TEACHERS' RECRUITMENT BOARD, TRIPURA (TRBT)
EDUCATION (SCHOOL) DEPARTMENT, GOVT. OF TRIPURA
SYLLABUS: BIOLOGY (MCQs OF 150 MARKS) : 2016
SELECTION TEST FOR POST GRADUATE TEACHER(STPGT)

Unit I: Diversity of Living Organisms

1) Classification of Living Organism - (a) Concept of Diversity (b) Need for Classification, Three Domains of Life (c) Taxonomy & Systematics; Concept of Species and Taxonomic Hierarchy (d) Binomial Nomenclature (e) Tools for Study of Taxonomy-Museums, Zoos, Herbaria, Botanical Gardens (f) Virus, Viroids and Prions.

2) Five Kingdom Classification- (a) Salient Features and Classification of Monera, Protista and Fungi into Major Groups; Lichens (b) Salient Features and Classification of Plants into Major Groups–Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperm (Classification of these Major Groups up to Classes Level with Characteristic Features and Examples) (d) Salient Features and Classification of Animals – Non-Chordates up to Phyla Level and Chordates up to Classes Level with Examples.

Unit II: Structural Organisation in Animals and Plants

1) Morphology of Flowering Plants- a) Root, Stem, Leaf and their Modifications; Functions of Different Parts of Flowering Plants (b) Inflorescence- Cymose, Racemose, Mixed and Special Types (c) Flower – Different Parts of Flower, Classification of Flower based on Symmetry and Position of Ovary on the Thalamus, Aestivation, Placentation (d) Fruit–Classification of Simple, Aggregate and Multiple Fruits with Examples and Salient Features of each type. (e) Seed -Structure of Dicotyledonous and Monocotyledonous Seed (f) Semi Technical Description of Following Families with Floral Formula and Floral Diagram- Malvaceae, Brassicaceae, Solanaceae, Liliaceae, Musaceae.

2) Anatomy of Flowering Plants: a) Salient Features, Classification and Function of Meristematic and Permanent Tissue b) Tissue System- Epidermal, Ground and Vascular Tissue System c) Anatomy of Dicotyledonous and Monocotyledonous Root and Stem, Anatomy of Different Types of Leaves d) Secondary Growth in Dicotyledonous Stem and Dicotyledonous Root.

3) Animal Tissue- Salient Features, Classification, Location, Structure and Function of Epithelial, Connective, Muscular and Nervous Tissue with Important Examples.

4) Morphology, Anatomy and Functions of Different Systems (Digestive, Circulatory, Respiratory, Nervous and Reproductive) of an Insect (Cockroach).

Unit III: Cell Structure and Function

1) Cell Theory and Cell as the Basic Unit of Life.
2) Structure of a Prokaryotic and Eukaryotic Cell (Plant Cell and Animal Cell)
3) Structure and Function of Cell Envelope, Cell Membrane, Cell Wall.
4) Cell Organelles-Structure and Function : (a) Endomembrane System- Endoplasmic Reticulum, Golgi Bodies, Lysosomes, Vacuoles (b) Mitochondria, Plastids , Ribosomes (c) Cytoskeleton, Cilia and Flagella, Centrioles (Ultra Structure and Function) (d) Nucleus - Nuclear Membrane, Chromatin, Nucleolus, Nucleoplasm (e) Microbodies.
5) Chemical Constituents of Living Cells- (a) Biomolecules-Structure and Function of Proteins, Carbohydrates, Fats, Nucleic Acids (b) Enzymes – Classification and Nomenclature, Properties, Enzyme Action, Factors Affecting Enzyme Activity, Enzyme Activators, Enzyme Inhibitors- their types, Allosterism.

6) Cell Division – (a) Cell Cycle And its Phases (b) Mitosis and Meiosis Cell Division (c) Significance of Mitosis and Meiosis.

Unit IV: Plant Physiology

1) Transport in Plants- (a) Means of Transport -Diffusion, Facilitated Diffusion, Passive Symports and Antiports, Active Transport (b) Plant - Water Relations :- Water Potential, Osmosis, Plasmolysis and Deplasmolysis, Imbibition (c) Long Distance Transport- Apoplast and Symplast, Ascent of Sap - Root Pressure, Transpiration Pull (d) Guttation and Bleeding (e) Transpiration -Opening and Closing of Stomata (Potassium ion Hypothesis), Factors Affecting Transpiration, Significance of Transpiration (f) Uptake and Translocation of Mineral Nutrients, Phloem Transport - Mass Flow Hypothesis.

