BHAVAN'S VIVEKANANDA COLLEGE

DEPARTMENT OF MATHEMATICS & STATISTICS

ACADEMIC ORGANISER
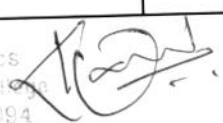
B.Sc. I YEAR SEMESTER -I 16-17 CBCS

Sub- MATHEMATICS   PAPER- MT121

DIFFERENTIAL EQUATIONS & GROUPTHEORY

UNIT NO	SUB UNIT	TOPICS	PERIODS PER SUBUNIT
1		**UNIT I D.E. of First Order and First Degree (15)**	
			1
	1	Introduction	1
	2	Partial differentiation	2
	3	Exact Differential Equations	6
	4	Non-Exact Differential Equations,Integrating factors, Methods	3
	5	Linear Differential Equations	2
	6	Differential Equations Reducible to Linear Form	
2		**D.E. of the First Order but not of the First Degree (15)**	
	1	Equations Solvable for p	3
	2	Equations Solvable for y	2
	3	Equations Solvable for x	2
	4	Clairaut's Equation	4
	5	Total differential equations	4
		UNIT III Groups-I (15)	
	1	Introduction	1
	2	Groups-Definition and Elementary Properties	4
	3	Finite Groups and Group Tables	3
	4	Subgroups	3
	5	Cyclic Groups-Elementary properties, cyclic subgroups	7
		UNIT IV Groups-II (15)	
	1	Permutations -functions and permutations	1
	2	Cycles and cyclic notations	1
	3	Even and odd permutations,	1
	4	Groups of permutations,Alternating groups	1
	5	Groups of Coset	3
	6	Criteria for the existance of a coset group	1
	7	Inner automorphism and Normal Subgroups, Definition of Factor group	2
	8	Homomorphisms-Def. and Elementary properties	2
	9	The fundamental theorem of homomrphism, applications	1
	10	Isomorphism-Def. and Elementary properties,cayley's theorem	2
		GRAND TOTAL	60

Unit 1 month column: JUNE&JULY; Unit 2: JULY&AUG; Unit III: AUG; Unit IV: SEP

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B.Sc. I YEAR
Sub- MATHEMATICS

SEMESTER -II CBCS 16-17
PAPER- MT221

DIFFERENTIAL CALCULUS &HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS

UNIT NO.		TOPICS	PERIODS PER SUBUNIT
1		**Differential Calculus I**	1
NOV&DEC	1	Introduction	
	2	Succesive differentiation	3
	3	Calculation of nth derivatives of standard, rational&products of powers of sines and cosines	3
	4	Leibnitz's thereom. The nth derivative of product of two functions.	3
	5	Partial differntiation	
	6	Homogeneous functions and Eulers theorem.	3
	7	Total derivatives	. 1
2		**Differential Calculus I (15)**	
DEC&JAN	1	Neighbourhood, interval, supremum, infimum, limits, continuity, differentiability	1
	2	Taylors and Maclaurins theorem	3
	3	Rolles , lagranges & Cauchy's theorem with geometric explanation.	4
	4	Taylors and Maclaurins series	3
	5	Indeterminate forms	3
	6	Maxima and minima of two variables	1
3		**Higher Order Linear Differential Equations-I (15)**	
JAN	1	Solution of Homogeneous Linear Differential Equations of Order n with Constant Coefficients	3
	2	Solution of Non-homogeneous Linear Differential Equations with Constant Coefficients by means of Polynomial Operators	12
4		**Higher Order Linear Differential Equations-II (12)**	
FEB	3	Method of Variations of Parameters(Non-homogeneous Linear Differential Equations with Constant Coeff.)	3
	4	Reduction of order method	3
	5	The Cauchy-Euler Equation	3
	6	Legender's equation	3
		GRAND TOTAL	60

