DEPARTMENT OF MATHEMATICS

Department has been running under-graduate (UG) programme since 1992.

UG is a three year programme, the syllabus of the programme are set by Gondwana University, Gadchiroli. After successful completion of these programmes students should be able to-	
UNDER-GRADUATE	
Odd-Semesters (Sem-I, III & V)	
SEMESTER-I	
Course	**Expected Outcomes**
USMT-01 Paper I – **Differential and Integral Calculus**	1. To verify the limit of function using $\in$ *and* δ definition. To know the continuity and types of discontinuity and also successive differentiation. 2. To know the Mean Value Theorems which provides the values of the function in terms of derivatives. 3. To know the improper integral Gamma function, Beta function and also indeterminate forms. 4. To know about Double integration.
USMT-02 Paper II – **Differential Calculus and Trignometry**	1. To verify the limit of function of two variables using the definition of limit. Solve the problems on partial differential, differential and chain rule. 2. To identify Homogeneous functions. To verify the Euler's theorem and also to know about the solutions of problems on Jacobian, maxima & minima, Lagrange's Multiplier method and Taylor's theorem for function of two variables. 3. To know the concepts of Tangent & normal, curvature asymptotes singular points, tracing of curve, parametric representation of curve and tracing of curve in cartesian form. 4. To know the concept of De Moivre's theorem to solve the problems and its application, square root of complex number, inverse circular & hyperbolic functions, logarithm of complex quantity, summation of series. C+iS Method.
SEMESTER-III	
COURSE	**EXPECTED OUTCOME**
USMT-05 Paper-V **Real Analysis**	1. To know, the sequence of real numbers and their convergence and divergence. 2. To know, the infinite series and their convergence by using various tests. 3. To know, the metric, neighbourhood, closed sets, open sets, bounded sets, De Morgan's law, metric space, open sphere, closed sphere and Cauchy sequence.

	4. To know and understand the Riemann integral.
USMT-06 Paper-VI **Set Theory and Laplace Transform**	1. To know about different sets and Relations. 2. To know the concepts of Fuzzy sets and operation on Fuzzy sets. 3. To know the Laplace transform, its properties and derivatives and integrals. 4. To know the inverse Laplace transform, convolution theorem and the solution of ordinary and partial differential equation.
SEMESTER-V DISCIPLINE SPECIFIC ELECTIVES (DSE)	
DSE-I **Linear Algebra**	1. To know Vector space, subspace, quotient space, linear span, basis and dimension. 2. To know and understand the linear transformation, matrix and linear transformation, Rank Nullity theorem of matrix and isomorphism. 3. To know about dual space, adjoint of linear transformation, Eigen values and Eigen vectors of a linear transform. 4. To know and understand the inner product space.
DSE-IV **Special Relativity-I**	1. To know the Newtonian mechanics, Inertial Systems, Galilean transformations, Newtonian relativity, Conservation laws in Newtonian mechanics, Maxwell's electromagnetic theory, Michelson-Morley experiment and Lorentz Fitzgerald contraction hypothesis. 2. To know Einstein's special theory of relativity, its postulates. Also, Lorentz transformation, its geometrical interpretation and group properties. To know and understand length contraction and time dilation. 3. To know and understand Relativistics Kinematics. 4. To know Four dimensional Minkowskian space-time of special relativity, Time like, Light-like and space-like intervals, Lorentz transformation in index form, proper time, world line of a particle, Four vectors and Four tensor in Minkowskian space-time.
SEMESTER-V SKILL ENHANCEMENT COURSE (SEC)	
SEC-II **MATHEMATICAL MODELING**	1. To know and understand the Mathematical Modeling. 2. To know the need of Mathematical Modeling, its principle, examples and limitation. 3. To know and understand the application of Differential equation in Mathematical Modeling.

	4. To know and understand the application of traffic flow, vibrating string, gravitational potential and conservation laws.
Even-Semesters (Sem-II, IV & VI)	
Course	**Expected outcome**
USMT-03 **Paper-I** **Ordinary Differential Equations and Difference Equation**	1. To know the method of solving first order exact differential equation, linear equation, Bernoulli's equation, first order higher degree equations and orthogonal trajectory. 2. To know the method of solving simultaneous differential equations. 3. To know the method of solving linear equation with variable coefficient, Cauchy's Euler's homogeneous linear differential equation and method of variation by parameters. 4. To know the Difference equation, method of solving homogeneous linear equation with constant coefficient and non homogeneous linear equation. method of solving linear equation.
USMT-04 **Paper-II** **Partial Differential Equation**	1. To know the formation of partial differential equation. Method of solving linear partial differential equation of first order and Lagrange's linear partial differential equation. 2. To know compatible differential equations, nonlinear partial differential equations and Charpit's method. 3. To know the method of solving homogeneous partial differential equation and Jacobbi's method. 4. To know the method of solving non homogeneous linear partial differential equation and equation reducible to linear partial differential equation.
SEMESTER-II	
USMT-07 **Paper-I** **Algebra**	1. To know and understand group, its properties, subgroups, cyclic groups and permutations. 2. To know and understand cosets and normal subgroup. 3. To know and understand homomorphism and non homomorphism group. 4. To know and understand Ring , Integral domain and Field.
USMT-08 **Paper-II** **Elementary Number Theory**	1. To know divisibility, division algorithm, Euclidean algorithm, gcd and lcm. 2. To know and understand prime numbers, Fundamental theorem of arithmetic, Fermat's numbers and linear Diphantine equation.

	3. To know and understand congruence and Chinese remainder theorem and Goldbach conjucture. 4. To know and understand arithmetic function, Euler's theorem, Mobius functions and Pythagorean triplets.
SEMESTER-VI DISCIPLINE SPECIFIC ELECTIVES (DSE)	
DSE-VI **Complex Analysis and Vector Calculus**	1. To know and understand Analytic function, Cauchy Riemann equation, Harmonic function, Mobius trasformation and cross ratio. 2. To know Complex integration, Cauchy integral Theorem and formula, Singularity and Residue theorem. 3. To know Vector differentiation and integration. 4. To know Green, Gauss and Stokes Theorems.
DSE-VIII **Special Relativity-II**	1. To know Tensor Analysis. 2. To know Christoffels symbols, its transformation, covariant and absolute derivative, Geodesics, Curvature, Ricci, Einstein tensor and the Banachi identity. 3. To know and understand Relativistic Mechanics. 4. To know and understand Electromagnetism.
SEMESTER-VI **SKILL ENHANCEMENT COURSE (SEC)**	
SEC-III **Graph Theory**	1. To know the basic concepts of Graph Theory, undirected and directed graphs. 2. To know the multiple graphs, path and circuit, shortest path, Eulerian path and circuit. 3. Travelling Salesman problems and planar graph. 4. Dijkstra's algorithm and Floyd-Warshall algorithm.