2) Mineral Nutrition- (a) Essential Minerals, Macro-and Micronutrients and Their Role; Deficiency Symptoms (b) Toxicity of Micronutrients c) Elementary Idea of Hydroponics, Aeroponics, Sand Culture as a Method to Study Mineral Nutrition (d) Nitrogen Cycle- Non- Biological Nitrogen Fixation, Biological Nitrogen Fixation.

3) Plant Respiration- (a) Cellular Respiration-Glycolysis, TCA Cycle and Electron Transport System; Fermentation – its types and Importance; Respiratory Balance Sheet (b) Amphibolic Pathway c) Respiratory Quotient of Nutrients.

4) Photosynthesis- (a) Site of Photosynthesis, Photosynthetic Pigments (b) Photochemical Phase- Cyclic and Non Cyclic Photophosphorylation, Chemiosmotic Hypothesis (c) Biosynthetic Phases- Photorespiration, C_3 and C_4 Pathways, CAM (e) Factors affecting Photosynthesis, Law of Limiting Factors.

5) Plant Growth and Development- (a) Phases of Plant Growth and Plant Growth Rate, Conditions of Growth, (b) Differentiation, Dedifferentiation and Redifferentiation, (c) Development-Sequence of Development Process in a Plant Cell, Plasticity (d) Growth Regulators - Auxin, Gibberellin, Cytokinin, Ethylene, ABA (e) Photoperiodism, Role of Phytochrome in Flowering (f) Seed Germination, Seed Dormancy (g) Vernalisation .

Unit V: Human Physiology

1) Digestion and Absorption-(a) Anatomical and Histological Structure of Human Alimentary Canal and Digestive Glands (b) Digestion, Absorption and Assimilation of Proteins, Carbohydrates and Fats (c) Role of Gastrointestinal Hormones (d) Peristalsis (e) Calorific Value of Proteins, Carbohydrates and Fats (F) Nutritional and Digestive Disorders- PEM, Indigestion, Constipation, Vomiting, Jaundice, Obesity, Physiological Role and Deficiency Symptoms of both Fat Soluble and Water Soluble Vitamins.

2) Breathing and Respiration- (a) Respiratory System in Humans (b) Mechanism of Breathing (c) Exchange and Transport of Gases (d) Regulation of Respiration in Human-Neural and Chemical Regulation (e) Respiratory Volumes (f) Disorders Related to Respiration– Asthma, Emphysema, and Occupational Respiratory Disorders.

3) Body Fluids and Circulation- (a) Composition of Blood, Blood Groups, Coagulation of Blood (b) Composition of Lymph and its Function (c) Structure of Human Heart and Blood Vessels (d) Cardiac Cycle, Cardiac Output, Heart Rate and its Control, Blood Pressure and its Regulation, ECG (d) Double Circulation (e) Regulation of Cardiac Activity (f) Disorders of Circulatory System– Hypertension, Coronary Artery Disease, Arteriosclerosis, Atherosclerosis, Heart Block, Rheumatic Heart Disease, Congenital Heart Disease, Angina Pectoris, Heart Failure, Heart Attack, Stoke-Adam Syndrome (g) Therapeutic Devices- Pacemaker, Defibrilator, Angioplasty, Stents, Coronary Artery Bypass Grafting.

4) Excretory Products and Their Elimination- (a) Modes of Excretion – Ammonotelism, Ureotelism, Uricotelism (b) Human Excretory System- Structure and Function (c) Urine Formation, Counter Current Mechanism, Normal And Abnormal Constituents of Urine (d) Regulation of Kidney Function-Role of ADH, Renin-Angiotensin Mechanism, Role of Atrial Natriuretic Factor (e) Micturition (f) Role of Other Organs in Excretion- Skin, Liver, Lungs (d) Disorders of the Excretory System - Uraemia, Renal Failure, Renal Calculi, Nephritis, Diabetes Insipidus (g) Dialysis and Artificial Kidney, Kidney Transplantation.

