	12/01/2019
3	32357607	Probability Theory and Statistics	Core	Discrete and continuous random variables, and Transformations. Expectation of random variables, and some special expectations	14/01/2019	19/01/2019
4	32357607	Probability Theory and Statistics	Core	Mean, Variance, Standard deviation, Moments and moment generating function, Characteristic function.	21/01/2019	26/01/2019
5	32357607	Probability Theory and Statistics	Core	The discrete distributions - Uniform, Bernoulli and binomial.	28/01/2019	02/02/2019
6	32357607	Probability Theory and Statistics	Core	The discrete distributions - negative Binomial, Geometric and Poisson	04/02/2019	09/02/2019

7	32357607	Probability Theory and Statistics	Core	The continuous distributions - Uniform, Gamma, Exponential, Chi-square and Beta.	11/02/2019	16/02/2019
8	32357607	Probability Theory and Statistics	Core	Normal distribution, and normal approximation to the binomial distribution.	18/02/2019	23/02/2019
9	32357607	Probability Theory and Statistics	Core	Random vector: Discrete and continuous, Joint cumulative distribution function and its properties.	25/02/2019	02/03/2019
10	32357607	Probability Theory and Statistics	Core	Joint probability mass/density function, Marginal probability mass function, and expectation of two random variables, Joint moment generating function, Conditional distributions and expectations	05/03/2019	16/03/2019
				<b>MID-SEMESTER BREAK</b>	18/03/2019	24/03/2019
11	32357607	Probability Theory and Statistics	Core	Correlation coefficient, Covariance, Calculation of covariance from joint moment generating function, Independent random variables.	25/03/2019	30/03/2019
12	32357607	Probability Theory and Statistics	Core	Linear regression for two variables, and the method of least squares. Bivariate normal distribution; Chebyshev's theorem.	01/04/2019	06/04/2019
13	32357607	Probability Theory and Statistics	Core	Statement and interpretation of the strong law of large numbers, Central limit theorem and the weak law of large numbers.	08/04/2019	20/04/2019
14	32357607	Probability Theory and Statistics	Core	Markov Chains, Chapman-Kolmogorov equations, classification of states.	22/04/2019	27/04/2019

Year: 2018-2019 (Even Semester)

Course: B.Sc. (Prog.) Physical Science

Paper Type: Theory

Semester: IV

Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	42354401	Real Analysis	Core	Finite and infinite sets, Examples of countable and uncountable sets.	01/01/2019	05/01/2019
2	42354401	Real Analysis	Core	Bounded sets, Statement of order completeness property of $\mathbb{R}$ , Archimedean property of $\mathbb{R}$ .	07/01/2019	12/01/2019
3	42354401	Real Analysis	Core	Real sequences, convergence, sum and product of convergent sequences, Order preservation and squeeze theorem.	14/01/2019	19/01/2019
4	42354401	Real Analysis	Core	Monotone sequences and their convergence with illustrations.	21/01/2019	26/01/2019
5	42354401	Real Analysis	Core	Bolzano–Weierstrass theorem (statement and examples), Cauchy Sequences.	28/01/2019	02/02/2019
6	42354401	Real Analysis	Core	Examples of Cauchy Sequences, Cauchy Convergence Criterion for sequences.	04/02/2019	09/02/2019
7	42354401	Real Analysis	Core	Definition and a necessary condition for convergence of an infinite series, Geometric series, Cauchy convergence criterion for series, Positively termed series,	11/02/2019	16/02/2019

				convergence of p-series, Comparison test, Limit comparison test and examples.		
8	42354401	Real Analysis	Core	D'Alembert's ratio test, Cauchy's root test.	18/02/2019	23/02/2019
9	42354401	Real Analysis	Core	Alternating series, Leibnitz's test, Absolute and conditional convergence.	25/02/2019	02/03/2019
10	42354401	Real Analysis	Core	Sequences and series of functions, Pointwise and uniform convergence, Mn-Test.	05/03/2019	16/03/2019
				<b>MID-SEMESTER BREAK</b>	<b>18/03/2019</b>	<b>24/03/2019</b>
11	42354401	Real Analysis	Core	Cauchy general principle for uniform convergence of series of functions, Weierstrass M-test.	25/03/2019	30/03/2019
12	42354401	Real Analysis	Core	Definition of power series, Radius and interval of convergence.	01/04/2019	06/04/2019
13	42354401	Real Analysis	Core	Power series expansions for exponential, sine and cosine functions and their properties.	08/04/2019	20/04/2019
14	42354401	Real Analysis	Core	Riemann Integration and examples, Integrability of continuous and monotone functions.	22/04/2019	27/04/2019

