KALAKSHETRA FOUNDATION

SCHEME OF EXAMINATION FOR THE POST OF TGT

	PART - A		
Test	**Component of the test**	**No. of questions**	**Total marks**
Section 1	General Reasoning	20	20
Section 2	Numeric Ability	20	20
Section 3	Basic Computer Literacy	20	20
Section 4	General Knowledge	20	20
Section 5	Language Competency Test (English)	10	10
Section 6	Language Competency Test (One other Modern Indian Languages*)	10	10
	Total (A)	**100**	**100**
	PART - B [SUBJECT-SPECIFIC]		
	Detailed Syllabus on KF Website	100	100
	Total (B)	**100**	**100**
	Total (A and B)	**200**	**200**
	*Minimum qualifying marks will be **100** and **not below 50 marks** in each part)*		
	SKILL TEST		
	Demo / Teaching Skills		30
	Subject Knowledge		30
	Communication Skill		30
	Usage of Teaching Aids		10
	Total		**100**
	Minimum qualifying marks 75%)		

Note:

- The candidate obtaining **50**% of marks each in PART-A and PART-B shall be declared qualified for the next stage of examination, i.e. Skill Test.
- The candidates should obtain **not below** 75% in the Skill Test.
- A list of candidates shall be prepared at the end of examination process, and the candidates getting the highest marks/rank shall be considered for appointment, as per the vacancies notified.
- Further necessary instructions will be given on the day of Examination.

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DETAILED SYLLABUS

Trained Graduate Teacher (Mathematics) -

1	**Real Numbers**
	Review of representation of natural numbers, integers, and rational numbers on the number line. Rational numbers as recurring/ terminating decimals. Operations on real numbers.
	Examples of non-recurring/non-terminating decimals. Existence of non-rational numbers (irrational numbers) such as $\sqrt{2}$, $\sqrt{3}$, and their representation on the number line. Explaining that every real number is represented by a unique point on the number line and conversely, viz. every point on the number line represents a unique real number.
	Definition of nth root of a real number.
	Rationalization , real numbers of the type $\frac{1}{a+b\sqrt{x}}$ and $\frac{1}{\sqrt{x}+\sqrt{y}}$ their combinations where x and y are natural number and a and b are integers.
	Laws of exponents with integral powers. Rational exponents with positive real bases
	Fundamental Theorem of Arithmetic statements after reviewing work done earlier and after illustrating and motivating through examples, Proofs of irrationality of $\sqrt{2}$, $\sqrt{3}$ $\sqrt{5}$ Number theory, sequences and patterns, Triangular Number, Hexagonal Number, square
	Numbers, Cube Numbers, patterns, Shape sequences, super cells, palindromic patterns. Kaprekar Constant .clock and Calender Number, collatz conjecture
	Bhramagupta's method of Computation.
2	**Polynomials**
	Definition of a polynomial in one variable, with examples and counter examples.
	Coefficients of a polynomial, terms of a polynomial and zero polynomial.
	Degree of a polynomial. Constant, linear, quadratic and cubic polynomials. Monomials, binomials, trinomials. Factors and multiples.
	Zeros of a polynomial. Relationship between zeros and coefficients of quadratic polynomials. Remainder Theorem with examples, Factor Theorem.
	Factorization of $ax2 + bx + c$, $a \neq 0$ where a, b and c are real numbers, and of cubic polynomials using the Factor Theorem.

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DETAILED SYLLABUS

	The algebraic expressions and identities. Verification of identities
	$(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$ $(x \pm y)^3 = x^3 \pm y^3 \pm 3xy(x \pm y)$ $x^3 \pm y^3 = (x \pm y)(x^2 \mp xy + y^2$ $x^3+y^3+z^3-3xyz = (x+y+z)(x^2+y^2+z^2-xy-yz-zx)$
	And their use in factorization of polynomials
3	**Matrices**
	R,R2,R3 as vector spaces over R and concept of Rn.Standard basis for each of them. Linear Independence and examples of different bases. Subspaces of R2, R3. Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces. Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix, Solutions of a system of linear equations using matrices
4	**Linear Equations in two variables**
	Linear equations in one variable. Introduction to the equation in two variables. Focus on linear equations of the type ax + by + c=0.Explain that a linear equation in two variables has infinitely many solutions and justify their being written as ordered pairs of real numbers, plotting them and showing that they lie on a line.
5	**Pair of linear equations in two variables**
	Pair of linear equations in two variables and graphical method of their solution, consistency/inconsistency. Algebraic conditions for number of solutions. Solution of a pair of linear equations in two variables algebraically - by substitution, by elimination.Simple situational problems.
6	**Quadratic Equations**
	Standard form of a quadratic equation ax2 + bx + c = 0, (a ≠ 0). Solutions of quadratic equations (only real roots) by factorization, and by using quadratic formula. Relationship between discriminant and nature of roots.
7	**Arithmetic Progressions**
	Arithmetic Progression, nth term and sum of the first n terms of A.P. and their application in solving daily life problems.
8	**Coordinate Geometry**
	The Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notations. Graphs of linear equations. Distance formula.