5) Locomotion and Movement- (a) Types of Movement in Human Being --- Ciliary, Flagellar, Muscular (b) Skeletal Muscle -- Contractile Proteins and Muscle Contraction (c) Skeletal System and its Functions (d) Joints

(e) Disorders of Muscular and Skeletal System– Myasthenia Gravis, Tetany, Muscular Dystrophy, Arthritis, Osteoporosis, Gout.

6) Neural Control and Coordination- (a) Neuron and Nerves (b) Generation and Conduction of Nerve Impulse, Structure of Synapse and Transmission of Nerve Impulse Through Synapse (c) Nervous System in Human: Central Nervous System, Peripheral Nervous System and Visceral Nervous System (d) Reflex Action (e) Sense Organs and Sensory Perception (e) Structure and Functions of Eye , Ear, Tongue and Nose.

7) Chemical Coordination and Regulation- (a) Endocrine Glands and Hormones (b) Human Endocrine System – Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads, Gastro-Intestinal Glands, Placenta (c) Mechanism of Hormone Action (d) Role of Hormones as Messengers and Regulators (e) Hypo and Hyperactivity and Related Disorders- Dwarfism, Acromegaly, Cretinism, Myxoedema, Simple Goiter, Exopthalmic Goiter, Diabetes, Addison's Disease, Cushing Syndrome, Conn's Syndrome.

Unit VI: Reproduction

1) Reproduction in Organisms-Reproduction, a Characteristic Feature of all Organisms for Continuation of Species. Mode of Reproduction- Asexual and Sexual.

2) Asexual Reproduction- Binary Fission, Sporulation, Budding, Gemmule, Fragmentation, Regeneration, Vegetative Propagation in Plants and its Advantages and Disadvantages.

3) Sexual Reproduction in Flowering Plants- (a) Flower Structure, Development of Male and Female Gametophytes (b) Pollination – Types, Agencies and Examples (c) Outbreeding Devices (d) Pollen – Pistil Interaction (e) Double Fertilization, Post Fertilization Events-Structure, Types and Development of Endosperm and Embryo (f) Development of Seed and Formation of Fruit (g) Special Modes of Reproduction – Apomixis, Parthenocarpy, Polyembryony (h) Significance of Seed and Fruit Formation

4) Human Reproduction- (a) Male and Female Reproductive Systems, Microscopic Anatomy of Testis and Ovary, Structure of Spermatozoa, Structure and Development of Graafian Follicle (b) Gametogenesis – Spermatogenesis and Oogenesis (c) Menstrual Cycle and its Hormonal Control, Fertilisation, Embryo Development up to Blastocyst Formation, Implantation (d) Physiology of Pregnancy and Placenta Formation, Physiology af Parturition, Breast Development and Lactation.

5) Reproductive Health –(a) Need for Reproductive Health and Prevention of Sexually Transmitted Diseases-(STD) (b) Birth Control – Need and Methods , Contraception & Medical Termination of Pregnancy (MTP), Amniocentesis (c) Infertility and Assisted Reproductive Technologies – IVF, ZIFT ,IUT, GIFT, ICSI, IUI.

Unit VII: Genetics and Evolution

1) Heredity and Variation: - (a) Mendelian Inheritance- Monohybrid Cross and Dihybrid Cross, Law of Dominance, Law of Segregation , Law of Independent Assortment, Test Cross and Back Cross (b) Deviations From Mendelism - Incomplete Dominance, Co-Dominance, Multiple Alleles and Inheritance of Blood Groups, Pleiotropy, Epistasis, Polygenic Inheritance (c) Chromosomal Theory of Inheritance (d) Chromosomes And Genes. (e) Sex Determination- in Humans, Birds and Honey Bee (f) Linkage and Crossing Over (g) Sex Linked Inheritance-Haemophilia, Colour Blindness (f) Chromosomal Mutation and Gene Mutation (h) Pedigree Analysis (i) Autosomal Disorders in Human- Sickle Cell Anaemia, Phenylketonuria, Albinism, Thalassemia (j) Chromosomal Disorders In Humans- Down's Syndrome, Turner's Syndrome , Klinefelter's Syndrome, Cri-Du-Chat Syndrome, Myelogenous Leukemia, Duchenne Muscular Dystrophy.

