Month	No. of Teaching days available	SEMESTER-I Honours Course MTMACOR01T Marks:50+25=75 Calculus and Geometry and Ordinary Differential Equation	SEMESTER-I Honours Course MTMACOR02T Marks:50+25=75 Algebra	SEMESTER-I General Course MTMGCOR01T Marks:50+25=75 Differential Calculus	Class teaching in hours of each core	Tutorial In hours
July,2019	26	**Unit 1:** i)Leibintz Rule on diffn. ii)Point of Inflexion iii) Envelopes iv)Asymptote	**Unit -1 :** i)Polar rep. of complex numbers, nth roots of unity, ii)De Moivre's theorem . iii) Theory of equations: Relation between roots and coefficients, Transformation of equation.	i) Limit and Continuity (ε and δ definition), Types of discontinuities, ii)Differentiability of functions, iii)Successive differentiation, Leibnitz's theorem.	Hons-22 Gen-16	HONS-4
August,2019	24	**Unit 1:** v)Curve tracing vi)L'Hospital's rule **Unit- 2** i)Reduction Formulae ii)Arc length of different curves iii) Area of surface of revolution iv) Techniques of sketching of conics	**Unit -1 :** iv)Descartes rule of signs, v)Cubic (Cardan's method) and biquadratic equations (Ferrari's method). **vi)Inequality**: The inequality involving AM≥GM≥HM, Cauchy-Schwartz inequality. **Unit -2 :** i) Relation, Partition ii) Mapping	iv) Partial differentiation, Euler's theorem on homogeneous functions v)Tangents and Normals,	Hons-22 Gen-16	HONS-4 Graphical Demonstration (Teaching Aid) Plotting of graphs of function
September,2019	22	**Unit-3** i)Reduction of canonical form ii)Polar Equation of conic iii)Sphere iv)Conicoids	**Unit -2 :** iii)**Integer:** Well-ordering property, Division algorithm, Divisibility and Euclidean algorithm. Congruence. iv)Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic. .	vi) Curvature, vii)Asymptotes, viii)Singular points, ix)Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates.	Hons-18 Gen-12	Hons-4 Graphical Demonstration (Teaching Aid) Plottingthe graphs of polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.

October,2019	03	**Unit-3** v)Plane sections of conicoids vi))Generating lines vii) Graphing of standard quadric surfaces	**Unit -3:** Linear Algebra: i) Systems of linear equations, row reduction and echelon forms	x) Rolle's theorem, xi)Mean Value theorems	Hons-3 Gen-2	
November,2019	24	**Unit -4:** i)Exact Differential equation, ii)Integrating factors iii)Linear equation iv)Bernoulli equations	**Unit 4:**, i) Vector equations, the matrix equation Ax=b, ii) Matrix inverse of a matrix, characterizations of invertible matrices. iii) Rank of a matrix	xii)Taylor's theorem with Lagrange's and Cauchy's forms of remainder. .	Hons-20 Gen-16	Hons-4 Graphical Demonstration (Teaching Aid) Sketching parametric curves (Eg. Trochoid, cycloid, epicycloids, hypocycloid).
Decembr,2019	20	Graphical Demonstration (Teaching Aid). .i)Tracing of conics in Cartesian coordinates/polar coordinates. vi)Sketching ellipsoid, hyperboloid of one and two sheets, elliptic cone, elliptic, paraboloid, and hyperbolic paraboloid using Cartesian coordinates.	**Unit 4:** **iv)**Eigen values, Eigen Vectors and Characteristic Equation of a matrix. v) Cayley-Hamilton theorem and its use in finding the inverse of a matrix.	xii)Taylor's series, Maclaurin's series of sin x, cos x, e^x, log(l+x), $(l+x)^n$ vxi)Maxima and Minima, xv) Indeterminate forms	Hons-16 Gen-6	Hons-4 Graphical Demonstration (Teaching Aid). iv) Obtaining surface of revolution of curves.
Mo	No.	SEMESTER-II		SEMESTER-II	Cla ss	Tutorial In hours
		Honours Course		General Course		

