

## iii. Teaching plan

**Krishna Chandra College**  
 DEPARTMENT OF MATHEMATICS  
**SESSION – 2022-23**  
**Teaching Plans**

**Name of the teacher: Prof Anup Ray**

Sem	General/ Hons	Course	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
1 <sup>st</sup> SEM	General	BMG1CC1A	Differential Calculus	<b>Unit – 3</b> Rolle's theorem, Mean Value theorems	7	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning-Answering,</li> <li>• Problem Solving,</li> <li>• Illustration with Example,</li> <li>• Board Working</li> </ul>	3. Differential Calculus-Das, Mukherjee 2. Differential Calculus-Santi Narayanan
				<b>Unit – 5</b> Maxima and Minima, Indeterminate forms.	8		
Total number Classes					15		

Sem	Gen/Ho ns	Course	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
2 <sup>nd</sup> SEM	General	BMG2CC1B	Differential Equations	<b>Unit – 1</b> 1 <sup>st</sup> order exact ODE, Integrating Factors, Rules to find an IF, 1 <sup>st</sup> order higher degree equations solvable for x,y,p	10	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning-Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> <li>• ICT</li> </ul>	1. Shepley L. Ross, Differential Equations. 2. An Introduction to Differential Equations-Ghosh, Maity
Total number Classes					10		

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Sem	General/ Hons	Course	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>1<sup>st</sup> SEM</b>	<b>Hons</b>	<b>BMH1CC01</b>	<b>Calculus, Geometry, Differential equations</b>	<b>Unit – 2</b> a) Reduction formulae, derivations and illustrations of reduction formulae for the integration of $\sin nx$ , $\cos nx$ , $\tan nx$ , $\sec nx$ , $(\log x)^n$ , $\sin nx \sin mx$ , b) Parametric equations, parametrizing a curve, arc length, arc length of parametric curves, area of surface of revolution. Techniques of sketching conics.	6	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning- Answering,</li> <li>• Problem Solving,</li> <li>• Illustration with Example,</li> <li>• Board Working</li> </ul>	1. Shepley L. Ross, Differential Equations. 2. An Introduction to Differential Equations- Ghosh, Maity 3. An Introduction to Analysis Integral Calculus- Ghosh, Maity
				<b>Unit – 4</b> a) Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation.	4		
				b) Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.	8		
				Total number Classes			

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Sem	Gen/Hons	Course	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>2<sup>nd</sup> SEM</b>	<b>Hons</b>	<b>BMH2CC04</b>	<b>Differential Equation and Vector Calculus</b>	<b>Unit – I</b> a) Lipschitz condition and Picard’s Theorem General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian,	20	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> </ul>	<ul style="list-style-type: none"> <li>• Shepley L. Ross, Differential Equations.</li> <li>• An Introduction to Differential Equations- Ghosh, Maity</li> <li>• Murray, D., Introductory Course in Differential Equations</li> </ul>
				Unit I b) Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler’s equation, method of undetermined coefficients, method of variation of parameters.	10		
				<b>Unit – II</b> a) Systems of linear ODE and its type, differential operators, an operator method for linear systems with constant coefficients,	10		
				Unit II b) Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions.	10		
Total number Classes					40		

<b>Name of the teacher: Prof Anup Ray</b>							
Sem	Gen/Hons	Course	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>3<sup>rd</sup> SEM</b>	<b>Hons</b>	<b>BMH3CC05</b>	<b>Theory of real functions and Introduction of Metric spaces</b>	<b>Unit – I I</b> a) Differentiability, Caratheodory’s theorem, algebra of differentiable functions.	5	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> </ul>	<ul style="list-style-type: none"> <li>• R. Bartle and D.R. Sherbert, Introduction to Real Analysis</li> <li>• W. Rudin, Principles of Mathematical Analysis</li> <li>• Real Analysis - S. K. Mapa</li> </ul>
				b) Relative extrema, interior extremum, Rolle’s theorem. MVT, intermediate value property of derivatives, Darboux’s theorem.	5		
				c) Applications of MVT to inequalities and approximation of polynomials, Curvature	5		
Total number Classes					15		

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Sem	General/Hons	Course	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>4<sup>th</sup> SEM</b>	<b>General</b>	<b>BMG4CC1D</b>	<b>Algebra</b>	<b>Unit – 1</b> a) Definition and examples of groups, abelian and non-abelian groups,	4	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning- Answering,</li> <li>• Problem Solving,</li> <li>• Illustration with Example,</li> <li>• Board Working</li> </ul>	<ol style="list-style-type: none"> <li>1. S. K. Mapa, Higher Algebra (Abstract and Linear</li> <li>2. Sen, Ghosh , Mukherjee - TOPICS IN ABSTRACT ALGEBRA</li> </ol>
				3. The group $\mathbb{Z}_n$ under addition modulo n and the group U(n) of units under multiplication modulo n. Cyclic groups.	6		
Total number Classes					10		

<b>Name of the teacher: Prof Anup Ray</b>							
Year	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>2<sup>nd</sup> Year, 4<sup>th</sup> sem</b>	<b>Hons</b>	BMH4CC09	<b>Multivariate Calculus</b>	<b>Unit - I</b> a) Functions of several variables, limit and continuity of functions of n variables,	8	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> </ul>	<ul style="list-style-type: none"> <li>• Tom M. Apostol, Mathematical Analysis</li> <li>• Maity, K.C. and Ghosh, R.K. Vector Analysis</li> <li>• James Stewart, Multivariable Calculus</li> </ul>
				b) Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability.	5		
				c) Chain rule for one and two independent parameters, directional derivatives, the gradient, Jacobian,	5		
				d) Maximal and normal property of gradient, tangent planes, Extrema of functions of n variables with necessary and sufficient conditions, method of Lagrange multipliers	7		
Total number Classes					25		

<b>Name of the teacher: Prof Anup Ray</b>							
Year	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>5<sup>th</sup> Sem, 3<sup>rd</sup> Year</b>	<b>Honours</b>	<b>BMH5CC12</b>	<b>Mechanics I</b>	<b>Unit – I</b> a) Co-planar forces. Friction. Virtual work. Forces in three dimensions. General conditions of equilibrium.	10	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> </ul>	<ol style="list-style-type: none"> <li>1. S. L. Loney, An Elementary Treatise On the Dynamics of a Particle and a Rigid Body</li> <li>2. S. Ramsey, Dynamics (Part I &amp; II)</li> <li>3. S. Ganguly and S. Saha, Analytical Dynamics of a Particle</li> <li>4. Chakraborty, Ghosh: Advanced Analytical Dynamics</li> <li>5. Ghosh, M. C, Analytical Statics.</li> <li>6. Matiur Rahman, Md., Statics</li> </ol>
				b) Centre of gravity for different bodies. Stable and unstable equilibrium, equilibrium of flexible string	10		
				<b>Unit – II</b> a) Simple harmonic motion, Damped and forced vibrations, Two dimensional motion, Motion of a projectile in a resisting medium. Motion of a particle under central force, Keplar’s laws of motion	10		
				b) Stability of nearly circular orbits, Slightly disturbed orbits, Motion of artificial satellites. Varying mass	7		
				b) Constrained motion, Motion of a particle in three dimensions. Motion on a smooth sphere, cone, and on any surface of revolution	8		
Total number Classes					45		

