

**FURTHER DETAILS REGARDING MAIN TOPICS OF  
PROGRAMME No. 11/2019 (Item No.8)**

**HIGH SCHOOL ASSISTANT (PHYSICAL SCIENCE)  
(MALAYALAM MEDIUM)**

**(NCA NOTIFICATION)**

**EDUCATION**

**(Category No.619/2017)**

**Part I (a&b) - General Knowledge, Current Affairs & Renaissance in Kerala**

**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.

**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, Swadeshabhmani, 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**

(P.T.O.)

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

## **GENERAL KNOWLEDGE AND CURRENT AFFAIRS**

### **General Knowledge and Current Affairs**

#### **Part I( c) - Teaching Methodology**

- ◆ History/conceptual development. Need and Significance, Meaning Nature and Scope of the Subject.
- ◆ Correlation with other subjects and life situations.
- ◆ Aims, Objectives, and Values of Teaching - Taxonomy of Educational Objectives - Old and revised

- ◆ Pedagogic analysis- Need, Significance and Principles.
- ◆ Planning of instruction at Secondary level- Need and importance. Psychological bases of Teaching the subject - Implications of Piaget, Bruner, Gagne, Vygotsky, Ausubel and Gardener - Individual difference, Motivation, Maxims of teaching.
- ◆ Methods and Strategies of teaching the subject- Models of Teaching, Techniques of individualising instruction.
- ◆ Curriculum - Definition, Principles, Modern trends and organizational approaches, Curriculum reforms - NCF/KCF.
- ◆ Instructional resources- Laboratory, Library, Club, Museum- Visual and Audio-Visual aids - Community based resources - e-resources - Text book, Work book and Hand book.
- ◆ Assessment; Evaluation- Concepts, Purpose, Types, Principles, Modern techniques - CCE and Grading- Tools and techniques - Qualities of a good test - Types of test items- Evaluation of projects, Seminars and Assignments - Achievement test, Diagnostic test – Construction, Characteristics, interpretation and remediation.
- ◆ Teacher - Qualities and Competencies - different roles - Personal Qualities - Essential teaching skills - Microteaching - Action research.

## **Part II (a) , (b)– Physics ,Chemistry**

### **Module I**

Particle dynamics-Newton's laws of motion, rotational dynamics, conservation laws- Linear momentum, angular momentum, energy. Simple harmonic motion, damped and forced oscillations, wave motion-progressive waves, super position of waves, Doppler effect.

Frames of reference, special theory of relativity

Elasticity-Young's modulus, rigidity modulus, bulk modulus, surface tension, viscosity.

### **Module II**

Electrostatics, transient current, current electricity, electromagnetic induction, alternating current, magnetic properties of materials.

Semiconductor physics- diodes, transistors, amplifiers, oscillators, logic gates.

### **Module III**

Reflection, refraction, dispersion, interference, diffraction, scattering, polarization, fibre optics, lasers, basic idea of spectroscopy.

Heat and thermodynamics-conduction, convection, radiation,laws of thermodynamics, Carnot engine, entropy.

Statistical distribution-ensemble, phase space, Maxwell-Boltzmann statistics.

### **Module IV**

Bohr atom model, vector atom model, hydrogen spectra, nuclear structure and properties, radio activity, nuclear fission and fusion, elementary particles.

Crystal structure, crystal symmetry, miller indices, brevais lattice, Bragg's law, packing fraction, super conductivity.

Wave nature of matter, uncertainty principle, postulates of wave mechanics, Schrodinger equation.

## Module V

Eigen functions and Eigen values -Postulates of quantum mechanics Time Schrödinger wave equation - Application to particle in a one dimensional box – Normalization of wave functions - Application of Schrödinger wave equation to hydrogen atom – Conversion of cartesian coordinates to polar coordinates - Radial and angular functions (mention only) – Orbitals and concept of Quantum numbers

Energy levels in molecules - Born-Oppenheimer approximation. *Rotational, vibrational, Raman, Electronic and NMR spectroscopy*: Basic Principles and applications. Elements of symmetry of molecules

Amorphous and crystalline solids , Defects in crystals - Stoichiometric and non stoichiometric defects . Ideal and non ideal solutions -Henry's law , Raoult's law - Dilute solutions - Colligative properties - Abnormal molecular mass – Van't Hoff factor.

Solubility product and common ion effect, precipitation of cations , Principles of volumetric analysis, Theories of indicators.

Principles and applications of Column chromatography, Paper chromatography, Thin layer chromatography, Ion exchange chromatography, - Rf values.