**Year: 2019-2020 (Odd Semester)**

**Course: B.Sc. (Hons.) Mathematics**

**Paper Type: Theory**

**Semester: V**

Sl. No	UPC	Paper Name	Core/AECC/GE/	Topic/Unit	Start Date	End Date
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			<b>SEC</b>			
1	32357504	Mathematical Finance	Core	Interest (simple and compound, discrete and continuous), time value of money, inflation.	20/07/2019	27/07/2019
2	32357504	Mathematical Finance	Core	Net present value, internal rate of return (calculation by bisection and Newton-Raphson methods), comparison of NPV and IRR.	29/07/2019	03/08/2019
3	32357504	Mathematical Finance	Core	Bonds, bond prices and yields, Macaulay and modified duration.	05/08/2019	10/08/2019
4	32357504	Mathematical Finance	Core	Term structure of interest rates: spot and forward rates, explanations of term structure, running present value, floating-rate bonds.	13/08/2019	17/08/2019
5	32357504	Mathematical Finance	Core	Immunization, convexity, puttable and callable bonds.	19/08/2019	23/08/2019
6	32357504	Mathematical Finance	Core	Asset return, short selling, portfolio return, (brief introduction to expectation, variance, covariance and correlation).	26/08/2019	31/08/2019
7	32357504	Mathematical Finance	Core	Random returns, portfolio mean return and variance, diversification, portfolio diagram, feasible set, Markowitz model (review of Lagrange multipliers for 1 and 2 constraints).	02/09/2019	07/09/2019
8	32357504	Mathematical Finance	Core	Two fund theorem, risk free assets, One fund theorem.	09/09/2019	14/09/2019

9	32357504	Mathematical Finance	Core	Capital market line, Sharpe index. Capital Asset Pricing Model (CAPM), betas of stocks and portfolios.	16/09/2019	21/09/2019
10	32357504	Mathematical Finance	Core	Security market line, use of CAPM in investment analysis and as a pricing formula, Jensen's index.	23/09/2019	05/10/2019
				<b>MID-SEMESTER BREAK</b>	<b>07/10/2019</b>	<b>13/10/2019</b>
11	32357504	Mathematical Finance	Core	Forwards and futures, marking to market, value of a forward/futures contract, replicating portfolios, futures on assets with known income or dividend yield, currency futures.	14/10/2019	19/10/2019
12	32357504	Mathematical Finance	Core	Hedging (short, long, cross, rolling), optimal hedge ratio, hedging with stock index futures.	21/10/2019	02/11/2019
13	32357504	Mathematical Finance	Core	Interest rate futures, swaps. Lognormal distribution, Lognormal model / Geometric Brownian Motion for stock prices, Binomial Tree model for stock prices, parameter estimation. comparison of the models.	04/11/2019	09/11/2019
14	32357504	Mathematical Finance	Core	Options, Types of options: put / call, European / American, pay off of an option, factors affecting option prices, put call parity.	11/11/2019	16/11/2019

**Year: 2019-2020 (Odd Semester)**

**Course: B.Sc. (Prog.) Physical Science**

Paper Type: Theory

Semester: III

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	42354302	Algebra	Core	Groups: Definition and examples of abelian and non-abelian groups,	20/07/2019	27/07/2019
2	42354302	Algebra	Core	The group $\mathbb{Z}_n$ of integers under addition modulo n and the group U(n) of units under multiplication modulo n.	29/07/2019	03/08/2019
3	42354302	Algebra	Core	Cyclic groups from sets of numbers, Group of nth roots of unity, The general linear group; Elementary properties of groups. Groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square.	05/08/2019	10/08/2019
4	42354302	Algebra	Core	The permutation group Sym(n), and properties of permutations. Order of an element, Subgroups and its examples, Subgroup tests, Cyclic subgroup.	13/08/2019	17/08/2019
5	42354302	Algebra	Core	Center of a group, Properties of cyclic groups. Cosets and its properties, Lagrange's theorem, Index of a subgroup.	19/08/2019	23/08/2019