<b>Name of the teacher: Prof Anup Ray</b>							
Year	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>3<sup>rd</sup> Year, 5<sup>th</sup> sem</b>	<b>General</b>	BMG5DSE1A1	<b>Matrices</b>	<b>Unit – III</b>	4	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> </ul>	<ul style="list-style-type: none"> <li>• S. K. Mapa, Higher Algebra (Abstract and Linear)</li> <li>• Advanced Higher Algebra – Ghosh Chakraborty,</li> </ul>
				a) Types of matrices. Rank of a matrix.	6		
				b) Invariance of rank under elementary transformations. Reduction to normal form	5		
				c) Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four.			
Total number Classes					15		

<b>Name of the teacher: Prof Anup Ray</b>							
Year	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>3<sup>rd</sup> Year, 5<sup>th</sup> sem</b>	<b>General</b>	BMG5SEC31	<b>Probability &amp; Statistics</b>	<b>Unit - I</b>	8	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> </ul>	<ul style="list-style-type: none"> <li>• A Gupta- Groundwork of Mathematical Probability and Statistics</li> <li>• Kapur, J.N. and Saxena H.C - Mathematical Statistics</li> </ul>
				a) Sample space, probability axioms, random variables (discrete and continuous), cumulative distribution function, pmf/pde	6		
				b) mathematical expectation, moments, moment generating function	6		
				c) characteristic function, discrete distributions: binomial, Poisson, continuous distributions: uniform, normal, exponential	10		
				<b>Unit - II</b>	10		
				a) Joint cumulative distribution function, joint pdf, marginal and conditional distributions,	10		
b) Expectation of function of two random variables, conditional expectations, independent random variables.							
Total number Classes					40		

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Year	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
3 <sup>rd</sup> Year, 6 <sup>th</sup> sem	Hons	BMH6DSE43	Mechanics II	<b>Unit – I</b> Newton’s laws of motion, Galilean transformation, Concept of absolute length and time, Limitations of Newton’s laws in solving problems.	15	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> </ul>	<ul style="list-style-type: none"> <li>• Classical mechanics kapur, J.N. -- Narayan Rana, Pramod Joag</li> <li>• Classical Mechanics- Herbert Goldstein</li> <li>• Hydrostatics – J M Kar</li> <li>• Hydrostatics - A. S. Ramsey</li> <li>• Theory of elasticity and plasticity - Helena, H. Jane</li> </ul>
				<b>Unit II</b> a) Equilibrium of fluid in a given field of force, Pressure in a heavy homogeneous liquid	10		
				b) Equilibrium of floating bodies, Isothermal and adiabatic changes in Gases, Convective equilibrium	10		
				c) Stress in continuum body, Stress quadric	5		
				<b>Unit-3</b> a) Constraints and their classifications, Lagrange’s equation of motion for holonomic system,	10		
				b) Gibbs-Appell’s principle of least constraint, Work energy relation for constraint forces of shielding friction.	10		
Total number Classes					60		



# Krishna Chandra College

DEPARTMENT OF MATHEMATICS

SESSION – 2022-23

Teaching Plans

<b>Name of the teacher: Dr Pallav Jyoti Pal</b>							
Sem	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>1<sup>st</sup> Sem</b>	<b>Honours</b>	<b>BMH1CC02</b>	<b>Algebra (Classical Algebra)</b>	<b>Unit – I(a)</b> Polar representation of complex numbers, n-th roots of unity, De Moivre’s theorem for rational indices and its applications.	5	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working.</li> </ul>	<ul style="list-style-type: none"> <li>• Classical Algebra- S.K.Mapa</li> <li>• Higher Algebra- Hall, Night</li> <li>• Titu Andreescu and Dorin Andrica: Complex Numbers from A to Z</li> <li>• W.S. Burnstine and A.W. Panton, Theory of equations</li> </ul>
				<b>Unit – I(b)</b> <ul style="list-style-type: none"> <li>• Theory of equations, Relation between roots and coefficients</li> <li>• Transformation of equation.</li> <li>• Descartes rule of signs.</li> <li>• Cubic and bi-quadratic equations, reciprocal equation, separation of the roots of equations, Strum’s theorem.</li> </ul>	8		
Total number Classes					13		

<b>Name of the teacher: Dr Pallav Jyoti Pal</b>							
Sem	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>2<sup>nd</sup> Sem</b>	<b>Honours</b>	<b>BMH1CC03</b>	<b>Graphical Demonstration</b>	<b>Unit – I</b> Plotting of recursive sequences. Study the convergence of sequences through plotting. Verify Bolzano-Weierstrass theorem through plotting of sequences and hence identify convergent subsequences from the plot.	5	<ul style="list-style-type: none"> <li>• Discussion,</li> <li>• ICT</li> <li>• Board Working</li> </ul>	<ul style="list-style-type: none"> <li>• T. Apostol, Calculus, Volumes I and II.</li> <li>• Ghosh, Maity- Differential Calculus</li> <li>• Rudra Pratap- Getting Started with MATLAB</li> </ul>
				<b>Unit – II</b> Study the convergence/divergence of infinite series by plotting their sequences of partial sum. Cauchy's root test by plotting $n$ th roots. Ratio test by plotting the ratio of $n$ th and $(n+1)$ th term.	5		
Total number Classes					10		

<b>Name of the teacher: Dr Pallav Jyoti Pal</b>							
Year	Gen/Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>3<sup>rd</sup> Sem, 2<sup>nd</sup> Year</b>	<b>Honours</b>	<b>BMH3CC07</b>	<b>Numerical Methods</b>	Unit – 4 Interpolation: Lagrange and Newton’s methods, Error bounds, Finite difference operators. Forward and backward difference interpolations. Numerical differentiation, finite differences	9	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working.</li> </ul>	<ul style="list-style-type: none"> <li>• F. B. Hildebrand, Introduction to Numerical Analysis</li> <li>• J. B. Scarborough, Numerical Mathematical Analysis</li> <li>• A Gupta, SC Bose, Introduction to Numerical Analysis</li> </ul>
				Unit – 5(a) : Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson’s 1/3rd rule, Simpsons 3/8 <sup>th</sup> rule, Weddle’s rule, Boole’s rule.	5		
				Unit – 5(b) : Midpoint rule, Composite Trapezoidal rule, Composite Simpson’s 1/3rd rule, Gauss quadrature formula. The algebraic eigenvalue problem: Power method.	5		
				Unit – 6: ODE: The method of successive approximations, Euler’s method, the modified Euler method, RK4 of orders two and four.	5		
Total number Classes					24		
<b>3<sup>rd</sup> Sem, 2<sup>nd</sup> Year</b>	<b>Honours</b>	<b>BMH3CC07</b>	<b>Lab</b>	Unit – 2 Solution of system of linear equations (a) Gaussian elimination method (b) Gauss-Seidel method	5	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Computer,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working.</li> <li>• ICT</li> </ul>	<ul style="list-style-type: none"> <li>• E. Balaguramy, Programming in Ansi C</li> </ul>
				Unit – 3 Interpolation : Lagrange Interpolation	4		
				Unit – 4 Numerical Integration (a) Trapezoidal Rule (b) Simpson’s one third rule	4		
Total number Classes					13		

