PART III: SYLLABUS FOR ENTRANCE EXAMINATION SRMJEEE (UG) B.TECH AND HEALTH SCIENCE (UG PROGRAMS)

PART 3 – MATHEMATICS (**40** Questions)

Unit 1: Sets, Relations and Functions

Sets and their representations, union, intersection and complements of sets and their algebraic properties, relations, equivalence relations, mappings, one-one, into and onto mappings, composition of mappings.

Unit 2: Complex Numbers and Quadratic Equations

Complex numbers in the form a+ib and their representation in a plane. Argand diagram. Algebra of complex numbers, modulus and argument of a complex number, square root of a complex number. Cube roots of unity, triangle inequality. Quadratic equations in real and complex number system and their solutions. Relation between roots and coefficients, nature of roots, formation of quadratic equations with given roots; symmetric functions of roots, equations reducible to quadratic equations.

Unit 3: Matrices, Determinants and their applications

Determinants and matrices of order two and three, properties of determinants, evaluation of determinants. Addition and multiplication of matrices, adjoint and inverse of matrix. Computing the rank of a matrix–test of consistency and solution of simultaneous linear equations using determinants and matrices.

Unit 4: Combinatorics

Permutations and Combinations : Fundamental principle of counting: permutation as an arrangement and combination as selection, meaning of P(n,r) and C(n,r). Simple applications, **Mathematical Induction and its Applications :**Stating and interpreting the principle of mathematical induction. Using it to prove formula and facts.

Unit 5: Algebra

Binomial theorem and its Applications : Binomial theorem for a positive integral index; general term and middle term; Binomial theorem for any index. Properties of binomial coefficients. Simple applications for approximations. **Sequences and Series :**Arithmetic, geometric and harmonic progressions. Insertion of arithmetic, geometric and harmonic means between two given numbers. Relation between A.M., G.M. and H.M. arithmetic, geometric series, exponential and logarithmic series.

Unit 6: Differential Calculus and its applications

Polynomials, rational, trigonometric, logarithmic and exponential functions. Inverse functions. Graphs of simple functions. Limits, continuity, differentiation of the sum, difference, product and quotient of two functions, differentiation of trigonometric, inverse trigonometric, logarithmic,

exponential, composite and implicit functions, derivatives of order up to two. Applications of **Applications of Differential Calculus :** Rate of change of quantities, monotonic–increasing and decreasing functions, maxima and minima of functions of one variable, tangents and normals, Rolle's and Lagrange's mean value theorems. Ordinary differential equations, their order and degree. Formation of differential equations. Solution of differential equations by the method of separation of variables. Solution of homogeneous and linear differential equations and those of the type $dy/dx + p(x)y=q(x)$

Unit 7: Integral Calculus and its applications

Integral as an anti-derivative. Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration using trigonometric identities. Integral as limit of a sum. Properties of definite integrals. Evaluation of definite integrals; Determining areas of the regions bounded by simple curves.

Unit 8: Analytical Geometry

Straight Lines in Two Dimensions : Cartesian system of rectangular co-ordinates in plane, distance formula, area of a triangle, condition for the collinearity of three points and section formula, centroid and in-centre of a triangle, locus and its equation, translation of axes, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes. **Circles in Two Dimensions:** Standard form of equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle in the parametric form, equation of a circle when the end points of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to the circle. **Conic Sections in Two Dimensions:** Sections of cones, equations of conic sections (parabola, ellipse and hyperbola) in standard form, condition for $y = mx+c$ to be a tangent and point(s) of tangency.

Unit 9 : Vector Algebra

Vectors and scalars, addition of vectors, components of a vector in two dimensions and three dimensional space, scalar and vector products, scalar and vector triple product. Application of vectors to plane geometry.

Unit 10: Statistics and Probability distribution

Measures of Central Tendency and Dispersion:Calculation of mean, median and mode of grouped and ungrouped data. Calculation of standard deviation, variance and mean deviation for grouped and ungrouped data. Probability: Probability of an event, addition and multiplication theorems of probability and their applications; Conditional probability; Baye's theorem, probability distribution of a random variable; binomial and Poisson distributions and their properties.

Unit 11: Trigonometry

Trigonometry ratios, compound angles, trigonometrical equations, solution of triangles, Trigonometrically identities and equations-Inverse trigonometric functions and their properties. Properties of triangles, including, incentre, circumcentre and orthocenter, solution of triangles.