6	42354302	Algebra	Core	Normal subgroups: Definition, examples and characterizations, Factor groups. Definition and examples of rings, commutative and noncommutative rings.	26/08/2019	31/08/2019
7	42354302	Algebra	Core	Properties of rings, Subrings and ideals.	02/09/2019	07/09/2019
8	42354302	Algebra	Core	Integral domains and fields, Examples of fields: $\mathbb{Z}_n$ , $\mathbb{Q}$ , $\mathbb{R}$ and $\mathbb{C}$ .	09/09/2019	14/09/2019
9	42354302	Algebra	Core	Definition and examples of vector spaces, Subspaces.	16/09/2019	21/09/2019
10	42354302	Algebra	Core	Linear independence, Basis and dimension of a vector space.	23/09/2019	05/10/2019
				<b>MID-SEMESTER BREAK</b>	<b>07/10/2019</b>	<b>13/10/2019</b>
11	42354302	Algebra	Core	Linear transformations.	14/10/2019	19/10/2019
12	42354302	Algebra	Core	Linear transformations continued and Null spaces.	21/10/2019	02/11/2019
13	42354302	Algebra	Core	Ranges and illustrations of the rank nullity theorem.	04/11/2019	09/11/2019
14	42354302	Algebra	Core	Revision	11/11/2019	16/11/2019

**Year: 2019-2020 (Even Semester)**

**Course: B.Sc. (Hons.) Mathematics**

**Paper Type: Theory**

**Semester: VI**

Sl. No	UPC	Paper Name	Core/AECC/GE/	Topic/Unit	Start Date	End Date
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			SEC			
1	32357607	Probability Theory and Statistics	Core	Sample space, Probability set function and examples, Random variable,	01/01/2020	11/01/2020
2	32357607	Probability Theory and Statistics	Core	Probability mass/density function, Cumulative distribution function and its properties.	13/01/2020	18/01/2020
3	32357607	Probability Theory and Statistics	Core	Discrete and continuous random variables, and Transformations. Expectation of random variables, and some special expectations	20/01/2020	25/01/2020
4	32357607	Probability Theory and Statistics	Core	Mean, Variance, Standard deviation, Moments and moment generating function, Characteristic function.	27/01/2020	01/02/2020
5	32357607	Probability Theory and Statistics	Core	The discrete distributions - Uniform, Bernoulli and binomial.	03/02/2020	08/02/2020
6	32357607	Probability Theory and Statistics	Core	The discrete distributions - negative Binomial, Geometric and Poisson	10/02/2020	15/02/2020
7	32357607	Probability Theory and Statistics	Core	The continuous distributions - Uniform, Gamma, Exponential, Chi-square and Beta.	17/02/2020	22/02/2020
8	32357607	Probability Theory and Statistics	Core	Normal distribution, and normal approximation to the binomial distribution.	24/02/2020	29/02/2020
9	32357607	Probability Theory and Statistics	Core	Random vector: Discrete and continuous, Joint cumulative distribution function and its properties.	02/03/2020	07/03/2020
				<b>MID-SEMESTER BREAK</b>	<b>09/03/2020</b>	<b>15/03/2020</b>

10	32357607	Probability Theory and Statistics	Core	Joint probability mass/density function, Marginal probability mass function, and expectation of two random variables, Joint moment generating function, Conditional distributions and expectations	16/03/2020	21/03/2020
11	32357607	Probability Theory and Statistics	Core	Correlation coefficient, Covariance, Calculation of covariance from joint moment generating function, Independent random variables.	23/03/2020	28/03/2020
12	32357607	Probability Theory and Statistics	Core	Linear regression for two variables, and the method of least squares. Bivariate normal distribution; Chebyshev's theorem.	30/03/2020	04/04/2020
13	32357607	Probability Theory and Statistics	Core	Statement and interpretation of the strong law of large numbers.	06/04/2020	11/04/2020
14	32357607	Probability Theory and Statistics	Core	Central limit theorem and the weak law of large numbers.	13/04/2020	18/04/2020
15	32357611	Linear Programming Problems and Theory of Games	Core	Markov Chains, Chapman-Kolmogorov equations, classification of states.	20/04/2020	25/04/2020
16	32357611	Linear Programming Problems and Theory of Games	Core	Markov Chains, Chapman-Kolmogorov equations, classification of states continued.	27/04/2020	02/05/2020
17	32357611	Linear Programming Problems and Theory of Games	Core	Revision.	04/05/2020	15/05/2020

