FURTHER DETAILS REGARDING MAIN TOPICS OF

PROGRAMME No. 04/2018 (Item No.17)

HIGHER SECONDARY SCHOOL TEACHER

(JUNIOR) ZOOLOGY

KERALA HIGHER SECONDARY EDUCATION

(Category No.335/2017)

MODULE I: SYSTEMATICS AND EVOLUTIONARY BIOLOGY

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.

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

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

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].
- Homoploymer 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

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

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

Recent developments in Zoology

Module VIII
RESEARCH METHODOLOGY/TEACHING APTITUDE

I. <u>TEACHING APTITUDE</u>

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

II. <u>RESEARCH APTITUDE</u>

- 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.

Module IX (a)
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.

Module IX (b)
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.

Module X (a)
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 Varghesc 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

Module X (b)
GENERAL KNOWLEDGE AND CURRENT AFFAIRS

General Knowledge and Current Affairs