

DETAILED SYLLABUS FOR THE POST OF NON VOCATIONAL TEACHER (JUNIOR) - (BIOLOGY) IN KERALA VOCATIONAL HIGHER SECONDARY SCHOOL EDUCATION

(Cat.No. : 503/2022, 575/2022, 588/2022)

(Total Marks- 100)

PART I-BOTANY

Total Marks: 35

MODULE -1 CRYPTOGRAMAE AND GYMNOSPERMAE (6 Marks)

PHYCOLOGY

Algae- Principles and modern trends in taxonomy of algae; Classification of Algae (Fritsch F. E. 1935). Salient features of major groups, Economic importance of algae : Biofertilizers, Food industry, Industrial and medicinal importance, algal bloom.

MYCOLOGY

Fungi- Principles and modern trends of classification of Fungi- (Alexopoulos et al. 1996); salient features of major groups, economic importance of Fungi. Thallus structure, reproduction and life cycle of the following classes- Myxomycota, Mastigomycota, Zygomycota, Ascomycota, Basidiomycota and Deuteromycota, Economic importances of fungi - significances in medicine and industry, fungal toxins and human health

LICHENOLOGY

Lichens -Classification, thallus structure, reproduction, ecological significance and economic importance of Lichens.

BRYOLOGY

Bryophyta- General characters and recent systems of classification (Shofield, 1985); salient features of major groups, economic importance of Bryophytes. Life cycle study of the following groups: Hepaticopsida, Anthocerotopsida and Bryopsida

PTERIDOLOGY

Pteridophytes- General characters, Telome theory, classification (Bierhost, 1971) salient features, reproduction and life cycle of major groups, economic importance of Pteridophytes

GYMNOSPERMS

Gymnosperms-General characters and classification (Sporne, 1965); salient features of major groups: cycadopsida, coniferopsida and gnetopsida, economic importance of Gymnosperms.

MICROORGANISMS

Bacteria: ultra structure, major groups, nutritional types and reproduction; Economic importance

Viruses: ultrastructure, major groups, nutritional types, replication

Actinomycetes: Major groups, Economic importance in ecology, medicine, agriculture and other industries

MODULE-2 GENETICS AND PLANT BREEDING (6 Marks)

MENDELIAN GENETICS

Mendel's experimental approach to study the pattern of inheritance, Monohybrid cross-the principles of dominance and segregation, Dihybrid cross-the principle of independent assortment. Applications of Mendelian Genetics, Trihybrid cross, Test Cross, Back Cross, Punnet square, Forkedline method.

Testing genetic hypothesis, Laws of probability, Binomial theorem, Chi-Square analysis, Pedigree analysis. Human disorders follow Mendelian patterns of inheritance,

Modified Mendelian ratios, Incomplete dominance, Codominance, Multiple alleles. Lethal alleles. Epistasis

Sex determination and Sex Linkage-Mechanism of sex determination in Drosophila, humans and plants, XY, ZW and XO mechanism. Barr bodies, Lyon's hypothesis.

MOLECULAR GENETICS

Genetic organization-DNA structure, Chemistry of nucleotides, organization of the poly nucleotide strand, Importance of double helical structure of DNA, Watson-Crick model-Conformational changes in DNA structure, Types of DNA, Organization of the Eukaryotic DNA, Repetitive DNA, DNA variation in organisms- DNA replication, Semiconservative replication in prokaryotic and eukaryotic organisms- enzymes in replication, DNA polymerase I, II, III, DNAGyrases, topoisomerases, ligases, RNA polymerase (primase) and replisome complex- current concept of DNA replication in prokaryotes and eukaryotes.

Molecular mechanism of Gene Regulation in Prokaryotes- Constitutive, Inducible and Repressible expression, positive and negative control- Induction and catabolite repression in lac operon, repression and attenuation in trp operon, lysogenic and lytic switches in lambda phage, Translational and post translational regulation.

Molecular mechanism of Gene Regulation in Eukaryotes- Controlled transcription of DNA, Alternate splicing of RNA, Cytoplasmic control of mRNA stability, RNA interference, siRNAs, miRNAs, untranslated regions (UTRs), nonsense mediated decay, chromatin remodeling, DNA methylation, Imprinting.