**Year: 2019-2020 (Even Semester)**

**Course: B.Sc. (Prog.) Physical Science**

**Paper Type: Theory**

**Semester: IV**

Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	42354401	Real Analysis	Core	Finite and infinite sets, Examples of countable and uncountable sets.	01/01/2020	11/01/2020
2	42354401	Real Analysis	Core	Bounded sets, Statement of order completeness property of $\mathbb{R}$ , Archimedean property of $\mathbb{R}$ .	13/01/2020	18/01/2020
3	42354401	Real Analysis	Core	Real sequences, convergence, sum and product of convergent sequences, Order preservation and squeeze theorem.	20/01/2020	25/01/2020
4	42354401	Real Analysis	Core	Monotone sequences and their convergence with illustrations.	27/01/2020	01/02/2020
5	42354401	Real Analysis	Core	Bolzano–Weierstrass theorem (statement and examples), Cauchy Sequences.	03/02/2020	08/02/2020
6	42354401	Real Analysis	Core	Examples of Cauchy Sequences, Cauchy Convergence Criterion for sequences.	10/02/2020	15/02/2020
7	42354401	Real Analysis	Core	Definition and a necessary condition for convergence of an infinite series, Geometric series, Cauchy convergence criterion for series, Positively termed series, convergence of p-series, Comparison test, Limit comparison test and examples.	17/02/2020	22/02/2020

8	42354401	Real Analysis	Core	D'Alembert's ratio test.	24/02/2020	29/02/2020
9	42354401	Real Analysis	Core	Cauchy's root test.	02/03/2020	07/03/2020
				<b>MID-SEMESTER BREAK</b>	<b>09/03/2020</b>	<b>15/03/2020</b>
10	42354401	Real Analysis	Core	Alternating series, Leibnitz's test, Absolute and conditional convergence.	16/03/2020	21/03/2020
11	42354401	Real Analysis	Core	Sequences and series of functions, Pointwise convergence.	23/03/2020	28/03/2020
12	42354401	Real Analysis	Core	Uniform convergence of sequence of functions, Mn-Test.	30/03/2020	04/04/2020
13	42354401	Real Analysis	Core	Cauchy general principle for uniform convergence of series of functions, Weierstrass M-Test.	06/04/2020	11/04/2020
14	42354401	Real Analysis	Core	Definition of power series, Radius and interval of convergence.	13/04/2020	18/04/2020
15	42354401	Real Analysis	Core	Power series expansions for exponential, sine and cosine functions and their properties.	20/04/2020	25/04/2020
16	42354401	Real Analysis	Core	Riemann Integration and examples.	27/04/2020	02/05/2020
17	42354401	Real Analysis	Core	Integrability of continuous and monotone functions.	04/05/2020	15/05/2020

#### E. Outstation Field visits for students

N.A.

Project Name / Paper Name			
Destination		Travel Mode	
Departure Month		Return	

Faculty-in-Charge		Number of Students going	
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**F. Internal Assessment: House Exam (Test/Presentation etc.) & Assignment\***

Course Code	Course Name	Unique Paper Code	Topic Name	Day and Date	Date/s of Exhibiting the Assessment Sheet to students, Discussing the marks, Returning/Retaining
<b>2017 – 2018 (Odd Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (V sem)	32357504	Test: Mathematical Finance	Monday 09/10/2017	16/10/2017
582B	B.Sc. (Prog.) Physical Science(III sem)	42354302	Test: Algebra	Friday 13/10/2017	27/10/2017
	B.Sc. (Hons.) Mathematics(III sem)	32353301	Test: Latex and HTML)	Tuesday 10/10/2017	27/10/2017
563	B.Sc. (Hons.) Mathematics (V sem)	32357504	Assignment: Mathematical Finance	Friday 29/09/2017	27/10/2017
582B	B.Sc. (Prog.) Physical Science(III sem)	42354302	Assignment: Algebra	Friday 29/09/2017	27/10/2017
	B.Sc. (Hons.) Mathematics(III sem)	32353301	Assignment: Latex and HTML)	Friday 29/09/2017	27/10/2017
<b>2017 – 2018 (Even Sem.)</b>					