**Name of the teacher: Dr Pallav Jyoti Pal**

Year	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd Year	Honours	BMH4CC09	Double and triple integral, vector calculus	Unit – II(a) Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates,	7	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working.</li> </ul>	<ul style="list-style-type: none"> <li>• Marsden, J., and Tromba, Vector Calculus</li> <li>• James Stewart, Multivariable Calculus, Concepts and Contexts</li> <li>• Tom M. Apostol, Mathematical Analysis</li> <li>• Maity, K.C. and Ghosh, R.K. Vector Analysis</li> <li>• Shanti Narayan, A Text Book of Vector Analysis</li> <li>• M. Spiegel, S. Lipschutz, D. Spellman, Vector Analysis</li> </ul>
				Unit – II(b) Triple integrals, Triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical coordinates. Change of variables in double integrals and triple integrals	8		
				Unit-III(a): Vector operators, Gradient of a scalar function, directional derivatives, Definition of vector field, Divergence and curl.	5		
				Unit-III(b): Line integrals, Fundamental theorem for line integrals, conservative vector fields, Application of line integral to Workdone	5		
				Unit-IV: Green’s theorem, surface integrals, integrals over parametrically defined surfaces. Stoke’s theorem, The Divergence theorem	10		
Total number Classes					35		

**Name of the teacher: Dr Pallav Jyoti Pal**

Year	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd Year	Honours	BMH4SEC21	Graph Theory	Unit – I Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi - partite graphs isomorphism of graphs	10	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> <li>• ICT.</li> </ul>	<ul style="list-style-type: none"> <li>• Nar Sing Deo : Graph Theory</li> <li>• Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory</li> </ul>
				Unit – II(a) Eulerian circuits, Eulerian graph, semi-Eulerian graph and theorems, Hamiltonian cycles and theorems	9		
				Unit-II(b): Representation of a graph by a matrix, the adjacency matrix, incidence matrix, weighted graph	6		
				Unit-III(a): Travelling salesman’s problem, shortest path,	7		
				Unit-III(b): Tree and their properties, spanning tree, Dijkstra’s algorithm, Warshall algorithm	8		
Total number Classes					40		

<b>Name of the teacher: Dr Pallav Jyoti Pal</b>							
Year	Gen/ Hons	Paper	Subject	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>6th Sem, 3rd Year</b>	<b>Honours</b>	<b>BMH6CC13</b>	<b>Metric spaces and Complex Analysis</b>	Unit 3 : Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability	7	<ul style="list-style-type: none"> <li>• Lecture,</li> <li>• Questioning – Answering,</li> <li>• Problem Solving,</li> <li>• Illustrate with Example,</li> <li>• Board Working</li> <li>• ICT.</li> </ul>	<ul style="list-style-type: none"> <li>• James Ward Brown and Ruel V. Churchill, Complex Variables and Applications</li> <li>• S. Ponnusamy, Foundations of omplex Analysis</li> </ul>
				Unit 4 (a): Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function	5		
				Unit 4 (b): Derivatives of functions, and definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy- Goursat theorem, Cauchy integral formula.	8		
				Unit 5 : Liouville’s theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples	6		
				Unit 6 : Laurent series and its examples, absolute and uniform convergence of power series	4		
Total number Classes					30		

<b>Name of the teacher: Dr Pallav Jyoti Pal</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
6th Sem, 3rd Year	<b>Honours</b>	BMH6PW01	<b>Project Word</b>	<b>Unit 1:</b> Mathematical tools and software	6	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> <li>• Graphical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• Elements of Mathematical Ecology- Mark Kot</li> <li>• Mathematical Biology: I. An Introduction- J D Murray</li> </ul>
				<b>Unit 2:</b> Review of Earlier Work	12		
				<b>Unit 3:</b> Identification of a problem	8		
				<b>Unit 4:</b> Problem solving,	12		
				<b>Unit 5:</b> Numerical Simulation	10		
				<b>Unit 6:</b> Project Writing	12		
Total number Classes					60		

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**SESSION – 2022-23**  
**Teaching Plans**

**Name of the teacher: Mr Sudipto Bhattacharjee**

Year	Gen/Honors	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
1st Sem, 1st Year	Honours	BMH1CC01	Calculus, Geometry & Differential Equations	<b>Unit 1A:</b> Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax+b} \sin x, e^{ax+b} \cos x, (ax + b)^n \sin x, (ax + b)^n \cos x$ .	6	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> <li>• Graphical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• G.B. Thomas and R.L. Finney, Calculus.</li> <li>• M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed.,</li> <li>• S.L. Ross, Differential Equations,</li> </ul>
				<b>Unit 1B:</b> Concavity and inflection points, envelopes, asymptotes, curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.	6		
				<b>Unit 3A:</b> Reflection properties of conics, translation and rotation of axes and second degree equations, classification of conics using the discriminant, polar equations of conics.	6		
				<b>Unit 3B:</b> Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, Generating lines, classification of quadrics, Illustrations of graphing standard quadric surfaces like cone, ellipsoid.	6		
				<b>Unit 5A:</b> Introduction to plotting software.	6		
				<b>Unit 5B:</b> Graphical Demonstration (Teaching Aid). 1. Plotting of graphs of function $e^{ax+b}, \log(ax + b), \frac{1}{ax+b}, \sin(ax + b), \cos(ax + b),  ax + b $ and to illustrate the effect of a and b on the graph 2. Plotting the graphs of polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them. 3. Sketching parametric curves (Eg. Trochoid, cycloid, epicycloids, hypocycloid). 4. Obtaining surface of revolution of curves. 5. Tracing of conics in Cartesian coordinates/polar coordinates. 6. Sketching ellipsoid, hyperboloid of one and two sheets, elliptic cone, elliptic, paraboloid, and hyperbolic paraboloid using Cartesian coordinates.	6		
Total number Classes					36		