CYTOGENETICS

Haploidy: Terminology and classification: Euhaploids- monohaploids, polyhaploids, aneuhaploids, disomic haploids- addition haploids- substitution haploid-- nullisomic haploid and misdivision haploid. Spontaneous occurrence-twin seedlings androgenetic and gynogenetic haploids- induction of haploids. Morphology and cytology of haploids and practical value in plant breeding.

Polyploidy: Types of euploids- autopolyploids, allopolyploids- segmental allopolyploid-, autoallopolyploids and agmatoploids – origin and cytogenetic basis of different types of polyploids – meiosis in polyploids (triploids and tetraploids), morphological- physiological and genetical characters of polyploids. Induction of polyploids-cytological effects of colchicines. Role of polyploids in plant breeding.

Aneuploidy: Hyperploids – trisomics- tetrasomics- double tetrasomics – Trisomics- types of trisomics- primary trisomics- secondary trisomics- tertiary trisomic, acrocentric trisomics- fragment trisomics- compensating trisomics – meiosis in trisomics, morphology-physiology and biochemistry of trisomics. Transmission of extra chromosome in trisomics.

PLANT BREEDING

Introduction-History of plant breeding, Green Revolution, nature of plant breeding, the disciplines to be known by a breeder, activities in plant breeding, some important achievements, undesirable consequences. Centres of origin: Different centres and their significance. Types of crops: Cereals, Millets, pulses, oil yielding plants. Fibre crops, narcotics, beverages

Germplasm: different types of germplasm, gene pool concept, genetic erosion, germplasm collections-requisites for a gene bank, genetic erosion in gene banks, constraints of gene bank. . Germplasm conservation : - in situ and ex-situ conservation- seed banks, plant gene banks, shoot tip gene banks, cell and organ gene banks, DNA banks, germplasm evaluation-cataloguing- multiplication and distribution, germplasm utilization.

Different methods- budding, grafting, layering, apomixis- classification with examples. Sexual reproduction- mechanism promoting self-pollination and cross pollination, genetic consequences of self and cross pollination. Relevance of mode of pollination.

Breeding methods in self and cross pollinated crops : Selection: History of selection, pureline selection, mass selection, pedigree selection, bulk method of selection, backcross method of selection procedure, applications, merits, demerits and achievements of each type. Transfer of recessive and dominant gene through back cross. Modifications of back cross method.

Hybridization: Types of hybridization, procedure, emasculation – different methods, consequences of hybridization.

MODULE III – PLANT TAXONOMY AND PHYTOCHEMISTRY (6 Marks)

PRINCIPLES OF TAXONOMY

Plant nomenclature, taxonomic hierarchy, phylogeny of angiosperms, taxonomic keys; History and development of Plant classification in India- Brief study of Artificial (Linnaeus)- Natural (Bentham and Hooker) and Modern systems of Classification (APG)- Plant nomenclature- ICBN- author citation- type concept- publication of names- rule of priority- definition of nomenclatural terms- autonym- homonym- basionym- tautonym and nomen nudum. Classification of taxonomic literature- floras- icons- monographs- reviews and journals.

CONSERVATION

Botanic gardens-definition- role in taxonomic studies- National and International Botanic Gardens- special reference to Royal Botanic Garden, Kew- Indian Botanic Garden, Calcutta- JNTBG &RI, Trivandrum. Herbarium-definition- importance history and development of herbarium-kinds of herbarium-steps in herbarium techniques important herbarium in India and World.

MORPHOLOGY

Macroscopic vegetative and floral identifying features-: Brief account on root types-modifications, stem-modifications, leaves-types-venation-phyllotaxy-modifications, inflorescence-racemose-cymose-special types, flowers-symmetry-floral whorls-arrangements-variations, fruits-simple-aggregate-multiple types, Seeds- structure-shapes, microscopic or ultra-structural morphological characters- trichomes- stomata- types of stomata- pollen wall ornamentation- seed surface pattern

CHEMO AND NUMERICAL TAXONOMY

Chemotaxonomy- definition- importance- role of secondary metabolites in systematics of plants- plant to plant variation- chemistry and plant identification - chemosystematics of Apiaceae- essential oils of Asteraceae and Lamiaceae, pigments of Gesneriaceae. Serotaxonomy- definition- history- methods-role of serology in taxonomy. Numerical taxonomy- definition- OTU's- principles of numerical taxonomy- merits and demerits of numerical taxonomy- applications of numerical taxonomy.