		MTMACOR03T Marks:50+25=75 Real Analysis	MTMACOR04T Marks:50+25=75 Differential Equation and Vector Calculus	MTMGCOR02T Marks:50+25=75 Differential Equation		
January'2020	21	**Unit-1:** **i)** Review of Algebraic and Order Properties of ℝ, ε-neighbourhood of a point in ℝ. Idea of countable sets, uncountable sets and unaccountability of ℝ. ii)Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets.	**Unit-1 :** i) Lipschitz condition and Picard's Theorem (Statement only). ii) General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications,	i) First order exact differential equations. Integrating factors, rules to find an integrating factor. ii) First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.	Hons-17 Gen-14	Hons-5
February,2020	20	**Unit-1:** iii) Suprema and Infima, Completeness Property of ℝ and its equivalent properties. iv) The Archimedean Property, Density of Rational (and Irrational) numbers in ℝ, Intervals. v) Limit points of a set, Isolated points, Open set, closed set. derived set, Illustrations of Bolzano-Weierstrass theorem for sets.	**Unit-1 :** iii) Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation. **Unit -2 :** iv) Method of undetermined coefficients, method of variation of parameters.	iii) Basic theory of linear differential equations, Wronskian, and its properties. iv) Solving a differential equation by reducing its order. v) Linear homogenous equations with constant coefficients, vi) Linear non-homogenous equations, vii) The method of variation of parameters,.	Hons-16 Gen-14	Hons-4
March,20 20	24	**Unit-1** **:**vi) compact sets in ℝ, Heine-Borel Theorem. **Unit-2 :**	**Unit-1 :** **v)** System of linear differential equations, types of linear systems, differential operators, an operator method for linear	viii) The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations. ix)Order and degree of partial	Hons-20	Hons-4

		i)Sequences, Bounded sequence, Convergent sequence, Limit of a sequence, lim inf, lim sup. Limit Theorems. Monotone Sequences, Monotone Convergence Theorem.	systems with constant coefficients.	differential equations, Concept of linear and non-linear partial differential equations.	Gen-16	
April,2020	24	**Unit-2 :** ii) Subsequences, Divergence Criteria. Monotone Subsequence Theorem (statement only). iii)Bolzano Weierstrass Theorem for Sequences. iv) Cauchy sequence, Cauchy'sConvergence criterion.	**Unit -2 :** vi) Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients. vii) Two Equations in two unknown functions. **Unit-3 :** **i)** Equilibrium points, Interpretation of the phase plane.	x) Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method.	Hons-20 Gen-16	Hons-4
May,2020	22	**Unit-3 :** **i)** Infinite series, convergence and divergence of infinite series, Cauchy Criterion.	**Unit-3 :** ii) Power series solution of a differential equation about an ordinary point, solution about a regular singular point.	xi) Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	Hons-18 Gen-12	Hons-4
June,2020	24	**Unit-3 :** ii) Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test. iii)Alternating series, Leibniz test. Absolute and Conditional convergence.	**Unit- 4 :** i)Triple product, introduction to vector functions, operations with vector-valued functions ii) Limits and continuity of vector functions, differentiation and integration of vector functions.		Hons-10 Gen-0	Hons-2

Mon	**No. of Teach**	SEMESTER-III	SEMESTER-III	Class teachi	Tutori al in	**MTMACOR07P** Numerical	MTMSSEC01M (For both Hons and General)
		Honours Course	General Course				