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Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>1st Sem, 1st Year</b>	<b>General</b>	BMG1CC1A	<b>Differential Calculus</b>	<b>Unit 1A:</b> Limit and continuity ( $\epsilon - \delta$ definition), examples.	4	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• G. B. Thomas and R. L. Finney, Calculus,</li> <li>• S. K. Mapa, Real Analysis</li> </ul>
				<b>Unit 1B:</b> Type of Discontinuities, examples, some important theorems.	6		
Total number Classes					10		

<b>Name of the teacher: Mr Sudipto Bhattacharjee</b>							
Year	Gen/	Paper	Paper	Subject Contains	No. of	Teaching	Reference Books

	Hons	code	title	Classes	methods		
2nd Sem, 1st Year	Honours	BMH2CC04	Differential Equations and Vector Calculus	<b>Unit 3A:</b> Equilibrium points, Interpretation of the phase plane.	2	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> <li>• Graphical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• S.L. Ross, Differential Equations,.</li> <li>• G.F.Simmons, Differential Equations</li> <li>• M.R. Spiegel, Schaum's outline of Vector Analysis</li> </ul>
				<b>Unit 3B:</b> Power series solution of a Differential equation about an ordinary point, solution about a regular singular point.	4		
				<b>Unit 4A:</b> Triple product, introduction to vector functions, operations with vector-valued functions.	5		
				<b>Unit 4B:</b> Limits and continuity of vector functions, differentiation and integration of vector functions.	5		
				<b>Unit 5:</b> Graphical Demonstration (Teaching Aid). 1. Plotting of family of curves which are solutions of second order differential equation. 2. Plotting of family of curves which are solutions of third order differential equation.	4		
Total number Classes				20			

<b>Name of the teacher: Mr Sudipto Bhattacharjee</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
2nd Sem, 1st Year	General	BMG2CC1B	Differential Equations	<b>Unit 3A:</b> Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations Formation of first order partial differential equations.	7	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> <li>• Graphical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• S.L. Ross, Differential Equations,.</li> <li>• G.F.Simmons, Differential Equations</li> <li>• I. Sneddon, Elements of Partial Differential Equations</li> </ul>
				<b>Unit 3B:</b> Linear partial differential Equation of first order, Lagrange's method, Charpit's method.	8		
				<b>Unit 4:</b> Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	9		
Total number Classes					24		

<b>Name of the teacher: Mr Sudipto Bhattacharjee</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
3rd Sem, 2nd Year	<b>Honours</b>	BMH3CC05	<b>Theory of Real Functions &amp; I ntroduction to Metric Space</b>	<b>Unit 4A:</b> Metric spaces: Definition and examples. Open and closed balls, neighbourhood, open set, interior of a set.	5	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• G.F. Simmons, Introduction to Topology and Modern Analysis.</li> </ul>
				<b>Unit 4B:</b> Limit point of a set, closed set, diameter of a set, subspaces, dense sets, separable spaces.	5		
Total number Classes					10		

<b>Name of the teacher: Mr Sudipto Bhattacharjee</b>							
Year	Gen/Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
3rd Sem, 2nd Year	Honours	BMH3CC06	Group Theory-I	<b>Unit 3A:</b> Properties of cyclic groups, classification of subgroups of cyclic groups.	6	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• John B. Fraleigh, A First Course in Abstract Algebra.</li> <li>• S. K. Mapa, Higher Algebra Abstract &amp; Linear</li> <li>• M. K. Sen, S. Ghosh, P. Mukhopadhyay, S. K. Maity, Topics in Abstract Algebra,</li> </ul>
				<b>Unit 3B:</b> Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group.	6		
				<b>Unit 3C:</b> Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.	8		
				<b>Unit 5A:</b> Group homomorphisms, properties of homomorphisms, Cayley's theorem.	7		
				<b>Unit 5B:</b> Properties of isomorphisms, First, Second and Third isomorphism theorems.	8		
Total number Classes					35		

<b>Name of the teacher: Mr Sudipto Bhattacharjee</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
3rd Sem, 2nd Year	<b>General</b>	BMG3CC1C	<b>Differential Calculus</b>	<b>Unit 4A:</b> Sequence and series of functions, Pointwise and uniform convergence, $M_n$ test.	5	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis,</li> <li>• S. K. Mapa, Real Analysis</li> </ul>
				<b>Unit 4B:</b> Statements of the results about Pointwise and uniform convergence and integrability and differentiability of functions.	5		
				<b>Unit 4C:</b> Power series and radius of convergence.	5		
Total number Classes					15		

**Name of the teacher: Mr Sudipto Bhattacharjee**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd Year	Honours	BMH4CC08	Riemann Integration and Series of Functions	<b>Unit 3A:</b> Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions.	7	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> <li>• Graphical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• R.G. Bartle and D.R. Sherbert, Introduction to Real Analysis,</li> <li>• S. K. Mapa, Real Analysis</li> <li>• M.R. Spiegel, Schaum's outline of Theory and Problems of Fourier Analysis</li> </ul>
				<b>Unit 3B:</b> Series of functions, Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test.	8		
				<b>Unit 4A:</b> Fourier series: Definition of Fourier coefficients and series, Riemann- Lebesgue lemma.	5		
				<b>Unit 4B:</b> Bessel's inequality, Parseval's identity, Dirichlet's condition. Examples of Fourier expansions and summation results for series.	5		
				<b>Unit 5A:</b> Power series, radius of convergence, Cauchy Hadamard Theorem.	4		
				<b>Unit 5B:</b> Differentiation and integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.	4		
Total number Classes					33		

**Name of the teacher: Mr Sudipto Bhattacharjee**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
5th Sem, 3rd Year	Honours	BMH5CC12	Mechanics-I	<b>Unit 3 :</b> Degrees of freedom, Moments and products of inertia, Momental Ellipsoid, Principal axes, D'Alembert's Principle, Motion about a fixed axis, Compound pendulum, Motion of a system of particles, Motion of a rigid body in two dimensions under finite and impulsive forces, Conservation of momentum and energy.	15	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• S. L. Loney., An Elementary Treatise on the Dynamics of particle and of Rigid Bodies,</li> <li>• S. A. Mollah, Dynamics of Rigid Bodies,</li> </ul>
Total number Classes					15		



<b>Name of the teacher: Mr Sudipto Bhattacharjee</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
5th Sem, 3rd Year	General	BMG5DSE1A1	Matrices	<b>Unit 1A:</b> $\mathbb{R}, \mathbb{R}^2, \mathbb{R}^3$ as vector spaces over $\mathbb{R}$ , Standard basis for each of them.	5	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• S. H. Friedberg, A. L. Insel, and L. E. Spence, Linear Algebra</li> <li>• S. K. Mapa, Higher Algebra Abstract &amp; Linear</li> </ul>
				<b>Unit 1B:</b> Concept of Linear Independence and examples of different bases, Subspaces of $\mathbb{R}^2, \mathbb{R}^3$ .	5		
				<b>Unit 2A:</b> Translation, Dilation, Rotation, Reflection in a point, line and plane, Matrix form of basic geometric transformations.	7		
				<b>Unit 2B:</b> Interpretation of eigen values and Eigenvectors for such transformations and eigenspaces as invariant subspaces.	8		
Total number Classes					25		