MOLECULAR SYSTEMATICS

Molecules and genomes in plant systematics, Techniques used in molecular taxonomy- Chloroplast DNA and plant phylogeny- present status and future prospects- Use of chloroplast DNA rearrangements in reconstructing plant phylogeny- Mitochondrial DNA in plant systematics- Applications and limitations- Ribosomal RNA as a phylogenetic tool in plant systematics

PHYTOCHEMISTRY

Major classes of plant chemicals-terpenoids, alkaloids and other nitrogen containing metabolites, phenolic compounds.

Extraction techniques. Separation and Purification techniques-chromatography TLC, HPLC and GC. Detection techniques-UV-Vis spectroscopy, Infrared spectroscopy (IR) and Mass spectroscopy (MS), NMR spectroscopy.

MODULE IV- MOLECULAR BIOLOGY AND BIOINFORMATICS (5 Marks)

GENE CLONING

Nucleic acid sample preparation for downstream analysis: Purification and extraction of nucleic acids, Techniques for the isolation of plasmid DNA, plant genomic DNA and total cellular RNA, mRNA preparation, c-DNA synthesis. Nucleic acid cleanup, quality and purity considerations, downstream applications.

VECTORS

Plasmids, phages, cosmids, phasmids, cornybacterial plasmids, BAC vectors. Agrobacterium Ti and Ri plasmids, plant viruses and animal viruses; Special vectors such as shuttle vectors, expression vectors, dominant selectable vectors, amplifiable vectors, integrating vectors, artificial mini chromosomes, broad host range vectors.

RECOMBINANT DNA TECHNOLOGY

Cutting and Joining DNA - Restriction enzymes, nomenclature, types, specificity; Ligation- Enzymes involved and optimization conditions; Modification of restriction fragments - Linkers, Adaptors. Gene transfer technology- Introducing genes into prokaryotes and eukaryotes, Agrobacterium mediated gene transfer in plants, Recombinant viral technique, DNA mediated gene transfer method, protoplast fusion, microcell fusion technique, metaphase chromosome transfer, liposomes, microinjection technique, electroporation and Biolistics.

MOLECULAR ANALYSIS

Construction of DNA libraries: Genomic and cDNA libraries: Objectives of constructing genomic library, determination of size of DNA library, steps and enzymes involved, method of screening libraries, screening expression libraries, preparation of BAC/YAC library, Polymerase Chain Reaction (PCR): Concept of PCR, Various kinds of PCR, Real Time PCR. Blotting techniques: Southern, Northern and Western blotting techniques, Ligation Chain Reaction, Applications of PCR. Mapping of DNA: restriction mapping, DNA foot-printing, gel retardation analysis, chromosome walking and jumping, DNA fingerprinting, RAPD, RFLP, AFLP, SSR, ISSR, SCoT, Single nucleotide polymorphisms (SNPs)- DNA sequencing.

BIOINFORMATICS

Bioinformatics resources –NCBI, NCBI data model, File formats-FASTA, Biological databases- Organism, Sequence (Primary and Secondary, Nucleotide and Protein), Structure and Mapping databases

DNA sequences and proteins: Gene finding strategies - Detecting open reading frames, Gene prediction programs: Hidden Markov model based gene discovery softwares-GENSCAN, GLIMMER.

Secondary databases of functional domains - Structure analysis toolsRASMOL, PYMOL, Tools at Ex Pasy–Motifs and patterns PROSITE, Pfam, Protein sequence analysis tools-PEPTOOL, Predictive methods –PSIPRED, SOPMA.

Phylogenetic analysis-Sequence similarity searches - Comparing nucleotide and amino acid sequences - Distance metrics. Similarity and homology. Scoring matrices. Methods of sequence alignment- Nucleotide BLAST, Protein BLAST, PSI-BLAST, Pairwise and Multiple sequence alignments, Methods of phylogenetic analysis: UPGMA, WPGMA, Neighbour joining method, Character Based Methods Molecular phylogenetic programmes. CLUSTAL, MEGA, PHYLIP, PAUP, PHASE, TREEVIEW.