563	B.Sc. (Hons.) Mathematics (VI sem)	32357607	Test: Probability Theory and Statistics	Thursday 15/03/2018	07/04/2018
	B.Sc. (Prog.) Analytical Chemistry(II sem)	42351101	Test: Calculus And Matrices	Friday 16/03/2018	07/04/2018
563	B.Sc. (Hons.) Mathematics (VI sem)	32357607	Assignment: Probability Theory and Statistics	Thursday 01/03/2018	07/04/2018
	B.Sc. (Prog.) Analytical Chemistry(II sem)	42351101	Assignment: Calculus And Matrices	Thursday 01/03/2018	07/04/2018
<b>2018 – 2019 (Odd Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (V sem)	32357504	Test: Mathematical Finance	Thursday 25/10/2018	03/11/2018
582B	B.Sc. (Prog.) Physical Science(III sem)	42354302	Test: Algebra	Thursday 25/10/2018	03/11/2018
563	B.Sc. (Hons.) Mathematics (V sem)	32357504	Assignment: Mathematical Finance	Friday 12/10/2018	03/11/2018
582B	B.Sc. (Prog.) Physical Science(III sem)	42354302	Assignment: Algebra	Friday 12/10/2018	03/11/2018
<b>2018 – 2019 (Even Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (VI sem)	32357607	Test: Probability Theory and Statistics	Saturday 30/03/2019	05/04/2019

582	B.Sc. (Prog.) Physical Science(IV sem)	42354401	Test: Real Analysis	Saturday 30/03/2019	05/04/2019
563	B.Sc. (Hons.) Mathematics (VI sem)	32357607	Assignment: Probability Theory and Statistics	Friday 01/03/2019	05/04/2019
582	B.Sc. (Prog.) Physical Science(IV sem)	42354401	Assignment: Real Analysis	Friday 01/03/2019	05/04/2019
<b>2019 – 2020 (Odd Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (V sem)	32357504	Test: Mathematical Finance	Thursday 17/10/2019	01/11/2019
582B	B.Sc. (Prog.) Physical Science(III sem)	42354302	Test: Algebra	Friday 18/10/2019	01/11/2019
563	B.Sc. (Hons.) Mathematics (V sem)	32357504	Assignment: Mathematical Finance	Friday 04/10/2019	01/11/2019
582B	B.Sc. (Prog.) Physical Science(III sem)	42354302	Assignment: Algebra	Friday 04/10/2019	01/11/2019
<b>2019 – 2020 (Even Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (VI sem)	32357607	Test: Probability Theory and Statistics	Monday 11/05/2020	15/05/2020
582	B.Sc. (Prog.) Physical Science(IV sem)	42354401	Test: Real Analysis	Wednesday 06/05/2020	17/04/2020
563	B.Sc. (Hons.) Mathematics (VI sem)	32357607	Assignment: Probability Theory and Statistics	Friday 17/04/2020	22/04/2020

582B	B.Sc. (Prog.) Physical Science(IV sem)	42354401	Assignment: Real Analysis	Wednesday 22/04/2020	27/04/2020
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\*Marks of the Internal Assessment to be submitted to the College 15 days before the last working day of every semester

**G. Organization of Department/College Society Meetings by Staff Advisor/Convener**

Department/Society	Meeting Date	Purpose
<b>2017 - 2018</b>		
Tensors-The mathematical Society	20.09.2017	Date of elections of office bearers is decided
Tensors-The mathematical Society	26.09.2017	Elections of office bearers held
Tensors-The mathematical Society	16.01.2018	To discuss about SUPREMUM
<b>2018 - 2019</b>		
Tensors-The Mathematical Society	20.09.2018	Discussion on Election of office bearers
Tensors-The Mathematical Society	25.09.2018	Election of office bearers
Tensors-The Mathematical Society	01.02.2019	To discuss about Supremum
<b>2019 - 2020</b>		
Tensors-The Mathematical Society	30.08.2019	Nomination for the selection of office bearers
Tensors-The Mathematical Society	09.09.2019	Result of the selection of office bearers declared
Tensors-The Mathematical Society	06.01.2020	To discuss about the talk of Prof. Pramod Kanwar and Prof. Sat Gupta on 08.01.2020

## H. College Functions

College Function	Function Date	Role to be played
NA	NA	NA

## Academic Planner

### A. Teaching Plan

Teacher's Name: **RAJ KUMAR**

Department: **MATHEMATICS**

Year: **2020-2021 (Odd Semester)**

Course: **B.Sc. (Hons.) Mathematics**

Paper Type: **Theory**

Semester: **V**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32357504	Mathematical Finance	Core	Interest (simple and compound, discrete and continuous), time value of money, inflation.	10/08/2020	14/08/2020
2	32357504	Mathematical Finance	Core	Net present value, internal rate of return (calculation by bisection and Newton-	16/08/2020	21/08/2020