Name of the teacher: Mr Sudipto Bhattacharjee							
Year	Gen/Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
6th Sem, 3rd Year	Honours	BMH6PW01	Project Work	<b>Unit 1:</b> Mathematical tools and software	6	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> <li>• Graphical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• S. M. Carroll, Spacetime and Geometry</li> <li>• S. Dodelson, Modern Cosmology</li> </ul>
				<b>Unit 2:</b> Review of Earlier Work	25		
				<b>Unit 3:</b> Research Methodology	8		
				<b>Unit 4:</b> Project Writing	21		
Total number Classes					60		

Name of the teacher: Mr Sudipto Bhattacharjee							
Year	Gen/Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
6th Sem, 3rd Year	General	BMG6DSE1B3	Linear Programming	<b>Unit -3 (1<sup>st</sup> part):</b> Linear Programming Problems, Graphical Approach for solving some Linear Programs, Convex Sets, supporting and Separating Hyperplanes	20	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> <li>• Graphical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• J.G. Chakraborty &amp; P. R. Ghosh, Linear Programming &amp; Game Theory</li> <li>• Linear Programming and Theory of Games, P. M. Karak</li> </ul>
Total number Classes					20		

# Krishna Chandra College

DEPARTMENT OF MATHEMATICS

SESSION – 2022-23

Teaching Plann

Name of the teacher: Sk Anowar Hossain

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
1st Sem, 1st year	Honours	BMH1CC02	Algebra	<b>Unit – III</b> Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation $Ax=b$ , solution sets of linear systems, applications of linear systems, linear independence.	10	<ul style="list-style-type: none"> <li>• ICT, Google Meet, Zoom</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	S. K. Mapa: Higher Algebra: Abstract and Linear, 15th Edition Linear Algebra <u>Stephen Friedberg</u> , <u>Arnold Insel</u> , <u>Lawrence Spence</u>
				<b>Unit – IV. A</b> Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices.	08		
				<b>Unit – IV. B</b> Vector Spaces of $R^n$ , Subspaces of $R^n$ , dimension of subspaces of $R^n$ , rank of a matrix, Eigen values, Eigen Vectors and Characteristic Equation of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix.	18		
Total number Classes					10		

**Name of the teacher: Sk Anowar Hossain**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
1st Sem, 1st year	General	BMG1CC1A	Differential Calculus	<b>Unit - III</b> Taylor's series, Maclaurin's series of $\sin X$ , $\cos x$ , $e^x$ , $\log(1+x)$ , $(1+x)^n$ ,	6	<ul style="list-style-type: none"> <li>• ICT, Google Meet, Zoom</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	Differential Calculus: Das and Mukherjee
				Maxima and Minima, Indeterminate forms.	4		
Total number Classes					10		

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
2nd Sem, 1st year	General	BMG2CC1B	Differential Equations	<b>Unit - I (2<sup>nd</sup> Part)</b> Methods for solving higher-order differential equations. Basic theory of linear differential equations,	6	<ul style="list-style-type: none"> <li>• ICT, Google Meet, Zoom</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	Differential Equation: Ghosh & Chakroborty
				Wronskian, and its properties.  Solving a differential equation by reducing its order.	4		
Total number Classes					10		

<b>Name of the teacher: Sk Anowar Hossain</b>							
<b>Year</b>	<b>Gen/ Hons</b>	<b>Paper code</b>	<b>Paper title</b>	<b>Subject Contains</b>	<b>No. of Classes</b>	<b>Teaching methods</b>	<b>Reference Books</b>
<b>3rd Sem, 2nd year</b>	<b>Honours</b>	<b>BMH3CC05</b>	<b>Theory of Real Functions &amp; Introduction to Metric Space</b>	<b>Unit – I A</b> Limits of functions ( $\epsilon - \delta$ approach), sequential criterion for limits, divergence criteria. Limit theorems, one sided limits. Infinite limits and limits at infinity	08	<ul style="list-style-type: none"> <li>• ICT, online classes</li> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• S. K. Mapa: Introduction to Real Analysis</li> <li>• Introduction to Real Analysis, 4ed, by Robert G. Bartle</li> </ul>
				<b>Unit – I B</b> Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem.	08		
				Uniform continuity, non-uniform continuity criteria, theorems on uniform continuity	07		
				<b>Unit – III A</b> Cauchy’s mean value theorem. Taylor’s theorem with Lagrange’s form of remainder, Taylor’s theorem with Cauchy’s form of remainder, application of Taylor’s theorem to convex functions, relative extrema.	05		
				<b>Unit – III B</b> Taylor’s series and Maclaurin’s series expansions of exponential and trigonometric functions, $\ln(1 + x)$ , $1/ax+b$ and $(1 + x)^n$ . Application of Taylor’s theorem to inequalities	05		
<b>Total number Classes</b>					<b>35</b>		

<b>Name of the teacher: Sk Anowar Hossain</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
3rd Sem, 2nd year	<b>Honours</b>	BMH3CC07	Numerical Methods & Numerical Methods Lab	<b>Unit – I</b> Algorithms, Convergence, Errors: Relative, Absolute. Round off, Truncation.	02	<ul style="list-style-type: none"> <li>• ICT, online classes</li> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering,
				<b>Unit – II</b> Transcendental and Polynomial equations: Bisection method, Newton's method, Secant method, Regula- falsi method, fixed point iteration, Newton-Raphson method. Rate of convergence of these methods.	06		
				<b>Unit – III</b> System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis, LU Decomposition.	08		
Total number Classes					16		
<b>Practical (using C programming)</b> <ol style="list-style-type: none"> <li>1. Solution of transcendental and algebraic equations by                             <ol style="list-style-type: none"> <li>(a) Newton Raphson method.</li> <li>(b) Regula Falsi method.</li> </ol> </li> <li>2. Solution of ordinary differential equations: Runge Kutta method</li> </ol>					06	C PROGRAMMING	Yashavant Kanetkar, Let Us C , BPB Publications, 2016.