MODULE V: PLANT PHYSIOLOGY AND BIOCHEMISTRY (6 Marks)

PLANT PHYSIOLOGY

Photosynthesis and Respiration- Plant pigments-Chemistry of photosynthesis and plant product, chemistry, structure and role of chlorophyll, carotenoids and anthocyanin, light absorption and energy transfer, light and dark reaction, Hill reaction O₂ evolution, photosynthetic unit and reaction centre, Emerson enhancement effect, photosystems, electron transport system, mechanism of photophosphorylation, quantum requirements of quantum yield, CO₂ fixation, Calvin cycle, Hatch and Slack pathway, CAM pathway

NITROGEN METABOLISM

General aspects of nitrogen economy; Nitrogen cycle, nitrate and nitrite reduction, denitrification, Non symbiotic and symbiotic N₂ fixation, Biological N₂ fixation, Structure of nodules, nod genes, nif genes; Structure, function and regulation of nitrogenase; Leghaemoglobin; Nodulins; Regulation and enhancement of nitrogen fixation. Biochemistry of nitrogen fixation. Chemoautotrophy in rhizobia and nitrifying bacteria, Pathways of ammonia assimilation, biosynthesis of amino acids, reductive amination, transamination, GDH and GS/ GOGAT pathways.

BIOCHEMISTRY OF CARBOHYDRATES

General composition and properties- solubility, reducing and non-reducing optical isomerism, stereoisomerisms, mutarotation, Classification Monosaccharides, their structure, occurrence, role, their derivatives by oxidation, reduction and substitution, Oligosaccharides- Disaccharides, tetrasaccharides their structure, occurrence and role in glycosidic bond formation, Polysaccharides- Homo and heterosaccharides, structural and storage polysaccharides – starch, glycogen, cellulose, hemicellulose, pectic substances, chitin, agar, gum.

BIOCHEMISTRY OF PROTEINS AND ENZYMES

Classification of Amino acids, structure of common amino acids, physio-chemical properties of amino acids, Synthesis and breakdown of peptide bonds, oxidation, reductive amination, transamination, and deamination. Proteins - Classification, General accounts, Functions of protein, Classification of protein according to solubility characteristics and chemical nature. Structure – primary, secondary, quaternary structure, Ramachandran plot, Protein sequencing, proteolytic enzymes. Enzymes- General account: Importance of enzymes in biological sciences, the classification and nomenclature of enzymes with examples, key to numbering classification of enzymes, Mode of enzyme action, derivation of Michaelis's constant, models for explaining enzyme action, energy of activation, various factors affecting the enzyme activity, Coenzymes- Introduction, structure and classification. Brief account on important coenzymes

BIOCHEMISTRY OF Lipids, Vitamins and Hormones-Classification of lipids: triacylglycerols, waxes, phospholipids (membrane lipids), glycerolipids, glycolipids, sphingolipids, isoprenoids, carotenoids,steroids. Chemistry and structure of terpenes, (eg. hemi, mono, sesqui, di and polyterpenes), Fatty acids- classification and systematic naming system, essential fatty acids, nonessential fatty acids, omega 3 and omega 6 fatty acids, Lipid metabolism- Synthesis of fatty acids, oxidation of fatty acids- α and β oxidation, Vitamins: Water soluble and lipid soluble vitamins, structure and role of vitamin A, D, tocopherol , thiamin, riboflavin, nicotinic acid, panthothenic acid, folic acid, ascorbic acid, lipoic acid, PABA, Plant hormones- Chemical structure and synthesis of hormones in plants, transport,

mode of action and physiological effects of Auxin, Gibberellin, Cytokinins, Abscisic acid and Ethylene in plants.

Module-VI: PLANT BIOTECHNOLOGY (Marks 4)

PLANT TISSUE CULTURE

Plant Tissue Culture Techniques -Historical aspects and significance: Introduction, history, and scope. Development of organ, tissue and cell culture, exploitation of totipotency. Laboratory requirements for plant tissue culture: Basic aspects of plant tissue culture: Sterilization techniques, different culture media components, growth regulators, undefined supplements, surface sterilization of explants, inoculation, subculturing etc. Types of Cultures: Cyto differentiation, organogenic differentiation, callus culture, callus mediated organogenesis, cell suspension culture- different types, measurements of growth pattern of cells in suspension, isolation of single cells, culture methods of single cells, testing viability of cells. Application of cell suspension and callus culture with special reference to medicinal and aromatic plants, in vitro techniques for micropropagation: Axillary bud proliferation approach, meristem and shoot tip culture. Production of virus free plants, shoot meristem culture, thermotherapy and meristem culture, cryotherapy, chemotherapy, virus indexing, maintenance of virus free stocks, applications and limitations, phases of micropropagation, micropropagation of tree species, medicinal and aromatic plants. Organogenesis via callus formation.