2) Molecular Basis of Inheritance- (a) DNA as Genetic Material, Structure of DNA and RNA, DNA Packaging, DNA Replication (b) Central Dogma-Transcription, Genetic Code, Translation (c) Gene Expression And Regulation (d) Genome and Human Genome Project, DNA Sequencing (e) DNA Finger Printing.

3) Evolution- (a) Origin of Life (b) Biological Evolution and Evidences for Biological Evolution from Paleontology, Comparative Anatomy, Embryology and Molecular Evidence (c) Lamarckism, Darwin's Contribution, Modern Synthetic Theory of Evolution (d) Hardy – Weinberg's Principle (e) Mechanism of

Evolution – Variation (Mutation and Recombination) , Natural Selection With Examples and types of Natural Selection, Gene Flow and Genetic Drift (f) Adaptive Radiation, Evolution of Plants, Human Evolution.

Unit VIII: Biology and Human Welfare

1) Health and Disease- (a) Infectious and Non Infectious Diseases; Common Human Diseases -Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, Common Cold, Amoebiasis, Ring Worm- Pathogens and Parasites Causing These Diseases, Symptoms, Mode Of Transmission, Diagnosis and Prevention (b) Immunology - Basic Concepts of Immunology, Innate Immunity and Acquired Immunity, Active and Passive Immunity, Cell Mediated and Humoral Immunity, Allergies, Autoimmunity, Immune System in the Body, Structure of Antibody, Structure And Function of Different Types of Immunoglobulins, Antibody Action, Monoclonal Antibodies (c) Vaccines, Vaccination and Immunization (d) Cancer (e) HIV and AIDS (f) Adolescence, Drug and Alcohol Abuse.

2) Insects and Human Welfare-Silk, Honey, Lac.

3) Improvement in Food Production-(a) Plant Breeding, Tissue Culture, Single Cell Protein (b) Biofortification (c)Animal Husbandry - Dairy Farm Management, Poultry Management, Animal Breeding and Pisciculture.

4) Microbes in Human Welfare- In Household Food Processing, Industrial Production, Sewage Treatment, Energy Generation and as Bio-Control Agents and Bio-Fertilizers

Unit IX: Biotechnology and its Application

1) Principles and Process of Biotechnology- Genetic Engineering; Tools of Recombinant DNA Technology - Restriction Enzymes, Cloning Vectors, Gene Transfer Methods; Processes of Recombinant DNA Technology - Isolation of Genetic Materials, Polymerase Chain Reaction(PCR), Bioreactors, Downstream Processing.

2) Application of Biotechnology in Health and Agriculture- (a) Biotechnological Application in Medicine- Human Insulin And Vaccine Production, Gene Therapy, Molecular Diagnosis of Human Diseases (b) Biotechnological Application in Agriculture- Bt Crops, RNA Interference (c) Transgenesis and Transgenic Animals (d) Biosafety Issues (e) Biopiracy and Patents.

Unit X: Ecology and Environment

1) Organism and Environment- (a) Habitat and Niche; Biomes; Major Abiotic Factors and Responses to Abiotic Factors, Adaptations (b) Population Interactions – Mutualism, Competition, Predation, Parasitism, Commensalism and Ammensalism; Protocooperation (c) Population Attributes –Birth Rate , Death Rate, Age Distribution; Population Growth.

2) Ecosystems- (a) Patterns; Components; Energy Flow; Pyramids of Number, Biomass and Energy, Decomposition and Productivity (b) Nutrient Cycling (Carbon and Phosphorus) (c) Ecological Succession (d) Ecological Services : Carbon Fixation, Pollination, Oxygen Release.

3) Biodiversity and its Conservation – (a) Types of Biodiversity, Patterns of Biodiversity, Loss of Biodiversity, Need for Biodiversity Conservation b) Biodiversity Hotspots, Endangered Organisms, Extinction, Red Data Book, Green Data Book, Blue Data Book, Black Data Book (c) Biodiversity Conservation – Biosphere Reserves, National Parks and Sanctuaries, Reserve Forests , Wetland Conservation and World Heritage Site.

4) Environmental Issues- (a) Air Pollution and its Control, Water Pollution and its Control, Noise Pollution and Its Control (b) Agrochemicals and Their Effects, Biomagnification, Solid Waste Management, Radioactive Waste Management (c) Greenhouse Effect and Global Warming, Ozone Depletion, Deforestation.

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