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd year	Honours	BMH4CC10	Ring Theory and Linear Algebra I	<b>Unit - III A</b> Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors,	05	<input type="checkbox"/> ICT, Google Meet, Zoom <input type="checkbox"/> Board Working <input type="checkbox"/> Illustrate with Examples.	S. K. Mapa: Higher Algebra: Abstract and Linear, 15th Edition  Linear Algebra by Stephen H. Friedberg , Arnold J. Insel , Lawrence E. Spence <input type="checkbox"/>
				<b>Unit - III B</b> linear span, linear independence, basis and dimension, dimension of subspaces, extension, deletion and replacement theorems.	07		
				<b>Unit - IV A</b> Linear transformations, null space, range, rank and nullity of a linear transformation,	06		
				<b>Unit - IV B</b> matrix representation of a linear transformation, algebra of linear transformations,	07		
				<b>Unit - IV C</b> Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix	10		
Total number Classes					35		

<b>Name of the teacher: Sk Anowar Hossain</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd year	General	BMG2CC1D	Algebra	<b>Unit – I (2<sup>nd</sup> Part)</b> Cyclic groups from number systems, complex roots of unity, circle group, the general lineargroup $GL_n(n,R)$ ,	5	<ul style="list-style-type: none"> <li>• ICT, Google Meet, Zoom</li> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	S. K. Mapa: Higher Algebra: Abstract and Linear,
				groups of symmetries of (i) na isosceles triangle, ii) na equilateral triangle,(iii) a recatngel, and (iv) asquare, the permutation group $Sym(n)$ , Group of quaternions.	5		
Total number Classes					10		



Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
5th sem, 3 rd year	Honours	BMH5DSE21	Probability and Statistics	<b>Unit – I A</b> Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions,	07	<ul style="list-style-type: none"> <li>• ICT, online classes</li> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	Introduction to the Theory of Statistics <u>Alexander Mood</u> Franklin Graybill Duane Boes  <b>Groundwork Of Mathematical Probability And Statistics</b> Amritava Gupta
				<b>Unit – I B</b> mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential	08		
				<b>Unit – II A</b> Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables,	08		
				<b>Unit – II B</b> bivariate normal distribution, correlation coefficient, joint moment generating function (jmgf) and calculation of covariance (from jmgf), linear regression for two variables	07		
Total number Classes					30		

<b>Name of the teacher: Sk Anowar Hossain</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
5th sem, 3 <sup>rd</sup> year	<b>Honours</b>	<b>BMH5DSE11</b>	<b>Linear Programming</b>	<b>Unit – IV A</b> Game theory: Formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies,	07	<ul style="list-style-type: none"> <li>• ICT, online classes</li> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	Introduction to the Theory of Statistics <u>Alexander Mood Franklin</u> Graybill Duane Boes  <b>Groundwork Of Mathematical Probability And Statistics</b> Amritava Gupta
				<b>Unit – IV B</b> graphical solution procedure, linear programming solution of games.	08		
Total number Classes					15		

Year	Gen/Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
6th Sem, 3rd year	Honours	BMH6CC13	Metric Spaces and Complex Analysis	<b>Unit - I</b> Metric spaces: Sequences in Metric Spaces, Cauchy sequences. Complete Metric Spaces, Cantor's theorem.	05	<input type="checkbox"/> ICT, Google Meet, Zoom <input type="checkbox"/> Board Working <input type="checkbox"/> Illustrate with Examples.	Metric Spaces <b>By Shirali S.</b>  Metric Spaces by P. K. Jain and K. Ahmad
				<b>Unit - II A.</b> Continuous mappings, sequential criterion and other characterizations of continuity, Uniform continuity,	08		
				<b>Unit - II B</b> Connectedness, connected subsets of R. Compactness: Sequential compactness, Heine-Borel property, Totally bounded spaces, finite intersection property, and continuous functions on compact sets.	10		
				<b>Unit - II C</b> Homeomorphism, Contraction mappings, Banach Fixed point Theorem and its application to ordinary differential equation	07		
Total number Classes					30		

<b>Name of the teacher: Sk Anowar Hossain</b>							
<b>Year</b>	<b>Gen/ Hons</b>	<b>Paper code</b>	<b>Paper title</b>	<b>Subject Contains</b>	<b>No. of Classes</b>	<b>Teaching methods</b>	<b>Reference Books</b>
<b>6th sem, 3 rd year</b>	<b>General</b>	<b>BMG6SEC42</b>	<b>Transportation and Game theory</b>	<b>Unit – I A</b> Transportation problem and its mathematical formulation, northwest-corner method,	08	<ul style="list-style-type: none"> <li>• ICT, online classes</li> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	Introduction to the Theory of Statistics <u>Alexander Mood</u> Franklin Graybill Duane Boes  <b>Groundwork Of</b>  <b>Mathematical</b>  <b>Probability And</b>  <b>Statistics</b> Amritava Gupta
				<b>Unit – I B</b> Least cost method and Vogel approximation method for determination of starting basic solution	08		
				<b>Unit – I C</b> Algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem	09		
<b>Total number Classes</b>					25		

<b>Name of the teacher: Sk Anowar Hossain</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
6th Sem, 3rd Year	<b>Honours</b>	BMH6PW01	<b>Project Work</b>	<b>Unit 1:</b> Mathematical tools and software	6	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	Several research papers on Hypercomposition, Hypergroup, Hyperring and related topics
				<b>Unit 2:</b> Review of Earlier Work	12		
				<b>Unit 3:</b> Identification of a problem	8		
				<b>Unit 4:</b> Problem solving,	12		
				<b>Unit 5:</b> Numerical Simulation	10		
				<b>Unit 6:</b> Project Writing	12		
Total number Classes					60		

# Krishna Chandra College

DEPARTMENT OF MATHEMATICS

SESSION – 2022-23

## Teaching Plans

**Name of the teacher: Puja Roy**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
1st Sem, 1st year	Honours	BMH1CC02	Algebra	<b>Unit - I</b> Inequality, The inequality involving $AM \geq GM \geq HM$ , Cauchy-Schwartz inequality.	05	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• S.K Mapa, Linear Algebra</li> </ul>
<b>Total number Classes</b>					05		

**Name of the teacher: Puja Roy**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
2nd Sem, 1st year	Honours	BMH2CC03	Real Analysis	<b>Unit - II</b> Sequences, Bounded sequence, Convergent sequence, Limit of a sequence, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Theorem, Bolzano Weierstrass Theorem for Sequences. Cauchy sequence, Cauchy's Convergence Criterion.	15	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• S. Goldberg, Calculus and mathematical analysis</li> </ul>
<b>Total number Classes</b>					15		

<b>Name of the teacher: Puja Roy</b>							
<b>Year</b>	<b>Gen/ Hons</b>	<b>Paper code</b>	<b>Paper title</b>	<b>Subject Contains</b>	<b>No. of Classes</b>	<b>Teaching methods</b>	<b>Reference Books</b>
<b>3rd Sem, 2nd year</b>	<b>Honours</b>	<b>BMH3CC06</b>	<b>Group Theory I</b>	<b>Unit – I</b> Definition and examples of groups, Permutation groups and quaternion groups (through matrices), elementary properties of group.	10	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• D.S. Malik, John M. Mordeson and M.K. Sen, Fundamentals of Abstract Algebra.</li> <li>• S.K Mapa ,Higher Algebra ,Abstract and linear</li> <li>• Joseph A. Gallian, Contemporary Abstract Algebra.</li> </ul>
				<b>Unit – II</b> Subgroups and examples of subgroups, centralizer, normalizer, center of a group, product of two subgroups.	5		
				<b>Unit – III</b> External direct product of a finite number of groups, normal subgroups, factor groups, Cauchy's theorem for finite abelian groups	10		
<b>Total number Classes</b>					25		

