

**DETAILED SYLLABUS FOR THE POST OF HIGHER SECONDARY  
SCHOOL TEACHER(ZOOLOGY) IN KERALA  
HIGHER SECONDARY EDUCATION DEPARTMENT  
(TOTAL 100 MARKS)**

**MODULE I: SYSTEMATICS AND EVOLUTIONARY BIOLOGY (10 Marks)**

**1. SYSTEMATICS**

- Basic concepts , Importance and applications
- Trends -Chemotaxonomy, Cytotaxonomy, Molecular taxonomy, Cladistics, Numerical taxonomy
- Dimensions of speciation, Species concept, Theories of biological classification, Hierarchy of categories.
- Procedural keys- Taxonomic procedures- Collection, Preservation, Curating, Identification.
- Taxonomic keys- Merits and demerits; ICZN, Formation of scientific names of various taxa.

**2. EVOLUTIONARY BIOLOGY**

An outline of evolutionary theories: Darwinism, Lamarckism, Modern synthesis (not in detail).

Origin of higher categories- Punctuated equilibrium- Macroevolution- Microevolution- Coevolution-Founder principle- C-value paradox-Concept of molecular clock- Cytochrome C- Haemoglobin-Histone.

**MODULE II: PHYSIOLOGY AND BIOCHEMISTRY. (10 Marks)**

**I. PHYSIOLOGY**

**1. Nutrition and Digestion**

- Types of nutrition
- Mechanism of Digestion , Absorption
- Gastro intestinal hormones
- Deficiency diseases of nutrients.

**2. Circulatory Physiology**

- Physiology of cardiac muscles
- cardiac cycle
- Electrical properties
- conducting system of heart
- Blood pressure
- Blood volume
- pressure control - integrated system.

**3. Nerve Physiology**

- Nerve action potential
- conduction of nerve impulse
- Synapse
- Synaptic transmission

- Neurotransmitters.

#### **4. Excretory physiology**

#### **5. Respiratory physiology**

#### **6. Muscle physiology**

#### **7. Endocrinology**

- Major Endocrine glands and their hormones and functions
- Mechanism of hormone action.

## **II. BIOCHEMISTRY**

### Biomolecules

- Carbohydrates: Classification, Structure, Properties, Functions.
- Proteins: Classification, Structure, Properties, Functions.
- Lipids: Classification, Structure, Properties, functions.

Enzymes: Mechanism of enzyme action. Factors affecting enzyme action, Enzyme kinetics, Menton-Michaelis kinetics, Substrate concentration, Enzyme inhibition and regulation, Isozyme, Coenzyme, Ribozymes.

Metabolism of carbohydrate: Glycolysis, TCA cycle, Pentose phosphate pathway, Glycogenesis, Glucogenesis, Gluconeogenesis, Regulation of carbohydrate metabolism.

Metabolism of protein: Deamination, Transamination,

Metabolism of Lipids: B oxidation, Synthesis of Fatty acid, Biosynthesis of cholesterol.

Energy metabolism: Oxidative metabolism, Oxidative phosphorylation, Chemiosmotic theory .

## **MODULE III: MICROBIOLOGY AND IMMUNOLOGY (10 Marks)**

### **I. MICROBIOLOGY**

- Classification of Microorganisms- Berg's manual.
  - Salient features of Bacteria, Viruses, Fungi, Protozoa, Algae.
  - Bacterial Cell- Structure and function
  - Bacterial Cell wall- Peptidoglycan, Gram's positive and Gram's negative, Mechanism of Gram's staining.
  - Bacterial culture media
  - Growth curves

2. **Industrial Microbiology:** Fermentation.

### **II: IMMUNOLOGY**

- Types of immunity - Innate, Acquired, Passive, Active, Cell mediated.
- Cells of primary and secondary lymphoid organs.
- Cells and organs of immune system.

### **III. Immunogens [ Antigen]**

- General properties- Structure and function, Variability and Diversity.

- Factors affecting antigenicity
- Epitopes and haptens
- Adjuvants.

#### **IV. Immunoglobulins [Antibodies]**

- General properties- Structure and function
- Different classes- Ig A, IgD, IgE, IgM
- Variability and Diversity
- Monoclonal and polyclonal antibodies

#### **V. Antigen Antibody interaction**

Complement system- Classical pathway, Alternate, cell mediated and humoral reactions.