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	Section formula (internal division) Area of Triangle.
9	**Introduction to Euclid's Geometry**
	History - Geometry in India and Euclid's geometry. Euclid's method of formalizing observed phenomenon into rigorous Mathematics with definitions, common/obvious notions, axioms/postulates and theorems. The five postulates of Euclid. Showing the relationship between axiom and theorem, for example (Axiom) 1. Given two distinct points, there exists one and only one line through them. (Theorem) 2. (Prove) Two distinct lines cannot have more than one point in common.
10	**Lines and Angles**
	If a ray stands on a line, then the sum of the two adjacent angles so formed is 180 degrees and the converse.
	If two lines intersect, vertically opposite angles are equal. Lines which are parallel to a given line are parallel.
11	**Triangles**
	Two triangles are congruent if any two sides and the included angle of one triangle is equal to any two sides and the included angle of the other triangle (SAS Congruence).
	Two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of the other triangle (ASA Congruence).
	Two triangles are congruent if the three sides of one triangle are equal to three sides of the other triangle (SSS Congruence).
	Two right triangles are congruent if the hypotenuse and a side of one triangle are equal (respectively) to the hypotenuse and a side of the other triangle. (RHS Congruence)
	The angles opposite to equal sides of a triangle are equal.
	The sides opposite to equal angles of a triangle are equal.
	If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
	If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side.
	If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.
	If the corresponding sides of two triangles are proportional, their corresponding

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	angles are equal and the two triangles are similar.
	If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.
12	**Quadrilaterals**
	The diagonal divides a parallelogram into two congruent triangles.
	In a parallelogram opposite sides are equal, and conversely.
	In a parallelogram opposite angles are equal, and conversely.
	A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal.
	In a parallelogram, the diagonals bisect each other and conversely.
	In a triangle, the line segment joining the mid points of any two sides is parallel to the third side and in half of it and (motivate) its converse.
13	**Circles**
	Equal chords of a circle subtend equal angles at the center and (motivate) its converse.
	The perpendicular from the center of a circle to a chord bisects the chord and conversely, the line drawn through the center of a circle to bisect a chord is perpendicular to the chord.
	Equal chords of a circle (or of congruent circles) are equidistant from the center (or their respective centers) and conversely.
	The angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.
	Angles in the same segment of a circle are equal.
	If a line segment joining two points subtends equal angle at two other points lying on the same side of the line containing the segment, the four points lie on a circle.
	The sum of either of the pair of the opposite angles of a cyclic quadrilateral is 180° and its converse.
	Tangent to a circle at, point of contact
	The tangent at any point of a circle is perpendicular to the radius through the point of contact.
	The lengths of tangents drawn from an external point to a circle are equal.
14	**Areas**

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	Area of a triangle using Heron's formula, Area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60°, 90° and 120°.
15	**Surface areas and volumes**
	Surface areas and volumes of spheres (including hemispheres) and right circular cones. Surface areas and volumes of combinations of any two of the following cubes, cuboids, spheres, hemispheres and right circular cylinders/cones. Area of a Triangle using Hero's formula and its application in finding the area of a quadrilateral.
16	Statistics
	Bar graphs, histograms (with varying base lengths), and frequency polygons. Mean, median and mode of grouped and ungrouped data, infrographics., presentation of data, tabular form.
17	Probability
	Classical definition of probability. Simple problems on finding the probability of an event. elementary probability and basic law. Discrete and continuous random variable.
18	**Trigonometry**
	Trigonometric ratios of an acute angle of a right-angled triangle. Proof of their existence (well defined); motivate the ratios whichever are defined at 00 and 900. Values of the trigonometric ratios of 300, 450 and 600.Relationships between the ratios.
19	**Trigonometric Identities**
	Proof and applications of the identity sin2A + cos2A = 1. Only simple identities to be given.
20	**Heights and Distances**
	Angle of elevation, Angle of Depression. Simple problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation / depression should be only 30°, 45°, and 60°
21	**Calculus**
	Sets. Functions and their graphs polynomial, sine, cosine, exponential and logarithmic functions. Step function, Limits and continuity. Differentiation, Methods of differentiation like Chain rule, Product rule and Quotient rule. Second order derivatives of above functions. Integration as reverse process of differentiation. Integrals of the functions introduced above.

