Syllabus for written examination for TGT Mathematics, Advt. No. 2/2023

1. ENVIRONMENTAL AWARENESS (Weightage 10%)

Introduction: Basics of ecology, eco system- concept, and sustainable development, Sources, advantages, disadvantages of renewable and non-renewable energy, Rain water harvesting, Deforestation – its effects & control measures.

Air and Noise Pollution: Air Pollution: Source of air pollution. Effect of air pollution on human health, economy, Air pollution control methods, Noise Pollution: Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimizing noise pollution.

Water and Soil Pollution: Water Pollution: Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of DO, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard, Soil Pollution: Sources of soil pollution, Effects and Control of soil pollution, Types of Solid waste- House hold, Industrial, Agricultural, Biomedical, Disposal of solid waste, Solid waste management E-waste, E – waste management.

Impact of Energy Usage on Environment: Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings, Concept of Carbon Credit & Carbon footprint.

2. Haryana General Knowledge and Welfare schemes of Haryana Government. (Weightage 20%)

Haryana history, current affairs, literature, Geography, Civics, Environment, Culture etc. and Welfare schemes run by state Government of Haryana and provisions there-in.

3. Road Safety Awareness (Weightage 5%)

Traffic Rules, importance of traffic rules, authority to implement traffic rules, punishment for violating traffic rules, authority to issue driving license, procedure to get driving license, classification of vehicles, traffic signs, knowledge of safety measures in vehicles.

4. Perspectives on Education and Leadership (Weightage 15%)

(a) Understanding the Learner

Concept of growth, maturation and development, principles and debates of development, development tasks and challenges, Domains of Development: Physical, Cognitive, Socio-emotional, Moral etc., deviations in development and its implications, Understanding Adolescence: Needs, challenges and implications for designing institutional support, Role of Primary and Secondary Socialization agencies. Ensuring Home school continuity.

(b) Understanding Teaching Learning

Theoretical perspectives on Learning -Behaviorism, Cognitivism and Constructivism with special reference to their implications for: (i) The role of teacher (ii) The role of learner (iii) Nature of teacher-student relationship (iv) Choice of teaching methods (v) Classroom environment (vi) Understanding of discipline, power etc.

Factors affecting learning and their implications for: (i) Designing classroom instructions, (ii) Planning student activities and, (iii) Creating learning spaces in school.

Planning and Organization of Teaching-Learning;e-Perspectives in Education, NEP-2020: Early Childhood Care and Education: The Foundation of Learning; Foundational Literacy and Numeracy; Curriculum and Pedagogy in Schools: Holistic & Integrated Learning; Equitable and Inclusive Education: Learning for All; Competency based learning and Education. Guiding Principles for Child Rights, Protecting and provisioning for rights of children to safe and secure school environment, Right of Children to free and

Compulsory Education Act, 2009, Historically studying the National Policies in education with special reference to school education;

School Curriculum Principles: Perspective, Learning and Knowledge, Curricular Areas, School Stages — Pedagogy & Assessment, (i) Concept of Syllabus and Curriculum, Overt and Hidden Curriculum (ii) Foundational Literacy and Numeracy, Early Childhood Care and Education (iii) Competency based Education, Experiential learning, etc. (iv) Instructional Plans: -Year Plan, Unit Plan, Lesson Plan (v) Instructional material and resources (vi) Information and Communication Technology (ICT) for teaching-learning (vii) Assessment of learning, for learning and as learning: Meaning, purpose and considerations in planning each. Enhancing Teaching Learning processes: Classroom Observation and Feedback, Reflections and Dialogues as a means of constructivist teaching.

c) Creating Conducive Learning Environment

The concepts of Diversity, disability and Inclusion, implications of disability as social construct, types of disabilities-their identification and interventions, Concept of School Mental Health, addressing the curative, preventive and promotive dimensions of mental health for all students and staff. Provisioning for guidance and counselling, Developing School, and community as a learning resource.

(d) School Organization and Leaders-hip

Leader as reflective practitioner, team builder, initiator, coach, and mentor, Perspectives on School Leadership: instructional, distributed, and transformative, Vision building, goal setting and creating a School development Plan, Using School Processes and forums for strengthening teaching learning-Annual Calendar, time-tabling, parent teacher forums, school assembly, teacher development forums, using achievement data for improving teaching —learning, School Self-Assessment, and Improvement, Creating partnerships with community, industry and other neighboring schools and Higher Education Institutes — forming learning communities.

(e) Perspectives in Education

NEP-2020: Early Childhood Care and Education: The Foundation of Learning; Foundational Literacy and Numeracy; Curriculum and Pedagogy in Schools: Holistic & Integrated Learning; Equitable and Inclusive Education: Learning for All; Competency based learning and Education, Guiding Principles for Child Rights, Protecting and provisioning for rights of children to safe and secure school environment, Right of Children to free and Compulsory Education Act, 2009, Historically studying the National Policies in education with special reference to school education; School Curriculum Principles: Perspective, Learning and Knowledge, Curricular Areas, School Stages — Pedagogy & Assessment

Mathematics (Weightage 50%)