<b>Name of the teacher: Puja Roy</b>							
Year	Gen/Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
3rd Sem, 2nd year	<b>General</b>	BMG3CC1C	<b>Real Analysis</b>	<b>Unit – II</b> Real sequence, bounded sequence, Cauchy's criterion, Cauchy's theorem on limit, monotone sequence	15	<ul style="list-style-type: none"> <li>● Board Working</li> <li>● Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>● S.K Mapa ,Introduction to Real Analysis</li> <li>● Fundamental Real Analysis ,Dr.Biswajit Pal ,Prof.Subrata Roychaudhuri,Dr .Soovoojeet Jana.</li> </ul>
				<b>Unit – III</b> Infinite series,,Cauchy's convergence criterion, geometric series, comparison test, root test, ratio test, Leibnitz's test, absolute and conditional convergence.	15		
<b>Total number Classes</b>					30		

<b>Name of the teacher: Puja Roy</b>							
Year	Gen/Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd year	<b>Honours</b>	BMH4CC10	<b>Ring Theory and Linear Algebra I</b>	<b>Unit – I</b> Definition and examples of rings, subrings, integral domains and fields, characteristic of a ring. Ideal, factor rings, prime and maximal ideals.	15	<ul style="list-style-type: none"> <li>● Board Working</li> <li>● Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>● S.K Mapa ,Higher Algebra ,Abstract and linear</li> <li>● John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson</li> <li>● D.S. Malik, John M. Mordeson and M.K. Sen, Fundamentals of Abstract Algebra.</li> </ul>
				<b>Unit – II</b> Ring homomorphisms, properties of ring homomorphisms. Isomorphism theorems I, II and III, field of quotients.	10		
<b>Total number Classes</b>					25		



Name of the teacher: Puja Roy							
Year	Gen/Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd year	General	BMG4CC1D	Algebra	<b>Unit - II</b> Subgroups and examples of subgroups, centralizer, normalizer, center of a group, Cyclic groups, cosets, Lagrange's theorem, Normal subgroups, Quotient group.	20	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• M. Mordeson and M.K. Sen, Fundamentals of Abstract Algebra.</li> <li>• S.K Mapa ,Higher Algebra ,Abstract and linear</li> <li>• Joseph A. Gallian, Contemporary Abstract Algebra.</li> </ul>
<b>Total number Classes</b>					20		

Name of the teacher: Puja Roy							
Year	Gen/Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
5th Sem, 3rd year	Honours	BMH5DSE11	Linear Programming	<b>Unit - I</b> Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, the simplex algorithm, introduction to artificial variables, two-phase method, Big-M method and their comparison.	22	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• Linear Programming and Game Theory, Chakravorty and Ghosh</li> <li>• Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 2nd Ed., John Wiley and Sons, India, 2004</li> </ul>
				<b>Unit - II</b> Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual, Dual Simplex method	08		
				<b>Unit - III</b> Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, assignment problem, Hungarian method for solving assignment problem, Travelling salesman problem.	15		
<b>Total number Classes</b>					45		

<b>Name of the teacher: Puja Roy</b>							
<b>Year</b>	<b>Gen/ Hons</b>	<b>Paper code</b>	<b>Paper title</b>	<b>Subject Contains</b>	<b>No. of Classes</b>	<b>Teaching methods</b>	<b>Reference Books</b>
<b>5th Sem, 3d year</b>	<b>General</b>	<b>BMG5DSE1A1</b>	<b>Matrices</b>	<b>Unit - IV</b> Matrices in diagonal form & its reduction up to Matrices of order 3, inverse of matrix, rank of matrix, solution of a system of linear equation.	20	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• M. Mordeson and M.K. Sen, Fundamentals of Abstract Algebra.</li> <li>• S.K Mapa ,Higher Algebra ,Abstract and linear</li> </ul>
<b>Total number Classes</b>					20		

<b>Name of the teacher: Puja Roy</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>6th Sem, 3rd year</b>	<b>Honours</b>	BMH6CC014	<b>Ring Theory and Linear Algebra II</b>	<b>Unit - I</b> Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility & irreducibility tests, Eisenstein criterion, and unique factorization in $\mathbb{Z}[x]$ . Divisibility in integral domains, irreducible, unique factorization domains, Euclidean domains.	20	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• D.S. Malik, John M. Mordeson and M.K. Sen, Fundamentals of Abstract Algebra.</li> <li>• S.K Mapa ,Higher Algebra ,Abstract and linear</li> <li>• Joseph A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa Publishing House,</li> </ul>
				<b>Unit - II</b> Dual spaces, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators. Eigen spaces of a linear operator, diagonalizability, Cayley-Hamilton theorem, and the minimal polynomial, canonical forms.	20		
				<b>Unit - III</b> Inner product spaces and norms, Gram-Schmidt orthogonalisation process, Bessel's inequality, the adjoint of a linear operator, Least Squares Approximation, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.	20		
<b>Total number Classes</b>					60		

<b>Name of the teacher: Puja Roy</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
6th Sem, 3d year	General	BMG6SEC42	Transportation and Game Theory	<b>Unit - II</b> Formulation of two person zero sum games, solving two person zero sum games, graphical solutions.	15	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• Linear Programming and Game Theory, Chakravorty and Ghosh</li> <li>• Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 2nd Ed., John Wiley and Sons, India,2004</li> </ul>
<b>Total number Classes</b>					15		

<b>Name of the teacher: Puja Roy</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
6th Sem, 3d year	General	BMG6DSE1B3	Linear Programming	<b>Unit - II</b> Duality, formulation of Dual problem, Primal-Dual relationships, economic interpretation of the Dual.	20	<ul style="list-style-type: none"> <li>• Board Working</li> <li>• Illustrate with Examples.</li> </ul>	<ul style="list-style-type: none"> <li>• Linear Programming and Game Theory, Chakravorty and Ghosh</li> <li>• Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 2nd Ed., John Wiley and Sons, India,2000</li> </ul>
<b>Total number Classes</b>					20		

# Krishna Chandra College

DEPARTMENT OF MATHEMATICS

SESSION – 2022-23

## Teaching Plans

<b>Name of the teacher: Mr Subhajit Mondal</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
1st Sem, 1st Year	Honours	BMHICC02	Algebra	Unit -2(a) : Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one Correspondence and cardinality of a set.	8	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• M. Mordeson and M.K. Sen, Fundamentals of Abstract Algebra.</li> <li>• S.K Mapa ,Higher Algebra ,Abstract and linear</li> </ul>
				Unit-2(b): Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic	7		
Total number Classes					15		
<b>Name of the teacher: Mr Subhajit Mondal</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
1st Sem, 1st Year	General	BMG1CC1A	Differential Calculus	<b>Unit 2 :</b> Tangents and Normals, Curvature, Asymptotes, Singular points, Tracing of curves, Parametric representation of curves and tracing of parametric curves, polar coordinates and tracing of polar coordinates	15	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• G. B. Thomas and R. L. Finney, Calculus,</li> <li>• S. K. Mapa, Real Analysis</li> </ul>
Total number Classes					15		