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22	**Inequalities**
	Elementary Inequalities, Absolute value, Inequality of means, Cauchy – Schwarz Inequality, Tchebychef's Inequality.

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Trained Graduate Teacher (Science)

1	Matter - Nature and Behaviour
	Gases, liquids, solids, plasma and Bose-Enstein condenstate, types of intermolecular forces.
	Classification of matter into mixures and pure substances. Henry's Law. Concentration of solutions. Colloids-phases of colloids, Tyndall effect, Brownian movement. Suspension.
	Properties of matter. Measurement of properties of matter-S.I. system of units, physical and chemical changes Laws of chemical combination
	Gay Lussac's law, Avogadro law, atomic and molecular masses, average atomic mass, mole concept and molar masses, percentage composition.
2	**Nature of matter**
	Elements, compounds and mixtures. Heterogeneous and homogenous mixtures, colloids and suspensions. Physical and chemical changes (excluding separating the components of a mixture).
3	**Particle nature and their basic units**
	Atoms and molecules, Law of Chemical Combination, Chemical formula of common compounds, Atomic and molecular masses.
4	**Structure of atoms**
	Electrons, protons and neutrons, Valency, Atomic Number and Mass Number, Isotopes and Isobars, Discharge tube experiments.
5	Chemical reactions
	Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions combination, decomposition, displacement, double displacement, precipitation, endothermic exothermic reactions, oxidation and reduction.
6	**Acids, bases and salts**
	Their definitions in terms of furnishing of H+ and OH– ions, General properties examples and uses, neutralization, concept of pH scale Numericals ,
	Importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.
7	**Metals and non-metals**
	Properties of metals and non-metals; Reactivity series; Formation and properties of ionic compounds; Basic metallurgical processes; Corrosion and

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	its prevention.
8	Carbon compounds
	Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series. , difference between saturated hydro carbons and unsaturated hydrocarbons. Chemical properties of carbon compounds Alcohols Preparation and properties. Qualitative analysis of alcohols, iodoform test, effect of alcohols on living beings.
	Carboxylic acids Preparation and properties.
	soaps and detergents. Concept of hybridization and shapes of molecules structural formula and molecular models. isomerism, IUPAC nomenclature of organic compounds.
9	**Periodic Classification of Elements**
	Mendeleev's periodic law, Periodic properties of elements, trends in the periods and groups Importance of the periodic table, position of hydrogen in the periodic table.
10	Tissues, Organs, Organ System, Organism
	Structure and functions of animal and plant tissues (only four types of tissues in animals; Meristematic and Permanent tissues in plants).
11	Life processes
	'Living Being'. Basic concept of nutrition, respiration, transport and excretion in plants and animals.
12	Control and co-ordination in animals and plants
	Tropic movements in plants; Introduction of plant hormones; Control and co-ordination in animals Nervous system; Voluntary, involuntary and reflexaction; Chemical co- ordination animal hormones.
13	**Reproduction**
	Reproduction in animals and plants (asexual and sexual) reproductive health – need and methods of family planning . Safe sex vs HIV/AIDS. Child bearing and women's health.
14	Heredity and Evolution
	Heredity; Mendel's contribution-Laws for inheritance of traits Sex determination brief introduction evolution. - Acquired and inherited traits., Homologus and Analogous organs.
	What are fossils?.
15	**Cell - Basic Unit of life**