				Raphson methods), comparison of NPV and IRR.		
3	32357504	Mathematical Finance	Core	Bonds, bond prices and yields, Macaulay and modified duration.	23/08/2020	28/08/2020
4	32357504	Mathematical Finance	Core	Term structure of interest rates: spot and forward rates, explanations of term structure, running present value, floating-rate bonds.	30/08/2020	04/09/2020
5	32357504	Mathematical Finance	Core	Immunization, convexity, putable and callable bonds.	06/09/2020	11/09/2020
6	32357504	Mathematical Finance	Core	Asset return, short selling, portfolio return, (brief introduction to expectation, variance, covariance and correlation).	13/09/2020	18/09/2020
7	32357504	Mathematical Finance	Core	Random returns, portfolio mean return and variance, diversification, portfolio diagram, feasible set, Markowitz model (review of Lagrange multipliers for 1 and 2 constraints).	20/09/2020	25/09/2020
8	32357504	Mathematical Finance	Core	Two fund theorem, risk free assets, One fund theorem.	27/09/2020	09/10/2020
9	32357504	Mathematical Finance	Core	Capital market line, Sharpe index. Capital Asset Pricing Model (CAPM), betas of stocks and portfolios.	11/10/2020	16/10/2020

10	32357504	Mathematical Finance	Core	Security market line, use of CAPM in investment analysis and as a pricing formula, Jensen's index.	18/10/2020	23/10/2020
11	32357504	Mathematical Finance	Core	Forwards and futures, marking to market, value of a forward/futures contract, replicating portfolios, futures on assets with known income or dividend yield, currency futures.	25/10/2020	30/10/2020
12	32357504	Mathematical Finance	Core	Hedging (short, long, cross, rolling), optimal hedge ratio, hedging with stock index futures.	01/11/2020	13/11/2020
13	32357504	Mathematical Finance	Core	Interest rate futures, swaps. Lognormal distribution, Lognormal model / Geometric Brownian Motion for stock prices, Binomial Tree model for stock prices, parameter estimation. comparison of the models.	15/11/2020	20/11/2020
14	32357504	Mathematical Finance	Core	Options, Types of options: put / call, European / American, pay off of an option, factors affecting option prices, put call parity.	22/11/2020	27/11/2020

**Year: 2020-2021 (Odd Semester)**

**Course: B.Sc. (Prog.) Physical Science**

**Paper Type: Theory**

**Semester: III**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	42354302	Algebra	Core	Groups: Definition and examples of abelian and non-abelian groups,	10/08/2020	14/08/2020
2	42354302	Algebra	Core	The group $\mathbb{Z}_n$ of integers under addition modulo $n$ and the group $U(n)$ of units under multiplication modulo $n$ .	16/08/2020	21/08/2020
3	42354302	Algebra	Core	Cyclic groups from sets of numbers, Group of $n$ th roots of unity, The general linear group; Elementary properties of groups. Groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square.	23/08/2020	28/08/2020
4	42354302	Algebra	Core	The permutation group $\text{Sym}(n)$ , and properties of permutations. Order of an element, Subgroups and its examples, Subgroup tests, Cyclic subgroup.	30/08/2020	04/09/2020
5	42354302	Algebra	Core	Center of a group, Properties of cyclic groups. Cosets and its properties, Lagrange's theorem, Index of a subgroup.	06/09/2020	11/09/2020
6	42354302	Algebra	Core	Normal subgroups: Definition, examples and characterizations, Factor groups. Definition and examples of rings, commutative and noncommutative rings.	13/09/2020	18/09/2020

7	42354302	Algebra	Core	Properties of rings, Subrings and ideals.	20/09/2020	25/09/2020
8	42354302	Algebra	Core	Integral domains and fields, Examples of fields: $\mathbb{Z}_n$ , $\mathbb{Q}$ , $\mathbb{R}$ and $\mathbb{C}$ .	27/09/2020	09/10/2020
9	42354302	Algebra	Core	Definition and examples of vector spaces, Subspaces.	11/10/2020	16/10/2020
10	42354302	Algebra	Core	Linear independence, Basis and dimension of a vector space.	18/10/2020	23/10/2020
11	42354302	Algebra	Core	Linear transformations.	25/10/2020	30/10/2020
12	42354302	Algebra	Core	Linear transformations continued, Matrix of transformation with respect to standard bases and given bases. Null spaces.	01/11/2020	13/11/2020
13	42354302	Algebra	Core	Ranges and illustrations of the rank nullity theorem.	15/11/2020	20/11/2020
14	42354302	Algebra	Core	Revision	22/11/2020	27/11/2020

