Syallabus for Recruitment Examination of Post Graduate Teacher (BIOLOGY)

PAPER -I

Unit I: Diversity of Living World

Systematic aims and components, Binomial system of nomenclature, classification of living organisms (five kingdom classification, major groups and principles of classification within each group), general description of Monera, Protozoa, Fungi, Algae, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms, salient features of animals (non-chordates up to phyla level and chordates up to classes level).

Unit II: Structural Organization in Plants and Animals

Morphology, anatomy and histology of angiosperms- roots, stems, leaf, flowers, inflorescence, fruits and seeds. Plants tissues- meristemetic and permanent (epidermal, ground and vascular) cambial activity, secondary growth, types of woods. Animal tissues, morphology, anatomy and histology of earthworm, cockroach and frog. Anatomy of bony fish.

Unit III:-Structural and Functional Organization of Cell

Structure of prokaryotic and eukaryotic cell, cell theory, cell divisions (mitosis and meiosis), cell membrane, cell wall, Cell organelles: structure and their functions. Structure and functions of carbohydrates, proteins. Enzymes: nature, classification and nomenclature. Mechanism of enzyme action, factors affecting enzyme action, vitamins, hormones and steroids, karyotype analysis.

Unit **IV:-Plant Physiology**

Plant - water relations-Imbibition, osmosis, plasmolysis, water potential. transport of water and solutes across cell membrane, mineral nutrition, functions of macro and micro nutrients and their role, deficiency symptoms. N_2 metabolism-biological nitrogen fixation; lipid metabolism ; Photosynthesis: photochemical reactions, carbon fixation pathways-C3 and C4 and CAM plants. Respiration: Exchanges of gases; Cellular respiration- glycolysis, Krebs cycle, electron transport system, respiratory quotient (RQ) and fermentation, physiological response to abiotic stress ; sensory photobiology ;plant growth regulators and their chemical nature, roles and application in agro- horticulture (auxins, gibberellins, cytokinins, ethylene & ABA); Growth indices (differentiation dedifferentiation & re-differentiation); Plant growth movement, flowering, photoperiodism and its signification, endogenous clock and its regulation, floral induction and development ; vernalization.

Unit V:-Human Biology

Morphology, anatomy, physiology of digestive system; ingestion, digestion, absorption, assimilation and egestion; Nutritional and digestive disorders- PEM, indigestion, constipation, vomiting, jaundice and diarrhea. Gas exchange transport ;pulmonary gas exchange and organs involved, transport of respiratory gases in blood,common respiratory disorders-Asthma, emphysema and occupational respiratory disorders; circulatory system; blood its components and functions,

mechanism of blood coagulation , blood groups and Rh factor ; structure and functions of heart; disorder of circulatory system- Hypertension, coronary artery disease, angina pectoris and heart failure. Excretion and osmo- regulation; modes of excretion-ammonotelism, ureotelism, uricotelism; Human excretory system- structure and function of nephron and regulation of urine formation, osmo-regulation and excretory products of human; disorders-uremia, renal failure, renal calculi, nephritis; dialysis and artificial kidney. Locomotion and Movement: human skeleton, joints and their types, types of muscles, mechanism of contraction of skeletal muscles, disorders of muscular and skeletal system. Nervous system in humans- structure and functions of brain and spinal cord, Generation and conduction of nerve impulse. Reflex action, structure and function of sense organs (Eye and Ear), Hormonal coordination, hormones and their function,hormonal imbalance and diseases. Human reproductive system: morphology, anatomy, histology and physiology of reproduction, spermatogenesis of male and Oogenesis of female, male and female hormones, factors influencing spermatogenesis and oogenesis , menstrual cycle, hormonal control of menstrual cycle, fertilization, implantation and pregnancy, placental hormones, pregnancy test, changes in a pregnant woman's mammary gland , structure of adult mammary gland, change in mammary gland during puberty, galactopoietics, milk let down menopause, senescence, impact of age on reproduction , foetal & embryonic gonads and genital duct, Hormonal basis of sex determination, disorders of sexual differentiation and development, reproductive health problems and strategies. Population explosion: causes and effects, birth control measures :natural method, physical / barriers, biochemical, hormonal immunological, surgical method , IUDS, amniocentesis, female foeticide, MMR,IMR,MTP,STD's infertility disorders of female, Medical assisted human reproductive technologies , GIFT,IVF,ZIFT, Embryo culture.

PAPER –II

Unit I:- Sexual reproduction in Plants

Structural details of angiospermic flower. Development of male and female gametophytes, pollination, double fertilization, Endosperm and its development types and functions, development of seed and fruit, types of fruits , apomixes and polyembryony, self incompatibility, methods to overcome incompatibility , experimental embryology including pollen storage and test fertilization, Tissue culture.

Unit II:-Genetics and Evolution

Mendel's law of inheritance, monohybrid and dihybrid crosses, incomplete dominance and co- dominance, linkage and crossing over, multiple alleles, Mutation, spontaneous & induced mutations,physical & chemical mutagens, molecular bases of gene mutation, extra chromosomal inheritance, chromosomal mutation, change in chromosomes structure and change in chromosomes number, Gene expression, structure of DNA and RNA, DNA fingerprinting, Gene mapping, Genetic code, chromosome aberrations, restriction enzyme, nucleotides sequence, comparison of homologies, Molecular clock, genetics in modern agriculture, animal breeding and medicine , human behaviour, misuse of genetics, stem cells and gene therapy,

bacterial transformation, transduction and conjugation, bacterial chromosome, types of bacterial structure and morphology. Evolution biology- cosmic evolution , experimental evidences for origin of life, origin of nature selection, extraterrestrial life, origin and evolution of man, population genetics, genetic variation, polymorphism, gene frequency, Hardy Weinberg's principle, genetic drift, adaptive radiations.

Unit-III: Biology in Human Welfare .

Health and Diseases: Pathogens, types of diseases, common diseases in humans, immunity: innate & acquired immunity , passive & active immunity, cells of the immune system and their differentiation, Lymphocytes, structure and functions of antibodies, Antigen -antibody reaction, Hormonal immune response, cell mediated immunity, auto-immunity, allergy, immunodeficiency disorders, etiology of HIV, genetics and biochemistry of cancer, drugs and alcohol abuse; addiction of drugs and alcohol, ill effects of drugs and alcohol, precautions, drugs and alcohol abuse in adolescence, strategies of food production and enhancement, animal husbandry, management of farm's animal breeding strategies and their types, plant breeding methods for release of new varieties, biofortification, single cell protein, Tissue culture form somatic hybridization in human welfare, biogas production, bio-control agents and bio fertilizers.

Unit IV: Biotechnology

Genetic Engineering: tools and techniques, technique of separation and isolation of DNA fragments, cloning, cloning vectors, electrophoresis, bio reactors, processing of its products, tissue engineering ,cry-preservation, fusion methods, detection and application of monoclonal antibodies, DNA, Vaccines, Edible technology, application in agriculture, GMO for pest resistance, RNA and ts-RNA technology, application in medicine, genetically engineered products, molecular diagnosis, serum and urine analysis, PCR,ELISA, Transgenic animals and their physiological, biological products and their use for testing safety vaccine and chemicals and bio- piracy.