APPLICATIONS OF PLANT TISSUE CULTURE

Cell Suspension Culture: Types of suspension culture, batch culture, continuous culture, open continuous, closed continuous, semi continuous, growth measurements, techniques for single cell culture, production of secondary metabolites, secondary products found in plants, method of production – factors affecting yield. Immobilized cell systems, bioreactors. Secondary metabolites detected in plant tissue culture. Root and hairy root culture. Methods of enhancement of secondary metabolite production in culture. Problem associated with secondary metabolite production. Meristem culture: explant, culture medium, environment during culture, browning of medium, rooting of shoots, deflasking and transfer of plantlets into soil. Somatic embryogenesis: Principle and concept, ontogeny and development of somatic embryos. Factors affecting embryo formation. Application of somatic embryogenesis. Artificial- synthetic Seeds: Introduction to synseed, production of synthetic seed encapsulation, steps of commercial artificial seed production, artificial seed propagation, applications. In vitro production of Haploids: In vitro production of haploids and uses of haploids, androgenic methods, anther culture, microspore (pollen) culture, pathways of development, factors governing the success of androgenesis, explant genotype, culture medium, growth regulators, physiological status of the donor plants, stages of pollen.

PROTOPLAST ISOLATION AND CULTURE

Protoplast isolation- different methods: mechanical method, enzymatic method, production of protoplasts, osmoticum, protoplast viability and density, protoplast purification. Culture of Protoplast: Culture techniques, culture medium and environmental factors, protoplast culture,

cell wall formation, growth, division and regeneration of plants, protoplast fusion, somatic hybridization, different types, fusion methods, spontaneous fusion, induced fusion, different types of fusagen, mechanism of fusion, identification and selection of hybrid cells, verification and characterization of somatic hybrids, chromosome status of fused protoplasts, cybrids, achievements and limitations

GERMPLASM STORAGE AND CRYOPRESERVATION

Conservation Biotechnology - Eco restoration Conservation of germplasm, In vitro strategies, short, medium and long term (cryopreservation) preservation application, techniques of cryopreservation, choice of material, preculture, cryoprotection, freezing, thawing, reculture, vitrification, encapsulation dehydration, determination of survival and viability, plant growth and regeneration, applications of cryopreservation, Cryopreservation of vegetative propagated and recalcitrant seed species, Large-scale utilization of cryopreservation for germplasm conservation, cryopreservation progress and prospects.

Module VII: BIOSTATISTICS (Marks 2)

Sampling methods and errors, Process and presentation of data - tables and graphs, Measures of central tendency - mean, median.

Measures of dispersion - range, quartile deviation, mean deviation, standard deviation and coefficient of variations, Probability - basic concept, theorems 6. Experimental design - randomized block, latin square, Tests of significance - T-tests, Chi-square, F-tests, ANOVA, Correlation and regression analysis.

PART II-ZOOLOGY

Total Marks: 35

MODULE I: SYSTEMATICS AND EVOLUTIONARY BIOLOGY (5 Marks)

SYSTEMATICS

- Trends -Chemotaxonomy, Cytotaxonomy, Molecular taxonomy, Cladistics, Numerical taxonomy
- Dimensions of speciation, Species concept, Theories of biological classification, Hierarchy of categories.
- ICZN, Formation of scientific names of various taxa.

EVOLUTIONARY BIOLOGY

- An outline of evolutionary theories: Darwinism, Lamarckism, Modern synthesis (not in detail).
- Punctuated equilibrium- Macroevolution- Microevolution, Coevolution
- C-value paradox.

MODULE II: PHYSIOLOGY AND BIOCHEMISTRY. (5 Marks)

PHYSIOLOGY

- Nutrition and Digestion
- Circulatory Physiology
- Nerve Physiology
- Excretory physiology
- Respiratory physiology
- Muscle physiology
- Endocrinology

BIOCHEMISTRY

- 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
- Metabolism of Lipids: B oxidation, Synthesis of Fatty acid.
- Energy metabolism: Oxidative metabolism, Oxidative phosphorylation, Chemiosmotic theory.