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	Cell as a basic unit of life; prokaryotic and eukaryotic cells, multi cellular organisms; cell membrane and cell wall, cell organelles and cell inclusions; chloroplast, mitochondria, vacuoles, endoplasmic reticulum, Golgi apparatus; nucleus, chromosomes – basic structure, number.
16	**Motion**
	Distance and displacement, velocity; uniform and non-uniform motion along a straight line; acceleration, distance-time and velocity-time graphs for uniform motion and uniformly accelerated motion, elementary idea of uniform circular motion.
17	**Force and Newton's Laws**
	Force and Motion, Newton's Laws of Motion, Action and Reaction forces, Inertia of a body, Inertia and mass, Momentum, Force and Acceleration.
18	**Gravitation**
	Gravitation; Universal Law of Gravitation, Force of Gravitation of the earth (gravity), Acceleration due to Gravity; Mass and Weight; Freefall.
19	**Floatation**
	Thrust and Pressure. Archimedes' Principle; Buoyancy.
20	Work, Energy and Power
	Work done by a Force, Energy, power; Kinetic and Potential energy; Law of conservation of energy).
21	**Sound**
	Nature of sound and its propagation in various media, speed of sound, range of hearing in humans; ultra sound; reflection of sound; echo.
22	**Effects of Current**
	Electric current, potential difference and electric current. Ohm's law; Resistance, Resistivity, Factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, Interrelation between P, V, I and R.
23	**Magnetic Effects of Current**
	Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming's Left Hand Rule, Electric Motor, Electromagnetic induction. Induced potential difference, Induced current. Fleming's Right Hand Rule, Electric Generator, Direct current. Alternating current frequency of AC. Advantage of AC over DC. Domestic electric circuits.

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24	**Food production**
	Plant and animal breeding and selection for quality improvement and management; Use of fertilizers and manures; Protection from pests and diseases; Organic farming.
25	**Natural Phenomena**
	Reflection of light by curved surfaces; Images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification. Refraction; Laws of refraction, refractive index. Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens. Functioning of a lens in human eye, defects of vision and their corrections, applications of spherical mirrors and lenses. Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life
26	**Our Environment**
	Eco-system, Environmental problems, Ozone depletion, waste production and their solutions. Biodegradable and non-biodegradable substances.
	Global warming and green house effect, acid rain, particulate pollutants, smog, formation of photochemical smog.
	Water pollution - oxygen demand, chemical oxygen demand, international standard of drinking water, processing of drinking water
27	**Diversity of living organisms**
	Basis of Classification.
	Classification & Evolution.
	Hierarchy of classification–groups.
	Plantae, Animalia.
	Nomenclature Why do we fall ill
	Health & its failure.
	Diseases and their causes
	Types of diseases- Infectious, Noninfectious.
	Prevention of diseases
	Immunisation

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DETAILED SYLLABUS

Trained Graduate Teacher (English)

1	Section A Reading Comprehension
	Three or four unseen passages from different genres (prose, poetry, drama, articles, editorials, scientific, and literary extracts).
	Questions will test comprehension, inference, vocabulary, tone, rhetorical devices, and logical sequencing.
2	Section B Writing Ability
	Functional Writing
	Formal and Informal Letters Business letters, job applications, letters to editors, complaints, and personal letters.
	Report Writing Factual description of events, newspaper reports, and analytical reports. Notices, Circulars, and Press Releases.
	Creative and Analytical Writing
	Essay Writing , Argumentative, analytical, reflective, and descriptive essays. Article/Debate/Speech Expressing opinions on socio-political, economic, and educational issues.
3	**Section C Grammar and Usage**
	Parts of Speech Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions. Sentence Structure Types of sentences, subject-verb agreement, parallelism, and sentence connectors.
	Tenses and Their Usage Active-passive voice, sequence of tenses, and reported speech. Clauses Noun, adjective, and adverb clauses.
	Common Errors Articles, prepositions, modifiers, redundancy, and word order. Editing and Proofreading Error detection, sentence correction, and transformation.
	Section D Literature
	British Literature
	Elizabethan and Jacobean Drama William Shakespeare, Christopher Marlowe, Ben Jonson. Poetry John Donne, Alexander Pope, William Wordsworth, Samuel Taylor Coleridge, John Keats. Victorian and Modern Writers Charles Dickens, Thomas Hardy, Virginia Woolf, T.S. Eliot, George Orwell.
	Indian Writing in English

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	R.K. Narayan, Mulk Raj Anand, Anita Desai, Vikram Seth, Arundhati Roy, Amitav Ghosh.
	World Literature
	Gabriel García Márquez, Chinua Achebe, Pablo Neruda, Khaled Hosseini.