

**FURTHER DETAILS REGARDING MAIN TOPICS OF  
PROGRAMME No. 01/2018 (Item No. 33)  
HIGHER SECONDARY SCHOOL TEACHER (JUNIOR)  
(MATHEMATICS)  
KERALA HIGHER SECONDARY EDUCATION  
(CATEGORY No.331/2017)**

History of Development of Mathematics.

Mensuration, length of arcs, area of sectors of circles, tangents to circles, circumcircle and incircle

of polygons, area of polygons, solids-volume and surface area.

Fundamentals of number theory. Continued fractions.

Boolean Algebra

Fundamentals of graph theory.

Sets and binary operations, groups, Sylow's Theorems, Rings and ideals, Fields, extension fields,

rings of polynomials, finite fields, Galois Theory, constructible numbers.

System of Linear Equations -

Vector spaces, linear transformations, characteristic values, characteristic polynomial, Minimal

polynomial, Cayley-Hamilton theorem, triangulation and diagonalization of matrices.

Hyperspaces and linear functionals.

Normed spaces, Banach spaces and related theorems, Linear Maps, inner product spaces, Hilbert

spaces and related theorems, finite dimensional and infinite dimensional normed spaces, bounded

operators, spectrum, duals and transposes. Adjoints, normal, unitary and self adjoint operators.

Polynomial Equations, Trigonometry, Analytical geometry of two dimension and three dimension,

similarity of triangles, vectors, matrices.

Calculus, applications of differentiation and integration, elementary functions (logarithms,

exponential, hyperbolic, trigonometric etc), Fundamental theorem of calculus, mean value

theorems, maxima and minima-functions of more than one independent variables, derivatives,

partial derivatives, saddle point, critical point.

Real numbers, rational, irrational numbers, algebraic and order properties of Real numbers,

supremum property, countable and uncountable sets, completeness property, sequences and series

of real numbers, relations and functions, limits and continuity of functions, uniform continuity,

differentiability and integrability of functions, Riemann integral, Riemann-Stieltjes integral,

sequences and series of functions. Term by term differentiation and integration of series of

functions.

Lebesgue measure, Lebesgue integral, convergence theorems and applications

Complex numbers, De Moivre's Theorem, Algebraic properties of complex numbers, regions in the

complex plane.

Complex functions, analytic functions, harmonic functions, conformal mapping, elementary

functions, derivatives and integrals of complex functions and related theorems, singularities, residue

theorem and its applications, Power series, Taylor series, Laurent series.

Metric spaces, topological spaces, basis, subbasis, closed set, closure, interior, boundary,

neighbourhood. Connectedness and compactness, locally connected, path connected, locally

compact spaces.

Functions, continuous functions, homeomorphism, quotient space.

Separation axioms and related theorems.

First order ordinary differential equations-formation, properties and various methods of solving.

Picards method of approximation.

Numerical methods

Second order ordinary differential equations – formation, properties and various methods of

solving. Equidimensional equations.

Existence and uniqueness of solutions.

Systems of first order equations.

Series solutions of first order and second order ordinary differential equation at ordinary and regular

singular points.

Hypergeometric functions and equations, Legendre equations and polynomials. Chebyshev's

Equations and polynomials. Bessel's equations and Functions.

Laplace transform, Fourier series, beta and Gamma functions.

Formation and solution of first order partial differential equation in two independent variables.

Functional dependence, analytic functions. Second order partial differential equation, formation,

classification.

Wave equation, heat diffusion equation, Laplace equation.

Numerical solutions of algebraic equations, finite differences, interpolation.

Fundamentals of Theory of Wavelets, Fuzzy set theory, Fractal geometry, Modular functions Jordan

forms, elliptic functions, Riemann Zeta Function, Automata and formal languages, Block Designs.

Monodromy theorem, Riemann mapping theorem, product topology and Tychonoff theorem.

Solutions at infinity of Differential Equations, Integral Equations, calculus of Variations.

Fundamentals of differential geometry, contractions, inverse function theorem, implicit function theorem.

Fundamentals of Mechanics and Fundamentals of Fluid Dynamics.

## **Part II Research Methodology/Teaching Aptitude**

### **I. TEACHING APTITUDE**

- Teaching: Nature, objectives, characteristics and basic requirements;
- Learner's characteristics;
- Factors affecting teaching;
- Methods of teaching;
- Teaching aids;
- Evaluation systems.

### **II. RESEARCH APTITUDE**

- Research: Meaning, Characteristics and types;
- Steps of research;
- Methods of research;
- Research Ethics;
- Paper, article, workshop, seminar, conference and symposium;
- Thesis writing: its characteristics and format.