#### **VI. Transplantation**

MHC genes, Auto-immune diseases.

### **MODULE IV (10 Marks)**

## **CELL, MOLECULAR BIOLOGY AND BIOTECHNOLOGY**

### **CELL**

Cell membrane- Structure and function.

Cell organelles with special reference to Mitochondria and Ribosomes

### **MOLECULAR BIOLOGY**

- Organization of eukaryotic genome, gene content and genomic size complexity of eukaryotic genome, conserved exons and recombination
- DNA replication , Repair and Recombination
- Prokaryotic and eukaryotic DNA replication. Enzyme involved in replication. DNA damage and repair.
- Transcription and RNA processing
- Prokaryotic and Eukaryotic transcription, Binding of transcription complexes, Post -transcriptional processing .
- Translation- prokaryotic and eukaryotic gene expression, Translational machinery, mechanism of initiation, elongation and termination, Post-translational modification of protein.
- Gene regulation mechanism in Prokaryotes, Eukaryotes
- Transcriptional signals-TATA, CAAT box, Enhancers.

### **A. BIOTECHNOLOGY**

Gene cloning.

- Major steps in cloning, Isolation and purification of genes.
- Vectors- properties of an ideal vector, different types [ plasmids, Ti plasmid, bacteriophages, cosmids, phagemids, artificial chromosomes].
- Enzymes in gene cloning.
- Probes and molecular markers [RFLP, RAPD, AFLP].
- Homopolymer tailing, linkers and adapters.

### **BGenetic engineering techniques.**

B1 Polymerase Chain reaction, DNA finger printing, Blotting techniques [ Northern, Southern , Western blottings, Dot blot, Slot blot].

B2 DNA sequencing - Maxam-Gilbert method, Sanger-Coulson method. Chromosome jumping, Genomic library and cDNA library, Site specific mutagenesis and gene targeting, Human genome project, Human gene therapy, and other genome projects.

B3 Transgenic animals.

## **MODULE V: GENETICS AND DEVELOPMENTAL BIOLOGY (10 Marks)**

### **I. GENETICS.**

- Mendelian principles of genetics- Laws , Linkage, Crossing over, Mutation, DNA, Types of DNA, RNA, Types of RNA.
- Lyon hypothesis.
- Syndromes- Klinefelter, Down, Turner.
- Genetic code.

### **II. DEVELOPMENTAL BIOLOGY**

- Gametogenesis, Fertilization and early development - Cleavage, Blastulation, gastrulation, Organogeny.
- Experimental Embryology.
- Embryonic induction.

## **MODULE VI: ECOLOGY, ETHOLOGY , BIODIVERSITY CONSERVATION AND BIOSTATISTICS (10 Marks)**

### **1. ECOLOGY:**

Definitions- Habit and habitat, Ecological niche, Ecosystem, Population ecology, Community ecology, Ecological succession, Pollution, Global warming.

### **2.ETHOLOGY**

Learning behaviour, Communication behaviour, Motivation.

### **3.BIODIVERSITY CONSERVATION**

Biodiversity concept, status in India, Value, Loss and causes of loss.

Indices, Hot spots of Biodiversity.

In situ and Ex-situ conservation.

### **4.BIOSTATISTICS**

Mean, Median, Mode, Standard deviation; Graphical representation of data.

## **BIOPHYSICS, BIOINFORMATICS AND COMPUTER APPLICATION**

### **1.INSTRUMENTATION**

- Scanning electron microscope, Transmission electron microscope
- Electrophoresis- Gel, PAGE, Agarose, 2D- Immunoelectrophoresis, Fluorescent
- HPLC, Flow cytometry
- NMR spectroscopy- Mass, Plasma , Atomic
- X-ray diffraction
- ELISA

### **2. BIOINFORMATICS**

Proteomics, Genomics, Data bases - Primary and Secondary, Search engines.

Transgenic animals, Stem cell research, IPR, Carbon trading, Ecological foot printing, Treaties and protocols

related to climate change.

## **MODULE – VII (10 Marks)**

Recent developments in Zoology

### **PART II (10 Marks)**

#### **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 (10 Marks)**

#### **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 (10 Marks)**

### **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 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**

**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**