RING THEORY AND SOLID GEOMETRY I

B.Sc. II YEAR   **SEMESTER -III**

Sub- MATHEMATICS   **PAPER- MT321**

UNIT NO.	SUB UNIT	TOPICS	PERIODS PER SUBUNIT
1		**Rings-I (15)**	
JUNE	1	Introduction	1
	2	Rings-Def. ,Some non-commutative Examples , basic properties	2
	3	Divisors of zero ,cacellation laws	2
	4	Integral Domains, Fields	3
	5	Characteristic of a ring	2
	6	Ideals and Quotient Ring	5
2		**Rings-II (15)**	
JULY	1	Homomorphisms of rings-Def, elementary properties, kernal of homomorshism	4
	2	Maximal and prime ideals , Prime fields	4
	3	Rings of Polynomials-Polynomials in an indeterminate form	4
	4	The evaluation homomorphism	3
3		**Solid Geometry- I (Planes 15)**	
AUGUST	1	Introduction, First degree equaton in x,y,z represents a plane. Converse of the Proceeding Statement	3
	2	Transformation to the Normal Form-Direction cosines of the normal to a plane & Angle between two planes,	1
	3	Determination of a Plane under Given Conditions	4
	4	System of Planes	3
	5	Two sides of a Plane, Length of the Perpendicular from a point to a plane	2
	6	Angular Bisector	2
4		**Solid Geometry- II (Lines 15)**	
SEPTEMBER	1	Introduction, Representation of Line	3
	2	Angle between a Line and a Plane	2
	3	Conditions for a line to lie in a plane	3
	4	Coplanar lines condition for the coplanarity of lines	2
	5	number of arbitrary constants in the equations of a straight line	1
	6	The shortest distance between two lines,	3
	7	Length of the perpendicular from a point to a line	1

BHAVAN'S VIVEKANANDA COLLEGE
DEPARTMENT OF MATHEMATICS & STATISTICS
ACADEMIC ORGANISER(16-17)
SOLID GEOMETRY II AND REAL ANALYSIS I

B.Sc. II YEAR

Sub- MATHEMATICS

SEMESTER -IV

PAPER- MT421

UNIT NO.	SUB UNIT	TOPICS	PERIODS PER SUBUNIT
1		**SOLID GEOMETRY II(SPHERES)-15**	1
	1	Introduction	1
NOVEMBER	2	Definition, Equation of a sphere	2
	3	The Sphere through four given points	2
	4	Equation of a Sphere under Different Conditions	4
	5	Equation of a circle	3
	6	Intersection of a Sphere and a Line, Equation of a Tangent Plane	2
	7	Angle of Intersection of Two Spheres	
		TOTAL	**15**
2		**SOLID GEOMETRY II(CONES AND CYLINDERS)-15**	1
	1	Introduction,	.1
DECEMBER	2	Definition, Condition that the General Equation of the Second Degree should represent a Cone	3
	3	Cone and a Plane through its Vertex	3
	4	Intersection of a line with a cone	1
	5	Intersection of Two Cones with a Common Vertex	2
	6	The Right Circular Cone	2
	7	The Cylinder	2
	8	The Right Circular Cylinder	
		TOTAL	**15**
3		**REAL ANALYSIS I (SEQUENCES)-15**	1
	1	Introduction	2
	2	Sequences	2
	3	Limit points of a Sequence, Limits Inferior and Superior	2
JANUARY	4	Convergent Sequences	1
	5	Non-convergent Sequences	2
	6	Cauchy's General Principle of Convergence	3
	7	Algebra of Sequences, Some Important Theorems	2
	8	Monotonic Sequences	
		TOTAL	**15**
4		**REAL ANALYSIS I (INFINITE SERIES)-15**	1
	1	Introduction	2
FEBRUARY	2	Positive Term Series	4
	3	Comparison Tests for Positive Term Series	2
	4	Cauchy's Root Test	3
	5	D'Alembert's Ratio Test	3
	6	Series with Arbitrary Terms	
		TOTAL	**15**
		GRAND TOTAL	**60**

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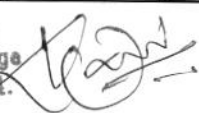# BHAVAN'S VIVEKANANDA COLLEGE

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MATHEMATICS PAPER III

B.Sc. - III Year(2016-17)

LINEAR ALGEBRA & VECTOR CALCULUS

UNIT NO.	SUB UNIT	TOPICS	PERIODS PER SUBUNIT	TOTAL PERIODS
		PART A:LINEAR ALGEBRA UNITS- 1 & 2		
1		**Linear Algebra I**		25
		Vector Spaces		
	1	Introduction	1	
	2	Vector Spaces - General Properties	2	
	3	Vector Subspaces - Algebra of subspaces	1	
	4	Linear Combinatons of vectors, Linear span,Linear sum of two subspaces	2	
	5	Linear dependence and Linear Independence of ve	2	
	6	Basis of vector space Finite dimensional vector spa	2	
	7	Dimension of vector spaces, vector subspaces	2	
	8	Linear Transformations and Linear Operators	2	
	9	Null Space and Range of linear transformation	2	
	10	Rank and Nullity of linear transformation	3	
	11	Linear Transformations as vectors	1	
	12	Product of Linear Transformations	1	
	13	Invertible linear transformations	2	
	14	The Matrix Representation of a Linear Transformation	1*	
		Revision	1*	
2		**Linear Algebra II**		20
	1	The adjoint or transpose of a Linear Transformation	2	
	2	Sylvester's law of Nullity	1*	
	3	Characteristic values and Characteristic vectors	2*	
	4	Cayley-Hamilton Theorem	1	
	5	Diagonalizable Operators	1*	
	6	Inner Product Spaces	2	
	7	Euclidean and unitary spaces	1	
	8	Norm or length of a vector	1	
	9	Schwartz Inequality	1	
	10	Othogonality	2	
	11	Orthonormal set, Complete Orthonormal set	2*	
	12	The Gram-Schmidt Orthogonalization Process	2*	
		Revision	2	

The leftmost column also shows month labels: AUG (subunits 1–5), SEP& OCT (subunits 6–10), NOV (subunits 11–14) for Unit 1; NOV (subunits 1–5 area through 9), DEC (subunits 10–12) for Unit 2.

