Syllabus for Sandip University Joint Entrance Exam(SU-JEE)

Exam Name – SU-JEE M.Sc. Maths

Title	Syllabus	No of Questions
Mathematics-I	**Matrices:** Rank of a matrix, Consistency of a system of linear equations, Characteristic equation , Linear transformations, Eigen values and Eigen vectors, Cayley Hamilton Theorem, Diagnolisation of matrices. **Calculus of one variable**: Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem, Rolle's theorem, Mean Value theorems, 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, Expansions of functions**:** Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series, Maclaurin's series Indeterminate forms. **Calculus of multivariable:** Limit and Continuity Partial differentiation, Euler's theorem on homogeneous functions Composite Theorems, Jacobians, Maxima and Minima **Laplace Transform**: Existence, Theorems on Laplace Transform and Inverse Laplace Transform, Convolution Theorem, Applications of Laplace Transform to solution of first and second order linear differential equations (constant coefficients) and simultaneous linear differential equations, Laplace transform of unit step, dirac delta and periodic functions. **Complex Analysis**: Complex Numbers - Point at Infinity- Stereographic Projection - Analytic functions: Definitions of Function of a Complex Variable- Mappings- Limits, Continuity -Derivatives and Differentiation Formula - Cauchy-Riemann Equations - Properties of Analytic Functions - Necessary and Sufficient Conditions for Analytic Functions -Harmonic Functions - Determination of Harmonic	35

	Conjugate and Analytic Function. Mappings Conformal Mapping, Bilinear Transformation.	
Mathematics-II	**Differential Equations:** Ordinary Differential Equations of order one**,** First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Applications to Ordinary Differential Equations of higher order, Methods for solving higher-order differential equations. Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations. **Partial Differential Equations:** Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method. **Power series solution of Differential Equations:** Solution near an ordinary point and a regular singular point, Frobenius method – Hypergeometric equation. Laguerre, Hermite and Chebyshev equations and their polynomial solutions. **Probability and Theoretical Distribution:** Probability theory - Random variables - Moments- Moment generating functions, Binomial, Poisson, Geometric, Exponential, Normal distributions, Testing of hypothesis: Introduction-large sample test based on normal distribution - Test for single mean difference between means, proportion, difference between proportion - small sample test based on t, F distributions - Test for single mean, difference between means, standard deviation, difference between standard deviations - Chi square test for goodness of fit, independence of attributes, Correlation and regression: Pearson's correlation co-efficient , Spearman's Rank correlation co-efficient, Regression lines, Analysis of Variance.	35

	Groups and rings: Definition of a group – some examples of groups – Some preliminary lemmas -Subgroups – A counting principle - Cosets and Lagrange's theorem. Normal subgroups and Quotient groups - Homomorphism - Automorphism. Definition and example of rings – Some special classes of rings - Homomorphisms - Ideals and quotient rings.More Ideals and quotient rings – The field of quotients of an integral domain, Elementary basic concepts - Linear independence and bases.	
Mathematics-III	**Integral Calculus:** Reduction formulae, Beta and Gamma Functions, Double Integrals , Change of order of Integration ,Triple Integrals ,Applications to Area, Surface Area and volume, Integrals Contours - Line Integrals-Cauchy-Goursat's Theorem,Cauchy's Integral Formula - Derivatives of Analytic Functions - Maximum Modulus Theorem, Power series - Taylor's and Laurent's Theorem. **Vector Calculus:** Gradient, Divergence of a scalar point function and curl of a vector point function, directional derivative, unit normal to a surface, Solenoidal and irrational vectors, physical interpretation of divergence and curl of a vector point function, Line, surface and volume integrals - theorems of Gauss, Stokes and Green's Theorem. **Fourier Series and Fourier Transform:** Fourier Series expansion of periodic functions with Period, 2p and period 2*l* – Use of odd & even functions in Fourier Series, Half-range Fourier Series - Development in Cosine series and in Sine series Change of interval Dirichlet's conditions, Fourier integral formula, Fourier transform, Inverse Theorem for Fourier transform, Fourier sine and cosine transforms and their inversion formulae. Linearity property of Fourier transforms, Change of scale property, Shifting theorem, Modulation theorem, Convolution theorem of Fourier transforms, Parseval's identity **Numerical Analysis**: Gauss elimination method – Error Analysis– Iterative methods: Gauss-Jacobi and Gauss-Seidel – Convergence considerations – Eigen value Problem, Power method. Interpolation: Lagrange's and	30

	Newton's interpolation -- Errors in interpolation –Optimal points for interpolation - Numerical differentiation by finite differences –Numerical Integration: Trapezoidal, Simpson's and Gaussian quadratures – Error in Quadratures, Numerical solution of differential equations: Single-Step methods: Euler's method –Taylor series method – Runge-Kutta method of fourth order – Multistep methods: Adams-Bashforth and Milne's methods **Real Analysis:** Introduction- ordered sets - fields- real field - the extended real number system – the complex field-Euclidean spaces, Finite, countable and uncountable sets-metric spaces-compact sets-perfect sets connected sets, Convergent sequences - subsequences - Cauchy sequences-upper and lower limits some special sequences and series - series of non-negative terms - the root and ratio tests-absolute convergence, Limits of functions – Continuous functions – Continuity and – Continuity and Connectedness – Monotonic Functions.	
Total		**100**