

BHAVAN'S VIVEKANANDA COLLEGE
DEPARTMENT OF MATHEMATICS & STATISTICS

ACADEMIC ORGANISER 2015-2016

B.Sc. I YEAR SEMESTER -I

Sub- MATHEMATICS PAPER- BMT121

DIFFERENTIAL EQUATIONS , VECTOR DIFFERENTIATION & NUMBER THEORY

UNIT NO	SUB UNIT	TOPICS	PERIODS PER SUBUNIT
1		D.E. of First Order and First Degree (18)	
JULY	1	Introduction	1
	2	Partial differentiation	1
	3	Exact Differential Equations	2
	4	Non-Exact Differential Equations, Integrating factors, Methods	9
	5	Linear Differential Equations	3
	6	Differential Equations Reducible to Linear Form	2
2		D.E. of the First Order but not of the First Degree & Orthogonal Trajectories (12)	
AUG	1	Equations Solvable for p	3
	2	Equations Solvable for y	2
	3	Equations Solvable for x	2
	4	Clairaut's Equation	3
	5	Orthogonal Trajectories	2
3		Vector Differentiation & Vector Differential Operators (15)	
AUG	1	Introduction	1
	2	Vector Differentiation	3
SEP	3	Partial Differentiation	2
	4	Vector Differential Operators - Gradient, divergence, curl	7
	5	Vector Identities	2
4		Number Theory (15)	
OCT	1	Introduction	1
	2	Divisibility, Division Algorithm	2
	3	G.C.D.	4
	4	Euclidean Algorithm	3
	5	Fundamental theorem of Arithmetic	3
	6	Basic properties of Congruences	2
	GRAND TOTAL		


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B.Sc. I YEAR

SEMESTER -II

Sub- MATHEMATICS

PAPER- MT221


HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS & GROUP THEORY

UNIT NO.	SUB UNIT	TOPICS	PERIODS PER SUBUNIT
1		Higher Order Linear Differential Equations-I (15)	
DEC	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
2		Higher Order Linear Differential Equations-II (12)	
JAN	1	Method of Variations of Parameters(Non-homogeneous Linear Differential Equations with Constant Coeff.)	3
	2	Reduction of order method	3
	3	The Cauchy-Euler Equation	3
	4	Legender's equation	3
3		Groups-I (18)	
FEB	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
4		Groups-II (15)	
MAR	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 homomorphism, applications	1
	10	Isomorphism-Def. and Elementary properties, cayley's theorem	2
		GRAND TOTAL	60

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DEPARTMENT OF MATHEMATICS & STATISTICS
 BHAVAN'S VIVEKANANDA COLLEGE
 ACADEMIC ORGANISER 2015-16
 MATHEMATICS PAPER II
 B.Sc. - II Year
 ABSTRACT ALGEBRA & REAL ANALYSIS

UNIT NO.	SUB UNIT	TOPICS	PERIODS PER SUBUNIT	TOTAL PERIODS
		Abstract Algebra (GROUPS&RINGS)		
1		Groups		30
J U N E		Introduction	1	
	1	Binary operations-Def.and properties	1	
	2	Groups-Definition and Elementary Properties	2	
	3	Finite Groups and Group Tables	2*	
	4	Subgroups and cyclic subgroups	2	
J U L Y	5	Permutations -functions and permutations	1	
	6	Groups of permutations	2	
	7	Cycles and cyclic notations	2*	
	8	Even and odd permutations, Alternating groups	1	
	9	Cyclic Groups-Elementary properties	2	
	10	Isomorphism-Def. and Elementary properties,cayley's theorem	2	
	11	Groups of Cosets-Applications	2	
	12	Normal Subgroups and Factor Groups	3	
A U G	13	Criteria for the existance of a coset group	1	
	14	Inner automorphism and Normal Subgroups, Factor and Simple groups	1	
	15	Homomorphisms-Def. and Elementary properties	2*	
	16	The fundamental theorem of homomorphism, applications	1	
		Revision	2	
2		RINGS		30
A U G		Introduction	1	
	1	Rings-Def. and basic properties ,Fields	4	
	2	Integral Domains,Divisors of zero ,cancellation laws,Charecteristic of a	4	
	3	Some non-commutative Examples	2*	
	4	Homomorphisms of rings-Def.and elementary properties.	4	
S E P & O C T	5	Maximal and prime ideals , Prime fields	4*	
	6	Rings of Polynomials-Polynomials in an indeterminate form	5	
	7	The evaluation homomorphism	4	
		Revision	2	


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UNIT NO.	SUB UNIT	TOPICS	PERIODS PER SUBUNIT	TOTAL PERIODS
		REAL ANALYSIS		
3		REAL NUMBERS		35
N O V		Introduction	1	
	1	The completeness properties of \mathbb{R}	1	
	2	Sequences -sequences and their limits,limit theorems	4	
	3	Monotonic sequences,subsequences	4*	
	4	Bolzano-Weirstrass theorem	1	
	5	Cauchy's criterion	2*	
	6	Properly divergent sequences	1	
	7	Series- Introduction, Absolute convergence	2	
8	Test for Absolute convergence,test for non-absolute convergence	8*		
D E C	9	Continuous Functions, combination of continuous functions	5	
	10	continuous functions on intervals	2	
	11	Uniform continuity	2	
		Revision	2	
4		DIFFERENTIATION AND INTEGRATION		25
D E C		Differentiation		
		Introduction	1	
	1	The Derivative	3	
	2	The Mean Value Theorems	4*	
	3	L'Hospital's Rules	2*	
4	Taylor's Theorem	3		
J A N		The Riemann Integration		
	5	The Riemann Integral	4	
	6	Riemann Integrable Functions	3	
	7	The Fundamental Theorem	3	
		Revision	2	
GRAND TOTAL				120

NOTE: '*' INDICATES TOPICS COVERED IN PRACTICAL SESSIONS

DEPARTMENT OF MATHEMATICS & STATISTICS

BHAVAN'S VIVEKANANDA COLLEGE

ACADEMIC ORGANISER

MATHEMATICS PAPER III


B.Sc. - III Year(2015-16)

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
AUG		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	
SEP & OCT	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	
NOV	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
NOV	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	
DEC	10	Othogonality	2	
	11	Orthonormal set, Complete Orthonormal set	2*	
	12	The Gram-Schmidt Orthogonalization Process	2*	
		Revision	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	Applications of these theorems	2*	
		Revision	1	
GRAND TOTAL				90

* INDICATES THE TOPICS COVERED IN THE PRACTICALS


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B.Sc. - III Year
MATHEMATICS PAPER IV 'B' 2015-16
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 differentiation, Introduction	2	
	2	Fourier series	3	
	3	Theorems and Dirichlet's condition	2*	
	4	Fourier series for even and odd function	4	
J U L Y	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 transform	3	
A U G	4	Linearity property, Change of scale property, Shifting theorem, modulation theorem, problems	3*	
	5	Convolution theorem, Parseval's identity	2	
J U L Y	6	Finite fourier sine and cosine transform	4*	
	7	Inversion formula for sine and cosine fourier transform	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	Final and initial value theorem	1	
& S E 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, Linearity 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	
J A N	4	Appl. of fourier transform to initial and boundary value problems	6*	
GRAND TOTAL				90

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