		PART B: MULTIPLE INTEGRALS AND VECTOR CALCULUS UNITS- 3&4		
3		**Multiple Integrals**		20
DEC	1	Introduction, the concept of a plane, curve	1	
	2	Line Integrals - Sufficient condition for the existence of the integral	1	
	3	The area of a subset of R^2	1	
	4	Calculation of double integrals	3	
	5	Jordan curve, Area	1	
JAN	6	Change of the order of the integration	4*	
	7	Double integral as a limit	1	
	8	Change of a variable in double integration	2*	
	9	Lengths of curves	2	
	10	Surface Areas	1*	
	11	Integral expression for the length of a curve	1	
		Revision	2	
4		**Vector Calculus**		25
JUNE	1	Vector Differentiation	1	
	2	Ordinary derivatives of vectors	1	
	3	Space curves	1	
	4	Continuity and Differentiability	1	
	5	Gradient	1	
	6	Divergence	1	
	7	Curl Operators	1*	
	8	Formulae involving these operators	2*	
JULY	9	Vector Integration	5	
	10	Theorems of Gauss and Stokes	4*	
	11	Greens theorem in plane	4	
	12	Aplications of these theorems	2*	
		Revision	1	
GRAND TOTAL				90

* INDICATES THE TOPICS COVERED IN THE PRACTICALS

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ACADEMIC ORGANISER
B.Sc. - III Year
MATHEMATICS PAPER IV 'B'   2016-17
INTEGRAL TRANSFORMS

UNIT NO.	SUB UNIT	TOPICS	PERIODS PER SUBUNIT	TOTAL PERIODS
1		FOURIER SERIES		20
J U N E	1	Revision of integration and differentation,Introduction	2	
	2	Fourier series.	3	
	3	Theorems and Dirichlet's condition	2*	
	4	Fourier series for even and odd function	4	
JULY	5	Half range fourier series	4*	
	6	Other forms of fourier series	5	
3		FOURIER TRANSFORMS		20
J U L Y	1	Dirichlet's conditions, Fourier integral formula, Fourier transform Inverse theorem for F.T.Problems based on above theorems	3	
	2	Fourier sine and cosine transform	3	
	3	Inversion formula for fourier tasnsform	3	
A U G	4	Linearity property, Change of scale property,Shifting theorem,modulation theorem, problems	3*	
	5	Convolution theorem , Parseval's identity	2	
JULY	6	Finite fourier sine and cosine transform	4*	
	7	Inversion formula for sine and cosine fourier tasnsform	2	
2		LAPLACE TRANSFORM AND INVERSE LAPLACE TRANSFORM		25
A U G U S T	1	Def of laplace transform, linearity property,Existence of L.T	1	
	2	Def of exponential order,Function of class A	1	
	3	Derivations of basic formulae,Problems using basic def of L.T	2	
	4	First and second shifting theorem	1	
	5	Problems using first and second shifting theorem	2*	
	6	Change of scale property and its problems	1	
	7	Laplace transform of derivatives and problems on it	2	
	8	Finial and initial value theorem	1	
& SEPT O C T	9	Laplace transform of integrals	1	
	10	Multiplication by t,division by t	2	
	11	Periodic ,Error,Beta,Gamma functions	2	
N O V E M B E R	12	Def of inverse L.T,Linearty property	1	
	13	First and second shifting theorems on inverse L.T ,problems	1	
	14	Change of scale property, division by p and its problems	3	
	15	Convolution theorem, problems	2	
	16	Heavisides formulae,problems	2	
4		APPLICATIONS OF LAPLACE TRANSFORM AND FOURIER TRANSFORM TO INITIAL AND B.V.P.		25
D E C	1	Solution of O.D.E with constant coefficients	7	
	2	Solution of O.D.E with variable coefficients	6*	
	3	Solution of simultaneous O.D.E and P.D.E	6	
JAN	4	Appl.of fourier transform to intial and boundary value problems	6*	
		GRAND TOTAL		90

NOTE: ' * ' INDICATES THE TOPICS TO BE COVERED IN THE PRACTICAL SESSIONS.

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