## **Part III- Salient Features of Indian Constitution**

Salient features of the Constitution - Preamble- Its significance and its place in the interpretation of the Constitution.

Fundamental Rights - Directive Principles of State Policy - Relation between Fundamental Rights and Directive Principles - Fundamental Duties.

Executive - Legislature - Judiciary - Both at Union and State Level. - Other Constitutional Authorities.

Centre-State Relations - Legislative - Administrative and Financial.

Services under the Union and the States.

Emergency Provisions.

Amendment Provisions of the Constitution.

## **Social Welfare Legislations and Programmes**

Social Service Legislations like Right to Information Act, Prevention of atrocities against

Women & Children, Food Security Act, Environmental Acts etc. and Social Welfare

Programmes like Employment Guarantee Programme, Organ and Blood Donation etc.

## **Part IV: General Knowledge and Current Affairs & Renaissance in Kerala**

### **TOWARDS A NEW SOCIETY**

Introduction to English education - various missionary organisations and their functioning- founding

of educational institutions, factories, printing press etc.

### **EFFORTS TO REFORM THE SOCIETY**

#### **(A) Socio-Religious reform Movements**

SNDP Yogam, Nair Service Society, Yogakshema Sabha, Sadhu Jana Paripalana Sangham, Vaala

Samudaya Parishkarani Sabha, Samathwa Samajam, Islam Dharma Paripalana Sangham, Prathyaksha

Raksha Daiva Sabha, Sahodara Prasthanam etc.

#### **(B) Struggles and Social Revolts**

Upper cloth revolts, Channar agitation, Vaikom Sathyagraha, Guruvayoor Sathyagraha, Paliyam

Sathyagraha, Kuttamkulam Sathyagraha, Temple Entry Proclamation, Temple Entry Act, Malyalee

Memorial, Ezhava Memorial etc.

Malabar riots, Civil Disobedience Movement, Abstention movement etc.

### **ROLE OF PRESS IN RENAISSANCE**

*Malayalee, Swadeshabhimani, Vivekodayam, Mithavadi, Swaraj, Malayala Manorama, Bhashaposhini,*

*Mathnubhoomi, Kerala Kaumudi, Samadarsi, Kesari, AI-Ameen, Prabhatham, Yukthivadi, etc*

### **AWAKENING THROUGH LITERATURE**

Novel, Drama, Poetry, *Purogamana Sahithya Prasthanam, Nataka Prashtanam,* Library movement etc

#### **WOMEN AND SOCIAL CHANGE**

Parvathi Nenmenimangalam, Arya Pallam, A V Kuttimalu Amma, Lalitha Prabhu. Akkamma

Cheriyani, Anna Chandi, Lalithambika Antharjanam and others

### **LEADERS OF RENAISSANCE**

Thycaud Ayya Vaikundar, Sree Narayana Guru, Ayyan Kali, Chattampi

Swamikal, Brahmananda

Sivayogi, Vagbhadananda, Poikayil Yohannan(Kumara Guru) Dr Palpu,  
Palakkunnath Abraham

Malpan, Mampuram Thangal, Sahodaran Ayyappan, Pandit K P Karuppan,  
Pampadi John Joseph,

Mannathu Padmanabhan, V T Bhattathirippad, Vakkom Abdul Khadar Maulavi,  
Makthi Thangal,

Blessed Elias Kuriakose Chaavra, Barrister G P Pillai, TK Madhavan, Moorkoth  
Kumaran, C.

Krishnan, K P Kesava Menon, Dr.Ayyathan Gopalan, C V Kunjuraman, Kuroor  
Neelakantan Namboothiripad, Velukkutty Arayan, K P Vellon, P K Chathan  
Master, K Kelappan, P. Krishna Pillai, A K Gopalan, T R Krishnaswami Iyer, C  
Kesavan. Swami Ananda Theerthan , M C Joseph, Kuttippuzha Krishnapillai and  
others

### **LITERARY FIGURES**

Kodungallur Kunhikkuttan Thampuran, KeralaVarma Valiyakoyi Thampuran,  
Kandathil Varghese

Mappila. Kumaran Asan, Vallathol Narayana Menon, Ulloor S Parameswara Iyer,  
G Sankara Kurup,

Changampuzha Krishna Pillai, Chandu Menon, Vaikom Muhammad Basheer.  
Kesav Dev, Thakazhi

Sivasankara Pillai, Ponkunnam Varky, S K Pottakkad and others

***NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.***