**Year: 2020-2021(Even Semester)**

**Paper Type: Theory**

**Course: B.Sc. (Hons.) Mathematics**

**Semester: II**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32351201	Real Analysis	Core	Algebraic and order properties of $\mathbb{R}$ . Absolute value of a real number; Bounded above and bounded below sets.	01/04/2021	10/04/2021
2	32351201	Real Analysis	Core	Supremum and infimum of a nonempty subset of $\mathbb{R}$ . Statement of order completeness property of $\mathbb{R}$ .	12/04/2021	17/04/2021
3	32351201	Real Analysis		Archimedean property of $\mathbb{R}$ . Density of rational numbers in $\mathbb{R}$ , Definition and types of intervals, Nested intervals property	19/04/2021	24/04/2021
4	32351201	Real Analysis		Neighborhood of a point in $\mathbb{R}$ , Open and closed sets in $\mathbb{R}$ .	26/04/2021	03/05/2021
				<b>SUSPENSION OF ONLINE TEACHING DUE TO COVID-19</b>	04/05/2021	16/05/2021
5	32351201	Real Analysis	Core	Real sequences, convergence, sum and product of convergent sequences, Order preservation and squeeze theorem.	17/05/2021	29/05/2021
6	32351201	Real Analysis		Continuation of real sequences and their convergence with more examples and demonstration.	31/05/2021	05/06/2021
7	32351201	Real Analysis	Core	Monotone sequences and their convergence with illustrations.	07/06/2021	12/06/2021
8	32351201	Real Analysis	Core	Bolzano–Weierstrass theorem (statement and examples), Cauchy Sequences and examples.	14/06/2021	19/06/2021

9	32351201	Real Analysis	Core	Examples of Cauchy Sequences, Cauchy Convergence Criterion for sequences.	21/06/2021	26/06/2021
10	32351201	Real Analysis		Limit superior and limit inferior for bounded sequence of real numbers with illustrations.	28/06/2021	03/07/2021
11	32351201	Real Analysis	Core	Definition of an infinite series. Convergence and divergence of infinite series, Sequence of partial sums of infinite series, Necessary condition for convergence,	05/07/2021	10/07/2021
12	32351201	Real Analysis		Cauchy criterion for convergence of series. Geometric series, Cauchy convergence criterion for series. Tests for convergence of positive term series: Integral test of infinite series.	12/07/2021	17/07/2021
13	32351201	Real Analysis		D'Alembert's ratio test and Cauchy's root test.	19/07/2021	24/07/2021
14	32351201	Real Analysis	Core	Alternating series, Leibniz test, Absolute and conditional convergence.	26/07/2021	02/08/2021

**Year: 2020-2021 (Even Semester)**

**Course: B.Sc. (Prog.) Physical Science**

**Paper Type: Theory**

**Semester: IV**

Sl. No.	UPC	Paper Name	Core/AECC/	Topic/Unit	Start Date	End Date
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			<b>GE/ SEC</b>			
1	42354401	Real Analysis	Core	Finite and infinite sets, Examples of countable and uncountable sets.	02/01/2021	09/01/2021
2	42354401	Real Analysis	Core	Bounded sets, Statement of order completeness property of $\mathbb{R}$ , Archimedean property of $\mathbb{R}$ .	11/01/2021	16/01/2021
3	42354401	Real Analysis	Core	Real sequences, convergence, sum and product of convergent sequences, Order preservation and squeeze theorem.	18/01/2021	23/01/2021
4	42354401	Real Analysis	Core	Monotone sequences and their convergence with illustrations.	25/01/2021	30/01/2021
5	42354401	Real Analysis	Core	Bolzano–Weierstrass theorem (statement and examples), Cauchy Sequences.	01/02/2021	06/02/2021
6	42354401	Real Analysis	Core	Examples of Cauchy Sequences, Cauchy Convergence Criterion for sequences.	08/02/2021	13/02/2021
7	42354401	Real Analysis	Core	Definition and a necessary condition for convergence of an infinite series, Geometric series, Cauchy convergence criterion for series, positively termed series, convergence of p-series, Comparison test, Limit comparison test and examples.	15/02/2021	20/02/2021
8	42354401	Real Analysis	Core	D’Alembert’s ratio test.	22/02/2021	27/02/2021
9	42354401	Real Analysis	Core	Cauchy’s root test.	01/03/2021	06/03/2021
10	42354401	Real Analysis	Core	Alternating series, Leibnitz's test Absolute and conditional convergence.	08/03/2021	13/03/2021