		MTMACOR05T Marks:50+25=75 Theory of Real Functions	MTMACOR06T Marks:50+25=75 Group Theory–I	MTMACOR07T Marks:50(Th)+ 25(Prac) =75 Numerical Methods	MTMGCOR03T Marks:50+25=75 Real Analysis			Methods Lab (Marks : 25) **List of practical (using C programming)**	Marks:25 C-Programming Language.
July,2019	26	Unit 1:Limits of functions (ε - δ approach), sequential criterion for limits, divergence criteria. Limit theorems, one sided limits. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity.	**Unit-1** : Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (through matrices), elementary properties of groups.	**Unit-1**: Algorithms, Convergence, Errors: Relative, Absolute. Round off, Truncation. Methods based on interpolations, methods based on finite differences.	i)Finite and infinite sets, examples of countable and uncountable sets. Ii)Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points andstatement of Bolzano-Weierstrass theorem.	Hons-22 Gen-16	Hons-4	i)Calculate the sum 1/1 + 1/2 + 1/3 + 1/4 + …. + 1/ N. ii)Enter 100 integers into an array and sort them in an ascending order. .	**Unit 1 : Basics of Computer Programming:** Definition, Requirement of programming language, Machine language, high-level programming languages, machine code of a program: compilation process, Problem solving approaches: algorithm and flowchart
August,2019	24	**Unit 1:** Algebra of continuous functions. Continuous functions on an interval, intermediate	**Unit-2:** Subgroups and examples of subgroups, centralizer, normalizer, center of a group, product of two	**Unit-2** : Transcendental and Polynomial equations: Bisection method, Newton's method, Secant	iii)Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and	Hons-20	Hons-4	iii)Solution of transcendental and algebraic equations by a. Bisection method b. Newton Raphson method.	**Unit2: Fundamentals of Programming:** Built in Data Types: int, float, double, char; Constants and Variables; first program: printf(), scanf(), compilation etc., keywords, Arithmetic

		value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem. **Unit-2**: Differentiability of a function at a point and in an interval, Caratheodory's theorem.	subgroups.	method, Regulafalsi method, fixed point iteration, Newton-Raphson method. Rate of convergence of these methods.	their convergence (monotone convergence theorem without proof).	Gen-16		c. Secant method. d. Regula Falsi method	operators: precedence and associativity, Assignment Statements: post & pre increment/decrement, logical operators: and, or, not.
September,2019	22	**Unit -2 A**lgebra of differentiable functions. Relative extrema, interior extremum, theorem. Rolle's	**Unit-3 :** Properties of cyclic groups, classification of subgroups of cyclic groups, Cycle notation for permutations,	**Unit -3** : System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss	iv)Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series,	Hons-18	Hons-4	iv)Solution of system of linear equations a.LU decomposition method b. Gaussian elimination	**Unit 3 : Statements:** Relational operators, if-else statement, Iterative Statements: for loop, while loop and do-while loop; controlling loop execution: break and continue, nested

		theorem. Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials.	properties of permutations, even and odd permutations, alternating group, properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.	Jacobi method, Gauss Seidel method and their convergence analysis, LU Decomposition.	Leibnitz's test(Tests of Convergence without proof). Definition and examples of absolute and conditional convergence.	Gen-14		method c. Gauss-Jacobi method d. Gauss-Seidel method	loop.
October,2019	03	**Unit-3**: 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. .		**Unit-4**: Interpolation: Lagrange and Newton's methods, Error bounds, Finite difference operators. Gregory forward and backward difference interpolations. Numerical differentiation.	v) Sequences of functions.	Hons-3 Gen-3		v) Interpolation a.Lagrange Interpolation b.Newton Interpolation	**Unit 4 : Arrays:** Definition & requirement, declaration & initialization, indexing, one dimensional array: finding maximum, minimum, simple sorting and searching.
November,2019	24	**Unit-3**: Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions, ln(1 +	**Unit-4:** External direct product of a finite number of groups, normal subgroups, factor groups, Cauchy's theorem	**Unit – 5:** Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3rd	vi)Series of functions, Point-wise and uniform convergence. Mn-test, M-test, Statements of the results about uniform convergence and	Hons-20	Hons-4	vi)Numerical Integration a. Trapezoidal Rule b. Simpson's one third rule c. Weddle's Rule	**Unit 5 : Multi-dimensional arrays:** Matrix Manipulations (Addition,Multiplication, Transpose) Arrays and Pointers, Memory llocation and