Number system, Polynomials, linear Equations & their applications, Properties of lines and angles, Triangle, Similarity of triangles, Tholes Theorem, Pythagoras Theorem and its applications, Quadrilateral types and propertiesarea &perimeters of Two dimensional objects, surfacearea and volume of Three dimensional objects, QuadraticEquation & its properties, introduction to trigonometry, height and distance (using trigonometry), sets and operation on set, application of set operations cartesian product of sets, Relations and its types Functions types of functions domainand range of functions, composition of functions, Trigonometrical functions, Principles of mathematicalInductions, Complex Number linear inequality and its Practicalapplications, Permutation and combinations, (Principleof counting factorial, application of formals of Permutationand combination under different conditions, BinomialTheorem, Statement and Proof of Binomial Theorem,application of Binomial Theorem in calculating different relation between binomial coefficients, Arithmetical. Progression (General term, sum of intern and its application Arithmetical mean, Geometrical progression (nth term, sum of GP, Sum of finite terms of GPGeometrical means,Arithmetic & Geometric series and its sum, Co-ordinate Geometry system of co-ordinatesdistance formula, section formula Equation of line in various form, Equation of circle and its

properties, Parabola and its equation ellipse and its Equation, hyperbola and its Equation application of 2 dimensional geometry, Three Dimensional geometry, Co-ordinate axis and Co-ordinate planes in three dimensional geometry, Co-ordinatesof a point in space, Distance formula, Section formula, Equation of line in space, Equations of plane in three dimension sphere Equations, central tendency Dispersions, analysis of frequency distributions, Probabilitydistribution, normal distribution, Poisson distributions, Bayes Theorem, conditional Probability law of total probability, trigonometrical functions, solutionof trigonometrical Equations, inverse trigonometrical Equationsmatrices, types of matrices, operation on matrices, inverse of a matrix, determinant of square matrix up tothird order, minors cofactors and application of determinant in calculating area & solving equation limits of (algebraic functions, trigonometrical functions,logarithmic functions, exponential functions andInverse trigonometrical functions, Differentiations,application of derivatives, Curve tracing in Cartesian and polar coordinates reduction formulae, volume and. Surface of solid of revolutions Differential Equations (up to graduation)

Algebra & Trigonometry

- Matrices, Determinants, Hermitian& Skew Hermitian matrices. Rank of Matrix, Properties of Determinant Eigen Values, Characteristic equation of matrix. Carey Hamilton Theory
- Relation b/w roots & coefficient of gen. polynomial eq in one variableDescartes's rule of sign. Sion of cubic Eq&biquadratic Eq.
- G.C.D, L.C.M, fundamental theorem of Arithmetic Linear cong., Fermat's theorem there, Wilson theorem, Euler function. Eulala'sgeneralization of Fermat's theorem.
- DeMarre's theorem & its application. Expansion ofTrigonometric functions. Gregory's series. Summation of series.

Calculus

- Definition of Limit of a function, Continuity &Differentiability & a function. Differentiation, Successive differentiation, Asymptotes, Curvature, Tracing ofCurves in Cartesian&Polar coordinates.
- Reduction formulae. Volume & Surface area of solids of revolution.
- Exact diff Eq. First order higher degree equations. Linear differential Eq" with content coefficient Homogeneous Linter ordinary diff Eq",
- Linear diffEqof 2^{nd} order. Transformation of the Eq by changing the dependent variables the independent variable

Probability

- Random experiment, Sample space, Cumulative distribution function, discreate & continuous random variable. Mean, Variance, Moment generality Functions.
- Discrete distribution: Bernoulli, binomial, geometric &Poisson.
- Continuousdist. - Uniform, exponential, gamma & normal. Conditional Prob. Bayes theorem.

Diff. Geometry

- Local theory of curveTangent, Principalnormal, curvature, Centre of curvature, sphericalcurvature.

- Involutes &evolutes of curves, Bertrand curves, surface, tangent& normal envelopes, edge ofregression &developable surfaces.
- First Fundamental form, Direction on a surface Curvature of normal section.
- Principal direction & curvatures. First & 2nd orderCurvature, Grecian curvature. Euler's theorem, Gauss formula
- Linear Algebra, Complex Analysis, Functions of several Variables & Partial Diff. Eq.
- Numerical Methods, Mathematical statistics, operations research.

Differential Eq's

- Series solutions of diff. eq. Power series method · Bessel Legendre&. Hyper geometer Eq.Orthogonality of fruition. Orthogonality of eight- functions.
- Laplace transformations: existence theory for L.T. Laplace transforms of derivative & integrals.Solutions of integral Eq & systems of diff equations using the L.T
- Partial Diff. Eq of First order. LaGrange's sol" Char pit'sgen. method of soI4. P.D questions of 2nd & higher order. Mono & non. Homogeneous Eq with constantcoefficient.

Mechanics

- Equilibrium of Coplanar forces. Virtual work. Forces in 3-dim. Pointset's central axis Wrenches, Null lines & planes.
- Velocities & acceleration along radial &transverse direction and along tangential & normaldirection.
- Central Orbit, Keppler's law of motion. Motion of a particle in3-dim. Acceleration interms of coordinate system.

Vector Analysis & Geometry

- Vector Integration, Gauss, Green & States theorem &problem based or them.
- Scalar & Vector product of three vectors. Products of four vectors., Reciprocalvector Gradient, Divergence & Curl of vectors.
- Tracing of conics, System of conics, Polar Eq. of Conic. Sphere, Cone, Cylinder.

Advanced Calculus

- Theorems on limits of Seq. Bounded & monotonic seq. Cauchy's convergence criterion, Cauchy's Integral test, Ratio test, DE Morgan& Bertrand's test, Leibnitz theorem
- Properties of Continuous functions. Chain ruleof Differentiability. Mean value theorem. Limit& continuity of fun of two variables. Partial diff., Euler's theorem of homogeneousfun. Taylor's theorem.
- Envelopes, Evolutes, Maxima, Minima & saddlepls &functions of two variables.
- Beta & Gamma functions. Double & Triple integrals

Important Note: The Weightage as mentioned against the syllabus is tentative & may vary.