Academic Calendar Mathematics (21-22)

Department of Mathematics								
Subject: MTMG								
Month: September 2021-December 2021						Year-2021-2022		
Sl No	Hons/Gen	Paper	Group	Topic	No. of Lecture	Name of the Lecture		Class Taken
1.	Gen	1st Sem		Differential Calculus				
				Limit, Continuity and Differentiation	5	Concept of Limit		
					2	Problems-Solutions		
					1	Class test		
					6	Continuity and discontinuity		
					3	Problems- Solutions		
					1	Class test		
					6	Differentiation		
					2	Problems-Solutions		
					1	Successive Differentiation		
					2	Leibnitz Theorem and its application		
					1	Problem Solutions		

					1	Class test		
					4	Partial Differentiations		
					2	Euler's Theorem		
					4	Problem Solutions		
					1	Class test		
				Applications	2	Tangents and Normals		
					2	Problems-Solutions		
					1	Curvatures		
					2	Problems-Solutions		
					2	Asymptotes		
					2	Problems-Solutions		
					1	Singular Points		
					2	Problems-Solutions		
					5	Tracing of curves		
					3	Tracing of curves		
					1	Class Test		

				Mean Value Theorem	1	Role's Theorem		
					1	Problems-Solutions		
					5	Mean Value Theorem		
					3	Problems-Solutions		
					2	Taylors Theorem		
				Mean Value Theorem	1	Maclaurin's Theorem		
					3	Maclaurin's Series		
					2	Problems-Solutions		
					4	Maximum and Minimum		
					2	Problems-Solutions		
2.	Gen	Sem 3		Real Analysis				
					3	Finite and infinite sets, Intervals, examples of countable and uncountable sets.		
					5	Real line, bounded sets, suprema and infima, completeness property of R,		
					2	Archimedean property of R		

					4	Concept of cluster points and statement of Bolzano-Weierstrass theorem		
					1	Class Test		
					2	Real Sequence		
					1	Bounded sequence		
					2	Cauchy convergence criterion for sequences		
					4	Cauchy's theorem on limits		
					3	order preservation and squeeze theorem		
					3	monotone sequences and their convergence (monotone convergence theorem without proof).		
					1	Class test		
					4	Infinite series		
					2	Cauchy convergence criterion for series		
					2	positive term series, geometric series		

					3	comparison test,		
					2	convergence of p-series		
					2	Root test		
					2	Ratio test		
					4	alternating series, Leibnitz's test(Tests of Convergence without proof).		
					5	Definition and examples of absolute and conditional convergence.		
					1	**Class test**		
					3	Sequences and series of functions		
					5	Pointwise and uniform convergence		
					3	Mn-test		
					3	M-test		
					8	Statements of the results about uniform convergence and integrability and differentiability of functions		
					8	Power series and radius of convergence.		

					1	Class Test		
3.	Gen	Sem 5		Matrices				
					5	R, R2, R3 as vector spaces over R		
					5	Basis and Dimension		
					5	Concept of Linear Independence and examples of different bases		
					5	Subspaces of R2, R3		
					1	Class test		
					5	Translation, Dilation, Rotation, Reflection in a point, line and plane		
					4	Matrix form of basic geometric transformations.		
					5	Interpretation of eigen values and eigen vectors		
					4	Eigen spaces		
					1	Class Test		
					4	Types of matrices		
					5	Rank of a matrix		

					4	Invariance of rank under elementary transformations.		
					4	Reduction to normal form,		
					5	Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four		
					1	Class Test		
					1	Matrices in diagonal form		
					5	Reduction to diagonal form upto matrices of order 3		
					5	Computation of matrix inverses using elementary row operations		
					5	Rank of matrix		
					5	Solutions of a system of linear equations using matrices.		
					5	Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.		
					1	Class Test		

	Month: January 2021- June 2021							
4	Gen	Sem 2		Differential Equation				
					5	First order exact differential equations.		
					5	Integrating factors, rules to find an integrating factor		
					5	First order higher degree equations solvable for x, y, p		
					5	Methods for solving higher-order differential equations		
					5	Basic theory of linear differential equations		
					3	Wronskian, and its properties		
					3	Solving a differential equation by reducing its order		
					1	Class Test		
					5	Linear homogenous equations with constant coefficients		
					6	Linear non-homogenous equations		

					3	The method of variation of parameters		
					3	The Cauchy-Euler equation		
					10	Simultaneous differential equations		
					3	Total differential equations.		
					1	Class Test		
					3	Order and degree of partial differential equations		
					3	Concept of linear and non-linear partial differential equations		
					3	Formation of first order partial differential equations		
					6	Linear partial differential equation of first order,		
					3	Lagrange's method		
					3	Charpit's method		
					5	Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.		

					1	Class Test		
5	Gen	Sem 4		Group Theory				
					8	Equivalence relations and partitions, Functions		
					1	Composition of functions		
					1	Invertible functions		
					5	One to one correspondence and cardinality of a set		
					5	Definition and examples of groups, examples of abelian and nonabelian groups, the group Zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n.		
					3	the general linear group GLn(n,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.		
					6	Cyclic groups from number systems, complex roots of unity, circle group		

					1	Class Test		
					8	Subgroups		
					3	cyclic subgroups		
					3	the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group.		
					5	Cosets, Index of subgroup, Lagrange's theorem		
					2	order of an element		
					6	Normal subgroups: their definition, examples, and characterizations		
					3	Quotient groups		
					1	Class Test		
					12	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 quaternions, rings of matrices, polynomial rings, and rings of continuous functions		

					5	Subrings and ideals		
					12	Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions.		
					1	Class Test		

Sl No	Hons/Gen	Paper	Group	Topic	No. of Lecture	Name of the Lecture	Class Taken
1.	Gen	6th Sem		Linear Programming			
				Linear Programming Problem and Graphysical Solution	2	Concept of LPP and Historical Background	
					2	Standard form of LPP and Matrix Representation	
					2	Formation of LPP	
					3	Problem Solution on LPP formation	
					5	Graphical approach of solving LPP: Bounded and Unbounded problems	
					1	Class Test	

				Vector and Convex Set	2	Concept of vectors	
					2	Concept of points, line and planes in n-dimensional euclidean space	
					2	Hyperplane	
					2	Linear Combination of vectors	
					2	Linear dependence and independence of vectors	
					2	Basis of a vector space	
					5	Convex combination and Convex sets	
					3	Convex Polyhedron and Convex hull	
					2	Separating Hyperplane and Supporting hyperplane	
					2	Extreme Points	
					1	Class Test	
				Simplex Method of solution	3	General Linear Programming Problem: Objective function, Constraints and Non-negativity condition.	

					2	concept of slack and surplus variables	
					2	Feasible solution, Basic solution, Degenerate solution, Basic feasible solution.	
					3	Characteristics of solutions on an LPP	
					3	Reduction of a feasible solution to a basic feasible solution.	
					2	Optimal solution and unbounded solution	
					5	Simplex Algorithm and solution by general simplex method	
					4	Concept of artificial variable and solution of LPP by Big M method.	
					5	Solution of LPP by Two Phase Method.	
					1	Class test	
				Duality Theory	3	Concept of Duality	
					1	Algorithm of Dual problem	
					5	Conversion of Primal to Dual	
					3	Primal-Dual relationship	

					2	Economical interpretation of Dual	
					5	Dual Simplex method	
					1	Class Test	