		x), 1/ax+b and (1 +x)n. Application of Taylor's theorem to inequalities	for finite abelian groups.	rule, Simpsons 3/8th rule, Weddle's rule, Boole's rule. Midpoint rule, Composite Trapezoidal rule, Composite Simpson's 1/3rd rule, Gauss quadrature formula. The algebraic eigen-value problem: Power method.	integrability and differentiability of functions.	Gen-16		d. Gauss Quadrature vii)Method of finding Eigen-value by Power method viii)Fitting a Polynomial Function	deallocation: *malloc()* and *free()* functions
Decembr,2019	20	.	**Unit-5:** Group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, First, Second and Third	**Unit – 6:** Ordinary Differential Equations: The method of successive approximations, Euler's method, the modified Euler method,	vii)Power series and radius of convergence.	Hons-14	Hons-2	ix)Solution of ordinary differential equations a. Euler method b. Modified Euler method c. Runge Kutta method	**Unit6 : Functions:** Why?, How to declare, define and invoke a function, Variables' scope, local& global variables and function parameters, Pointers, arrays as function parameters, *return* statement, Header

			isomorphism theorems	Runge-Kutta methods of orders two and four.		Gen-08		files and their role. Illustrate different examples like swapping values, compute n!, nCr, find max/min from a list of elements, sort a set of numbers, matrix addition/multiplication etc.
Month	No. of Teaching days available	SEMESTER-IV Honours Course			SEMESTER-IV General Course	Class teaching in hours of	Tutorial In hours	MTMSSEC02M (For both Hons and Gen) Marks:25 Logic and Sets
		MTMACOR08T Marks:50+25=75 Riemann Integration and Series of Functions	MTMACOR09T Marks:50+25=75 Multivariate Calculus	MTMACOR10T Marks:50(Th)+ 25(Prac) =75 Ring Theory and Linear Algebra I	MTMGCOR04T Marks:50+25=75 Algebra			
January'2020	21	**Unit -1 :** Riemann integration: inequalities of upper and lower sums, Darbaux integration, Darbaux theorem,	**Unit-1** : Functions of several variables, limit and continuity of functions of two or more variables Partial differentiation,	**Unit 1:** Definition and examples of rings, properties of rings, subrings, integral domains and fields, characteristic of a ring. Ideal,	Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under addition modulo	Hons-17	Hons-4	**Unit 1 :** Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.

		Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two Definitions. 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.	total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters,.	ideal generated by a subset of a ring, factor rings, operations on ideals, prime and maximal ideals.	n and the group U(n) of units under multiplication modulo n.	Gen 16		
February,2020		**Unit-2 :** Improper integrals, Convergence	**Unit-1:D**irectional derivatives, the gradient,	**Unit 2 :** Ring homomorphisms, properties of ring homomorphisms.	Cyclic groups from number systems, complex roots of unity, circle group, the general linear group GLn(n,R),	Hons 16	Hons-4	**Unit-1:** Propositional equivalence: Logical equivalences. Predicates and quantifiers:

	20	of Beta and Gamma functions.	maximal and normal property of gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems.	Isomorphism theorems I, II and III, field of quotients.	Groupsof symmetries of (i) an isosceles triangle, (ii)anequilateraltriangle,(iii) a rectangle, and (iv) a square.	Gen-14			Introduction, Quantifiers, Binding variables and Negations.
March,2020	24	**Unit-3 :** Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and	**Unit-2** : Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals,	**Unit 3 :** Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span,	The permutation group Sym (n), Group of quaternions. 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. Cosets, Index of subgroup, Lagrange's theorem,	Hons-20	Hons-4		**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

		integrability of the limit function of a sequence of functions. 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. integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.	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.	linear independence, basis and dimension, dimension of subspaces.	order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.	Gen 16		sets. Power set of a set.
April,2020	24	**Unit 4:** Fourier series: Definition of Fourier coefficients and series,	**Unit-3** : Definition of vector field, divergence and curl. Line integrals,	**Unit 4 :** Introduction to linear transformations, Subspaces, dimension of	Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Zn the ring of integers modulo n, ring of real	Hons 20	H0ns-4	**Unit 3 :** Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set.

