

- 5.5 The upper age limit is also relaxed up to 42 years for widows, divorcees and certain other categories of women.
- 5.6 The upper age limit is also relaxed up to 47 years for "Persons with Disability" of Punjab.

**Note:** Provisions mentioned in Punjab Civil Services (General and Common Conditions of Service) Rules, 1994 amended from time to time may be considered

## 6. PATTERN AND SCHEME OF COMPETITIVE EXAMINATION FOR SELECTION

### 6.1 PROCEDURE FOR SELECTION

The procedure for selection of candidates for the post of Lecturer Mathematics (Group-A) (Subordinate Institutions) in the Department of Technical Education and Industrial Training, Government of Punjab will be as per the following details:-

Subject Matter	No. of Questions	Total Marks
Written Competitive Examination	120	480
Interview	-	60
<b>Total Marks</b>	-	<b>540</b>

The written competitive examination for the post will be scheduled soon.

### 6.2 PATTERN OF THE WRITTEN COMPETITIVE EXAMINATION

The pattern for written competitive examination comprising of 120 questions (@ 4 marks for each question) is as follows:

Sr.No.	Topic	No. of Questions	Marks (Each Question carries 4 marks)	Type of Questions
1.	Questions from the Subject (Part-A of Syllabus)	100	400	MCQs (Multiple Choice Questions)
2.	Questions from General Knowledge & Current Affairs, General Mental Ability, Logical Reasoning & Quantitative Aptitude. (Part-B of Syllabus)	20	80	
<b>Total</b>		<b>120</b>	<b>480</b>	

**The important points to note:**

- I. The Question Paper will be in English language only.
- II. Each question carries **4(four) marks** and, for each correct answer candidate will get **4(four) marks**.
- III. There will be **Negative Marking (One Mark for each question)** in the written examination for questions wrongly answered i.e. for each in correct answer, **1(One) mark** will be deducted from the total score.
- IV. To answer a question, the candidate has to find, for each question, the correct answer/best option.
- V. Answer key will be uploaded on the PPSC website (after written examination), and the candidates will be permitted to raise objections (if any). Candidates will be given four days to deliberate before putting up the objections.

General Information regarding 09 posts of Lecturer Mathematics (Group-A) (Subordinate Institutions) in the Department of Technical Education and Industrial Training, Government of Punjab in the year of 2022

## ANNEXURE (VIII)

### PART-A

**Algebra:-** Group Action, Class Equations, Sylow's theorem, Fundamental theorem of finitely generated Abelian groups, Solvable and Nilpotent Groups, Automorphism group of cyclic groups, Ideals of Matrix Rings, Factorization in Integral Domains, Modules, Free Modules, Vector spaces, subspaces, Basis, Eigen values, Eigen vectors, Jordan Canonical form, Rational Canonical form, Field Extensions, Normal and separable extensions, Algebraically closed fields, Perfect fields, Finite fields, Fundamental theorem of Galois theory.

**Topology:** - Cardinals topological spaces, Elementary concepts: Interior, Closure and Derived Set, Relativisation. Continuity and its Characterizations, Cartesian product topology, Connectedness, Compactness, Invariance of Connectedness and Compactness under arbitrary products, Relationship of Compactness with Nets and Filters. Countability: First and Second countable spaces. Lindelof spaces, Equality of Compactness, Countable Compactness and the Heine Borel Theorem in Metric spaces.

**Analysis:-** Metric space, Riemann-Stieljes integration, Power series, Fourier series, Linear transformations, Taylor's theorem, Inverse function theorem, Implicit function theorem. General measurable spaces, Integration theorem, Integration of series. Riemann integrals. Banach spaces, Hahn-Banach theorem in Linear Spaces and its applications, Uniform boundedness principle, Open mapping theorem, Closed graph theorem, Reflexivity. Hilbert spaces, Adjoint operators, Self adjoint operators, Normal and unitary operators. Analytic function, Cauchy-Riemann equations, Conformal Mapping, Complex Integration, Taylor's theorem. Laurent series in an annulus. Singularities, Argument principle, Rouché's theorem, Fundamental theorem of Algebra, Maximum Modulus Principle, Residue calculus.

**Differential Geometry:-** Curves in the plane and space, Surfaces in three dimensions, the lengths of curves on a surface, the first fundamental theorem, curvature of surfaces, the second fundamental form, the Gauss and Weingarten maps, Normal and Geodesic curvatures, Gaussian and Principal curvatures, Geodesics.

**Differential Equations:-** Existence and Uniqueness Theorem and applications of ODE of first order and higher order system of differential equations. Fundamental set of solutions, Fundamental Matrix, Wronskian, Abel Liouville formula, Reduction of order, Adjoint systems and self adjoint systems of second order.

**Numerical solution of ODE and PDE:** Numerical solution of ordinary and partial differential equations; Euler's method, Improved Euler's method, RK method of 4th order, Finite difference methods, Stiff equations, Milne's method, Adams-Bashforth method, Numerical solution of Laplace equations, Wave equations and Heat equations.

**Mathematical Methods:-** Solutions of Integral equations (Fredholm and Volterra), Variational problems and its solutions.

**Solid Mechanics:-** Analysis of strain, analysis of stress, Hooke's Law, Airy's stress function.

**Optimization:-** Formulation of the general LPP, graphical method, simplex method, duality theory, assignment and transportation problem, integer programming, game theory.

**PART-B**

**General Knowledge, Logical Reasoning & Mental Ability**

**(a) General Knowledge & Current affairs**

General Knowledge and Current affairs of National and International importance including:

- (i) Economic issues.
- (ii) Polity issues.
- (iii) Environment issues.
- (iv) Geography.
- (v) Science and Technology.
- (vi) Any other current issues.
- (vii) (a) History of India with special reference to Indian freedom struggle movement.  
(b) History of Punjab- 14th century onwards.

**(b) Logical Reasoning, Mental Ability & Quantitative Aptitude.**

- (i) Logical reasoning, analytical and mental ability.
- (ii) Basic numerical skills, numbers, magnitudes, percentage, numerical relation appreciation.
- (iii) Data analysis, Graphic presentation charts, tables, spreadsheets.