

**ACADEMIC CALENDER**

**Semester I, Mathematics General**

**Distribution of Syllabus**

**DSC 1A (MTMGCOR01T) / GE 1(MTMHGEC01T) Differential Calculus**

	Headlines of the Chapters with the topic	No. of Lectures	July to September No. of Lectures		Internal Examination	October (2 weeks)	Rest of October & November No. of Lectures		Final Semester Examination
			Theory	Tutorial			Theory	Tutorial	
Unit I	Limit & continuity( $\epsilon$ and $\delta$ definition), Types of discontinuities,Differentiability of functions, Successive differentiation,Leibnitz's theorem,Partial differentiation, Euler's theorem on homogeneous functions.	25	25	0	End of September	Puja Vacation	0	0	End of December
Unit II	Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves. Parametric representation of curves and tracing of parametric curves, polar coordinates and tracing of curves in polar coordinates.	25	15	0			10	0	
Unit III	Rolle's theorem,Mean value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series, Maclaurin's series of $\sin x$ , $\cos x$ , $e^x$ , $\log(1+x)$ , $(1+x)^n$ , Maxima and Minima,Indeterminate forms.	25	10	0			15	0	



ACADEMIC CALENDER									
Semester III, Mathematics General									
Distribution of Syllabus									
DSE 1C (MTMGCOR03T) / GE 3(MTMHGEC03T) Real Analysis									
	Headlines of the Chapters with the topic	No. of Lectures	July to September No. of Lectures		Internal Examination	October (2 weeks)	Rest of October & November No. of Lectures		Final Semester Examination
			Theory	Tutorial			Theory	Tutorial	
Unit I	Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of $\mathbb{R}$ , Archimedean property of $\mathbb{R}$ , intervals. Concept of cluster points and statement of Bolzano-Weierstrass theorem.	15	10	0	End of September	Puja Vacation	5	0	End of December
Unit II	Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof).	20	10	0			10	0	
Unit III	Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof). Definition and examples of absolute and conditional convergence.	20	12	0			8	0	
Unit IV	Sequences and series of functions, Pointwise and uniform convergence. Mn-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.	20	12	0			8	0	

ACADEMIC CALENDER								
Semester IV, Mathematics General								
Distribution of Syllabus								
DSC 1D (MTMGCOR04T) / GE 4(MTMHGEC03T) Algebra								
	Headlines of the Chapters with the topic	No. of Lectures	January to March No. of Lectures		Internal Examination	April to May No. of Lectures		Final Semester Examination
			Theory	Tutorial		Theory	Tutorial	
Unit I	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 nonabelian groups, the group $Z_n$ of integers under addition modulo $n$ and the group $U(n)$ of units under multiplication modulo $n$ . Cyclic groups from number systems, complex roots of unity, circle group, the general linear group $GL_n(n, \mathbb{R})$ , groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group $Sym(n)$ , Group of quaternions.	25	20	0	Middle of March	5	0	June
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. Cosets, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.	25	20	0		5	0	
Unit III	Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, $Z_n$ 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.	25	10	0		15	0	

ACADEMIC CALENDER									
Semester V, Mathematics General									
Distribution of Syllabus									
DSE (MTMGDSE01T) Matrices									
	Headlines of the Chapters with the topic	No. of Lectures	July to September No. of Lectures		Internal Examination	October (2 weeks)	Rest of October & November No. of Lectures		Final Semester Examination
			Theory	Tutorial			Theory	Tutorial	
Unit I	R, R <sup>2</sup> , R <sup>3</sup> as vector spaces over R. Standard basis for each of them. Concept of Linear Independence and examples of different bases. Subspaces of R <sup>2</sup> , R <sup>3</sup> .	10	10	0	End of September	Puja Vacation	0	0	End of December
Unit II	Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces.	20	12	0			8	0	
Unit III	Types of matrices. Rank of a matrix. Invariance of rank under elementary transformations. Reduction to normal form, Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four.	20	12	0			8	0	
Unit IV	Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.	25	15	0			10	0	

**ACADEMIC CALENDER**

**Semester VI, Mathematics General**

**Distribution of Syllabus**

**DSE (MTMGDSE04T) Linear Programming**

	Headlines of the Chapters with the topic	No. of Lectures	January to March No. of Lectures		Internal Examination	April to May No. of Lectures		Final Semester Examination
			Theory	Tutorial		Theory	Tutorial	
Unit I a	Linear Programming Problems, Graphical Approach for solving some Linear Programs. Convex Sets, Supporting and Separating Hyperplanes. Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison	45	35		Middle of March	10		June
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Unit II	Duality, formulation of the dual problem, primal- dual relationships, economic interpretation of the dual, sensitivity analysis.	30	15			15		