Structure and applications of silicones, silicates and zeolites. Cement , Glass , Inorganic fertilizers , Rocket propellants (Brief study)

Types of pollution: Air and water. Pollutants , Control of air and water pollution

## Module VI

Atom Models– Planck's quantum Theory - Photoelectric effect -de Broglie's relation – Dual nature of matter and radiation, Heisenberg's uncertainty principle. Atomic orbitals and Quantum numbers - Pauling's Exclusion principle - Hund's rule of maximum multiplicity -Aufbau's principle – Electronic configuration of atoms.

Ionic bond – Properties - Born-Lande equation (derivation not expected) – Born-Haber cycle – Fajan's rules and its applications. Covalent bond - Valence bond theory–VSEPR Theory - Concept of Hybridisation –Types: sp, sp<sup>2</sup>, sp<sup>3</sup>, dsp<sup>2</sup>, sp<sup>3</sup>d, d<sup>2</sup>sp<sup>3</sup>,sp<sup>3</sup>d<sup>2</sup> - Explanation with simple examples .Molecular Orbital Theory – LCAO - Bonding and anti bonding molecular orbitals - Bond order. Theories of Metallic bonding: Free electron theory, valence bond theory and band theory (Basics concepts only).Hydrogen bond – Intra and inter molecular hydrogen bond.

Periodic laws, – Periodic properties – Electronegativity scales (Pauling and Mullikan scales) – Effective nuclear charge – Slater rule – Diagonal relationship

Representative and Transition Elements – General Characteristics, preparation and properties of simple compounds. Lanthanides and actinides

Metals: Occurrence, Concentration of ores, Refining of metals, Extractive metallurgy of Al, Fe, Ni, Cu and Ti – Classification of steel, hardening of steel.

Isomerism in coordination compounds - Werner's theory -EAN rule - Valence bond theory - Crystal field theory - Splitting of d-orbitals in octahedral, tetrahedral and square planar complexes –Applications

Organometallic Compounds: Definition, Classification and Applications

Radioactivity –Natural and artificial, Nuclear stability – N/P ratio –Nuclear forces –Half life period – Gieger Nuttal rule –Disintegration series – Transmutation , Nuclear fission and Nuclear fusion –Application of radioactive isotopes

## Module VII

Postulates of kinetic theory of gases - Collision number.

First law of thermodynamics – Joule-Thomson effect - Liquefaction of gases – Inversion temperature. Second law of thermodynamics - Concept of entropy - Entropy as criteria of spontaneity. Free energy functions - Hess's law, Bond energies. Third law of thermodynamics.

Law of mass action - Law of chemical equilibrium - Equilibrium constant in terms of concentration, partial pressure and mole fractions Van't Hoff's equation - Homogeneous and heterogeneous equilibria - Le Chatelier's Principle and its applications.

Rate of a reaction - Factors influencing the rate of a reaction - Rate law - Order and molecularity - Rate constants for first, second, third and zero order reactions - half life period for first order reaction- Arrhenius equation - Collision theory - Transition state theory - Homogeneous and heterogeneous catalysis - Enzyme catalysis

Photosynthesis - Simple Photochemical reactions – Fluorescence – Phosphorescence

Chemisorption and physisorption - Factors affecting adsorption - Adsorption isotherms Classification, Preparation, purification and properties of colloids, Protective colloids - Gold number - Applications of colloids.

Phase Equilibria: Components and degrees of freedom - One component and two component systems (Simple cases only)

Faraday's laws, Kohlrausch's law - Arrhenius theory, Ostwald's dilution law – Debye-Huckel - Onsager's equations for strong electrolytes, Galvanic cells, electrochemical series - Nernst equation

### **Module VIII**

Uniqueness of Carbon, Classification of organic compounds - Hybridization of carbon in organic compounds. Structural and Stereoisomerism, Baeyer strain theory, Conformation and configuration - Specific rotation – Chirality, Enantiomers, Diastereomers– Racemic mixture - Resolution methods

Inductive effect, Mesomeric effect, Hyperconjugation and Electromeric effect - Steric effect. *organic reactions*: Substitution, Addition, Elimination and Rearrangement. Mechanisms of SN1, SN2, E1 & E2

Nomenclature of organic compounds– Preparation and properties of alkanes, alkenes, alkynes, alkyl halides, alcohols, aldehydes and ketones, carboxylic acids & their derivatives. Aromaticity, Huckel's rule - Structure and stability of benzene, Electrophilic substitution reactions in benzene with mechanisms

Grignard reagent-Preparation and synthetic applications

Classification of polymers, preparation and applications of important polymers, biodegradable polymers

Biomolecules: Carbohydrates, proteins, nucleic acids, vitamins (Classifications with examples, applications/functions)

***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***