11	42354401	Real Analysis	Core	Sequences and series of functions, Pointwise convergence.	15/03/2021	23/03/2021
				<b>MID-SEMESTER BREAK</b>	24/03/2021	30/03/2021
12	42354401	Real Analysis	Core	Uniform convergence of sequence of functions, Mn-Test.	31/03/2021	03/04/2021
13	42354401	Real Analysis	Core	Cauchy general principle for uniform convergence of series of functions, Weierstrass M-Test.	05/04/2021	10/04/2021
14	42354401	Real Analysis	Core	Definition of power series, Radius and interval of convergence.	12/04/2021	17/04/2021
15	42354401	Real Analysis	Core	Power series expansions for exponential, sine and cosine functions and their properties.	19/04/2021	24/04/2021
16	42354401	Real Analysis	Core	Riemann Integration and examples. Integrability of continuous and monotone functions.	26/04/2021	29/04/2021

#### I. Outstation Field visits for students

Project Name / Paper Name	N.A.		
Destination	N.A.	Travel Mode	N.A.
Departure Month	N.A.	Return	N.A.
Faculty-in-Charge	N.A.	Number of Students going	N.A.

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#### J. Internal Assessment: House Exam (Test/Presentation etc.) & Assignment\*

Course Code	Course Name	Unique Paper Code	Topic Name	Day and Date	Date/s of Exhibiting the Assessment Sheet to students, Discussing the marks, Returning/Retaining
<b>2020 – 2021 (Odd Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (V sem)	32357504	Test-1: Mathematical Finance	Friday 27/11/2020	30/11/2020
582	B.Sc. (Prog.) Physical Science(III sem)	42354302	Test: Algebra	Friday 06/11/2020	14/11/2020
563	B.Sc. (Hons.) Mathematics (V sem)	32357504	Assignment: Mathematical Finance	Friday 29/10/2020	04/11/2020
582	B.Sc. (Prog.) Physical Science(III sem)	42354302	Assignment: Algebra	Friday 17/10/2020	24/11/2020
<b>2020 – 2021 (Even Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (II sem)	32351201	Test: Real Analysis (H)	Monday 28/07/2021	30/07/2021
582	B.Sc. (Prog.) Physical Science(IV sem)	42354401	Test: Real Analysis	Wednesday 24/04/2021	30/04/2020
563	B.Sc. (Hons.) Mathematics (II sem)	32351201	Assignment: Real Analysis (H)	Friday 08/07/2021	17/07/2021
582	B.Sc. (Prog.) Physical Science(IV sem)	42354401	Assignment: Real Analysis	Wednesday 07/04/2021	14/04/2021

**\*Marks of the Internal Assessment to be submitted to the College 15 days before the last working day of every semester**

**K. Organization of Department/College Society Meetings by Staff Advisor/Convener**

Department/Society	Meeting Date	Purpose
2020 - 2021		
Tensors-The Mathematical Society	23.01.2021	Nomination for the selection of office bearers
Tensors-The Mathematical Society	03.02.2021	Election for the selection of office bearers
Tensors-The Mathematical Society	04.02.2021	Result of the selection of office bearers declared
Tensors-The Mathematical Society	17-23 Feb. 2021	To discuss about the Fresher party for first year students on 24.02.2021
Tensors-The Mathematical Society	08.03.2021	To discuss about the following: 1. Talk of Prof. Vikas Bist, Department of Mathematics, Panjab University, Chandigarh, regarding Qazi Zameeruddin Memorial Lecture on 09.03.2020 2. Two day annual festival SUPREMUM 2021 which was to be held on 9 <sup>th</sup> and 10 <sup>th</sup> March 2021

**L. College Functions**

College Function	Function Date	Role to be played
NA	NA	NA