		Reimann Lebesgue lemma, Bessel's inequality, Parseval's identity, Dirichlet's condition. Examples of Fourier expansions and summation results for series.	Applications of line integrals: Mass and Work. Fundamental theorem for line integrals, conservative vector fields, independence of path.	subspaces, null space, range, rank and nullity of a linear transformation.	quaternions, rings of matrices, polynomial rings, and rings of continuous functions.	Gen 16		Composition of relations, Types of relations, Partitions,
May,2020	22	**Unit – 5:** Power series, radius of convergence, Cauchy Hadamard Theorem. Differentiation and integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.	**Unit-4** : Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.	matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms. Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.	Subrings and ideals, Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions.	Hons 18 Gen 14	Hons-4	**Unit-3:**Equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- ary relations.
June,2020	24					Hons Gen	Hons-	

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HONOURS	NUMBER OF LECTURES	JULY-SEPTEMBER	OCTOBER -DECEMBER	JANUARY-MARCH		APRIL-JUNE
PART III PAPER V	115	GROUP A REAL ANALYSIS III NO. OF CLASSES= 37	GROUP A REAL ANALYSIS III NO. OF CLASSES=43	GROUP A REAL ANALYSIS III NO. OF CLASSES=15	TEST EXAMINATION	UNIVERSITY FINAL EXAMINATION
		GROUP B METRIC SPACE NO. OF CLASSES=15	GROUP C COMPLEX ANALYSIS NO. OF CLASSES=15			
PART III PAPER VI	125	GROUP A PROBABILITY NO. OF CLASSES= 20	GROUP A PROBABILITY NO. OF CLASSES= 10			
		GROUP A STATISTICS NO. OF CLASSES=15	GROUP A STATISTICS NO. OF CLASSES=20			
		GROUP B NUMERICAL ANALYSIS NO. OF CLASSES=30	GROUP B NUMERICAL ANALYSIS NO. OF CLASSES=10	GROUP B COMPUTER PROG. NO. OF CLASSES=20		
PART III PAPER VII	122	GROUP A VECTOR ANALYSIS NO. OF CLASSES=10	GROUP CD HYDROSTATICS NO. OF CLASSES=25	GROUP CD HYDROSTATICS NO. OF CLASSES=10		
		GROUP B ANALYTICAL STATICS NO. OF CLASSES=23		GROUP B ANALYTICAL STATICS NO. OF CLASSES=19		
		GROUP C RIGID DYNAMICS NO. OF CLASSES=15	GROUP C RIGID DYNAMICS NO. OF CLASSES=10	GROUP C RIGID DYNAMICS NO. OF CLASSES=10		

DEPARTMENT OF MATHEMATICS

HONOURS	NUMBER OF LECTURES	JULY-SEPTEMBER	OCTOBER - DECEMBER	JANUARY-MARCH	TEST EXAM	APRIL-JUNE

PART III PAPER VIIIA	65	GROUP A LINEAR ALGEBRA NO. OF CLASSES= 13	GROUP A MODERN ALGEBRA NO. OF CLASSES= 10			UNIVERSITY FINAL EXAMINATION
		GROUP A BOOLEAN ALGEBRA NO. OF CLASSES=10		GROUP C TENSOR CALCULUS NO. OF CLASSES= 17		
		GROUP B DIFFERENTIAL EQN. II NO. OF CLASSES= 15				
PART III PAPER VIIIB PRACTICAL	50	NUMERICAL ANALYSIS NO. OF CLASSES= 5	NUMERICAL ANALYSIS NO. OF CLASSES= 20	STATISTICS NO. OF CLASSES= 25		

GENERAL	NUMBER OF LECTURES	JULY-SEPTEMBER	OCTOBER -DECEMBER	JANUARY-MARCH	UNIVERSITY FINAL EXAMINATION
PART -III PAPER -IV	90	GROUP A ELEMENTS OF COMPUTER SCIENCE NO. OF CLASSES= 14	GROUP A ELEMENTS OF COMPUTER SCIENCE NO. OF CLASSES= 10	GROUP A ELEMENTS OF COMPUTER SCIENCE NO. OF CLASSES= 12	
ANY ONE OF GR A, GR B, GR C.		GROUP B A COURSE OF CALCULUS NO. OF CLASSES= 14	GROUP B A COURSE OF CALCULUS NO. OF CLASSES= 10	GROUP B A COURSE OF CALCULUS NO. OF CLASSES= 12	
		GROUP C DISCRETE MATHEMATICS NO. OF CLASSES= 14	GROUP C DISCRETE MATHEMATICS NO. OF CLASSES= 10	GROUP C DISCRETE MATHEMATICS NO. OF CLASSES= 12	