

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

**SYLLABUS FOR EXAMINATION FOR THE POST OF
SR.TEACHER (GRADE-II),
SECONDARY EDUCATION DEPARTMENT**

PAPER - II

MATHEMATICS

Part - (i)

180 marks

(Secondary and Senior Secondary standard)

Arithmetic : Partnership, Average, Interest-Simple and Compound, Payment in Installments, Percentage, Profit & Loss, Discount, Ratio and Proportion.

Plane Geometry : Angles and lines at a point, Angles made by a transversal with two lines, classification of triangles on the basis of sides and angles, Rectilinear figures, congruence of triangles, inequalities of triangles, similar triangles, Area of plane figures, Circles, Arcs and Angles subtended by them. Tangents to a circle.

Algebra : Equations (one and two variables), Factors, Mathematical induction, Binomial theorem, Quadratic equations, nature of roots, quadratic functions, quadratic inequalities, finite and infinite sequences, Arithmetic progression, Geometric Progression, Harmonic Progression, Arithmetic Geometric series, Logarithmic and exponential series, Permutations, Combinations, Matrix, Determinants of order two and three, Inverse matrix, solution of simultaneous linear equations of two and three unknowns, Relations and Functions, Complex numbers, its elementary properties, Demovier's theorem, Separation into real and imaginary parts.

Trigonometry : Angles and their measurements, Trigonometric ratios of acute angles, Angles and lengths of arc, trigonometric functions, compound multiple angles, solutions of trigonometric equations, inverse trigonometric functions, properties of triangles.

Calculus :

- 1 Differential Calculus - Limits, differentiability, continuity, derivative of Sum and Difference, derivative of product of functions, Composite functions, implicit functions, trigonometric functions, parametric functions, applications of derivatives, maxima and minima of one variable.
- 2 Integral Calculus - Indefinite integrals, definite integrals, definite integral as a limit of sum, Applications of definite integral, quadrature.

Co-ordinate Geometry :

- 1 **Two Dimensional Geometry** - Distance between two points, Sections formula, area of triangle, locus, equations of straight line, pair of straight lines, circles, parabola, ellipse, hyperbola, their equations, general properties, tangent, normal, chord of contact, pair of tangents, pole & polar, system of circle.
- 2 **Co-ordinate Geometry in 3 - dimensions** - Distance formula, Sections Formula, direction cosines, direction ratios, angle between two lines, equation of plane one point form, normal form, intercept form, distance of a point from a plane, angle between two planes, angle between a line and a plane, symmetrical equations of a line through one and two points, co-planer and skew lines, shortest distance between two lines, sphere.

Statistics : Mean, Mode, Median, Quartiles, Deciles, Percentiles, Index number, Measure of dispersion, Correlation and Regressions Probability - Laws of probability, addition and multiplications law, conditional probability.

Vector - Dot product, Cross product, their properties, Scalar triple product, Vector triple product and related problems.

Statics and Dynamics : Composition and resolution of co-planer forces, component of a force in two given directions, equilibrium of concurrent forces, parallel forces and moment, velocity and acceleration, simple linear motion under constant acceleration, Laws of motion, projectile.

Part - (ii)

80 marks

(Graduation Standard)

- 1 **Abstract Algebra** - Group, Normal subgroup, permutation group, Quotient group, Homomorphism & groups, Isomorphism theorems, Cayley and Lagrange's theorems, Automorphism.
- 2 **Calculus** - Partial derivatives, Maxima and Minima of functions of two variables, Asymptotes, double and triple integrals, Beta and Gamma functions. Mean Value Theorems.
- 3 **Real Analysis** - Real numbers as a complete ordered field, linear sets, lower and upper bounds, limit points, closed and open sets, Real sequence, limit and convergence of a sequence, Riemann integration, convergence of series, absolute convergence, uniform convergence of sequence and series of functions.

- 4 **Vector Analysis** - Differentiation of a vector functions of scalar variable, Gradient, divergence and curl (rectangular co-ordinates) vector identities, Gauss's Stoke's and Green's theorems.
- 5 **Differential Equations** - Ordinary differential equations of first order and first degree, differential equations of first order but not a first degree, Clairut's equations its general and singular solutions, linear differential equations with constant coefficients, homogeneous, linear differential equations with variable coefficients, simultaneous linear differential equations of first order.
- 6 **Statics and Dynamics** - Friction, Common Catenary, Principle of virtual work kinetics and kinematics, Simple harmonic motion, Hook's Law, motion of particle attached to horizontal and vertical elastic strings, motion under resisting medium.
- 7 **Linear Programming** - Graphical method of solution of linear programming in two variables, convex sets and their properties, simplex method, Assignment problems, Transportation problems.
- 8 **Numerical Analysis and Difference Equation** - Polynomial interpolation with equal or unequal stepsize. Lagrange's interpolation formula. Truncation error. Numerical differentiation. Numerical integration, Newton-Cotes quadrature formula. Gauss's quadrature formulae, convergence, Estimation of errors. Transcendental and polynomical equations, bisection method, Regula-falsi method, method of iteration. Newton - Raphson method, Convergence. First and higher order Homogeneous linear difference equations, non homogenous linear difference equations. Complementary functions, Particular integral.

Part - (iii)

40 marks

(Teaching Methods)

- Meaning and Nature of Mathematics.
- Aims & Objectives of Mathematics Teaching.
- Methods of Mathematics Teaching (analytic, synthetic, inductive, deductive, heuristic, Project & Laboratory).
- Using various techniques of teaching mathematics viz - Oral, written, drill, assignment, supervised - study & programmed Learning.
- Arousing and maintaining interest in learning of Mathematics.
- Importance & meaning of planning. Preparing Lesson Plan, Unit Plan. Yearly Plan, Short Lesson Plan.
- Preparing low cost improvised teaching aids. Audio-Visual aids in Mathematics.
- Transfer of mathematics learning to various subjects and actual life situation.
- Planning & equipments of Mathematics laboratory.
- The mathematics teacher academic & professional - preparation.
- Principle of curriculum & qualities of a good text book.

- Process of obtaining feed-back and evaluation in Mathematics in terms of Cognitive, Affective and Psycho-motor Development.
- Preparation and use of tests for evaluation such as achievement test & diagnostic test.
- Diagnostic, Remedial and enrichment programmes with respect to syllabus at Secondary and Senior Secondary stages.
- Mathematics for gifted and retarded children.

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For the competitive examination for the post of senior teacher :-

- 1 The question paper will carry maximum 300 marks.
- 2 Duration of question paper will be **Two Hours Thirty Minutes.**
- 3 The question paper will carry 150 questions of multiple choices.
- 4 Paper shall include following subjects carrying the number of marks as shown against them :-

(i)	Knowledge of Secondary and Sr. Secondary Standard about relevant subject matter.	180 Marks
(ii)	Knowledge of Graduation Standard about relevant subject matter.	80 Marks
(iii)	Teaching Methods of relevant subject.	40 Marks
	Total	300 Marks
- 5 All questions carry equal marks.
- 6 There will be **Negative Marking.**

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