MODULE III: MICROBIOLOGY AND IMMUNOLOGY (5 Marks)

MICROBIOLOGY

- 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.

IMMUNOLOGY

- Types of immunity - Innate, Acquired, Passive, Active, Cell mediated.
- Cells of primary and secondary lymphoid organs.
- Cells and organs of immune system.
- Immunogens [Antigen]: General properties- Structure and function, Variability and Diversity, Epitopes and haptens, Adjuvants.
- Immunoglobulins [Antibodies] General properties- Structure and function, Different classes- Ig A, IgD, IgE, IgM, Variability and Diversity
- Monoclonal and polyclonal antibodies
- Antigen Antibody interaction
- Complement system- Classical pathway, Alternate, cell mediated and humoral reactions.
- Transplantation
- MHC genes, Auto-immune diseases.

MODULE IV: CELL BIOLOGY, MOLECULAR BIOLOGY AND BIOTECHNOLOGY (5 Marks)

CELL BIOLOGY

- Cell membrane- Structure and function.
- Cell organelles with special reference to Mitochondria and Ribosomes

MOLECULAR BIOLOGY

- DNA Composition and Structure; Types of DNA. RNA, Types of RNA.
- 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.
- Genetic code.
- Translation- prokaryotic and eukaryotic gene expression, Translational machinery, mechanism of initiation, elongation and termination, Post-translational modification of protein.
- Gene regulation mechanism in Prokaryotes and Eukaryotes

BIOTECHNOLOGY

- Gene cloning: Major steps in cloning
- Vectors- properties of an ideal vector, different types- plasmids, Ti plasmid, bacteriophages, cosmids, phagemids, artificial chromosomes.
- Genetic engineering techniques: Polymerase Chain reaction, DNA finger printing, Blotting techniques [Northern, Southern, Western blottings, Dot blot, Slot blot].
- Human genome project, Human gene therapy

MODULE V: GENETICS AND DEVELOPMENTAL BIOLOGY (5 Marks)

GENETICS

Mendelian principles of genetics- Laws

- Linkage, Crossing over, Mutation
- Syndromes- Klinefelter, Down, Turner.

DEVELOPMENTAL BIOLOGY

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

MODULE VI: ECOLOGY, ETHOLOGY AND BIODIVERSITY CONSERVATION (5Marks)

ECOLOGY:

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

ETHOLOGY

- Learning behaviour, Communication behaviour, Motivation.

BIODIVERSITY CONSERVATION

- Loss and causes of biodiversity loss.
- Hot spots of Biodiversity.
- In situ and Ex-situ conservation.

MODULE VII: BIOPHYSICS, BIOINFORMATICS AND COMPUTER APPLICATION (3 Marks)

BIOPHYSICS

- Scanning electron microscope, Transmission electron microscope
- Electrophoresis- Gel, PAGE, Agarose, 2D- Immunoelectrophoresis
- ELISA

BIOINFORMATICS

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

MODULE – VIII (2 Marks)

- Recent developments in Zoology

RESEARCH METHODOLOGY/TEACHING APTITUDE

I. TEACHING APTITUDE

(5 Marks)

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

II. RESEARCH APTITUDE

(5 Marks)

- 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.

General Knowledge, Current Affairs & Renaissance in Kerala

(20 Marks)

General Knowledge and Current Affairs

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.

Other Constitution Authorities:- Election Commission of India, Human Rights Commission UPSC, State Public Service Commissions, Information Commission, etc.

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.

CURRENT AFFAIRS

RENAISSANCE IN KERALA AND FREEDOM MOVEMENT

Towards A New Society

Introduction to English education - various missionary organisations and their functioning- founding of educational institutions, factories, printing press – CMS 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, Swadeshbhimani, Vivekodayam, Mithavadi, Swaraj, Malayala Manorama, Bhashaposhini, Mathnubhoomi, Kerala Kaumudi, Samadarsi, Kesari, Al-Ameen, Prabhatham, Yukthivadi, Deepika – Nasrani Deepika, 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, Nidheerikkal Manikathanar 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.