<b>Name of the teacher: Mr Subhajit Mondal</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>2nd Sem, 1st Year</b>	<b>Honours</b>	<b>BMH2CC03</b>	<b>Real Analysis</b>	Unit-1: Review of Algebraic and Order Properties of $\mathbb{R}$ , $\epsilon$ -neighbourhood of a point in $\mathbb{R}$ . Idea of countable sets, uncountable sets and uncountability of $\mathbb{R}$ . Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets. Suprema and Infima. Completeness Property of $\mathbb{R}$ and its equivalent properties.	10	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> <li>• Graphical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• S. K. Mapa, Real Analysis</li> <li>• R. Bartle and D.R. Sherbert, Introduction to Real Analysis</li> <li>• W. Rudin, Principles of Mathematical Analysis</li> </ul>
				The Archimedean Property, Density of Rational (and Irrational) numbers in $\mathbb{R}$ , Intervals. Limit points of a set, Isolated points, Open set, closed set, derived set, Illustrations of Bolzano-Weierstrass theorem for sets, compact sets in $\mathbb{R}$ , Heine-Borel Theorem.	10		
				Unit-3: Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test. Alternating series, Leibniz test. Absolute and Conditional convergence.	15		
Total number Classes					35		

**Name of the teacher: Mr Subhajit Mondal**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
2nd Sem, 1st Year	General	BMG2CC1B	Differential Equations	Linear Homogeneous equations with constant coefficients, Linear non-homogeneous equations, The method of variation of parameters, The Cauchy-Euler equations, Simultaneous linear equations, Total differential equations.	16	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• Differential Equations, S.L Ross</li> <li>• Differential Equations, Ghosh, Chakrabarty</li> </ul>
Total number Classes					16		

**Name of the teacher: Mr Subhajit Mondal**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
3rd Sem, 2nd Year	General	BMG3CC1C	Real Analysis	Unit I: Finite and infinite sets, examples of countable and uncountable sets. Real lines, bounded sets, suprema and infima, completeness property of R, intervals. Concept of cluster points and statement of Bolzano Weierstrass theorem.	15	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis,</li> <li>• S. K. Mapa, Real Analysis</li> </ul>
Total number Classes					15		

**Name of the teacher: Mr Subhajit Mondal**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>3<sup>rd</sup> Sem ,2<sup>nd</sup> year</b>	<b>Honours &amp; General ( same syllabus)</b>	BMH3SEC11 BMG3SEC11	<b>Logic and Sets</b>	Unit 1 : Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	18	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics</li> <li>• Pearson Education,P.R. Halmos, Naive Set Theory, Springer,</li> <li>• E. Kamke, Theory of Sets, Dover Publishers,</li> </ul>
				Unit 2 : Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.	07		
				Unit 3 : Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set. Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- ary relations.	15		
Total number Classes					40		

**Name of the teacher: Mr Subhajit Mondal**



Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd Year	Honours	BMH4CC08	Riemann Integration and Series of Functions	Unit -1 : Riemann integration: inequalities of upper and lower sums, Darboux integration, Darboux theorem, Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two Definitions.	10	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• Santi Narayan, Integral calculus, S Chand,</li> <li>• T. Apostol, Calculus I, II, Wiley, 2007.</li> <li>• K.A. Ross, Elementary Analysis, The Theory of Calculus, Undergraduate Texts in Mathematics, Springer</li> </ul>
				Riemann integrability of monotone and continuous functions, Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals, Fundamental theorem of Integral Calculus.	10		
				Unit-2 :Improper integrals, Convergence of Beta and Gamma functions	7		
Total number Classes					27		

**Name of the teacher: Mr Subhajit Mondal**

Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
4th Sem, 2nd Year	General	BMG4CC1D	Algebra	Unit II Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator Subgroup of group, examples of subgroups including the center of a group. Cossets, Index of subgroup,	10	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• Abstract Algebra, S K Mapa</li> <li>• M. Mordeson and M.K. Sen, Fundamentals of Abstract Algebra.</li> </ul>
				Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and Characterizations, Quotient groups	10		
				Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems,	10		
				$Z_n$ the ring of integers modulo $n$ , ring of real quaternions, rings of matrices, polynomial Rings, and rings of continuous functions. Subrings and ideals, Integral domains and fields, examples of Fields: $Z_p$ , $Q$ , $R$ , and $C$ . Field of rational functions.	10		
Total number Classes					40		

<b>Name of the teacher: Mr Subhajit Mondal</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>4th Sem, 2nd Year</b>	<b>General</b>	<b>BMG4SEC21</b>	<b>Vector Calculus</b>	<b>Unit I</b> Differentiation and partial differentiation of a vector function.	8	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• Maity, K.C. and Ghosh, R.K. Vector Analysis</li> <li>• Vvector Analysis- Chakraborty, Ghosh</li> </ul>
				Derivative of sum, dot and cross product of two vectors.	8		
				<b>Unit II (a)</b> Gradient	8		
				<b>Unit II (b)</b> Divergence	8		
				<b>Unit II (c)</b> Curl.	8		
Total number Classes					40		

<b>Name of the teacher: Mr Subhajit Mondal</b>							
Year	Gen/ Hons	Paper code	Paper title	Subject Contains	No. of Classes	Teaching methods	Reference Books
<b>5th Sem, 3rd Year</b>	<b>General</b>	<b>BMG5DSE1 A1</b>	<b>Matrices</b>	<b>Unit IV :</b> Metric in Diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverse using elementary row operations.	10	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• S. H. Friedberg, A. L. Insel, and L. E. Spence, Linear Algebra</li> <li>• S. K. Mapa, Higher Algebra Abstract &amp; Linear</li> </ul>
Total number Classes					10		

<b>Name of the teacher: Mr Subhajit Mondal</b>							
<b>Year</b>	<b>Gen/ Hons</b>	<b>Paper code</b>	<b>Paper title</b>	<b>Subject Contains</b>	<b>No. of Classes</b>	<b>Teaching methods</b>	<b>Reference Books</b>
<b>6th Sem, 3rd Year</b>	<b>General</b>	<b>BMG6SEC1 B3</b>	<b>Linear Programmi ng</b>	Duality, Formulation of dual problem	10	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Board Working</li> <li>• Illustrate with Examples</li> </ul>	<ul style="list-style-type: none"> <li>• Linear Programming, P.M Karak</li> <li>• A Handbook on Linear Programming, Ghosh, Chakrabarty</li> </ul>
				Primal-Dual relationship, economic interpretation of the dual	10		
Total number Classes					20		