

BIOLOGY
(HIGHER SECONDARY STANDARD)

SUBJECT CODE: 322

I. BOTANY

UNIT – I: TAXONOMY OF ANGIOSPERMS

Types of classifications – artificial – natural – phylogenetic. Biosystematics – binomial nomenclature – herbarium and its uses. Bentham and Hooker's classification of plants – families – Malvaceae - Solanaceae – Euphorbiaceae – Musaceae and their Economic importance.

UNIT – II: PLANT ANATOMY

Tissue and tissue systems – anatomy of monocot and dicot roots – anatomy of monocot and dicot stems – anatomy of dicot leaf.

UNIT – III: CELL BIOLOGY AND GENETICS

Chromosomes – structure and types – genes and genomes – linkage and crossing over – gene mapping – recombination of chromosomes – mutation – chromosomal aberrations – DNA as genetic material - structure of DNA – replication of DNA - structure of RNA and its types.

UNIT – IV: BIOTECHNOLOGY

Recombinant DNA technology – transgenic plants and microbes – plant tissue culture and its application – protoplasmic fusion – single cell protein.

UNIT – V: PLANT PHYSIOLOGY

Photosynthesis – significance – site of photosynthesis – photochemical and biosynthetic phases – electron transport system – cyclic and non-cyclic photophosphorylation – C₃ and C₄ pathways – photorespiration – factors affecting photosynthesis – mode of nutrition – autotrophic – heterotrophic – saprophytic – parasitic and insectivorous plants – chemosynthesis – respiration – mechanism of glycolysis – Krebs cycle – pentose phosphate pathway – anaerobic respiration – respiratory quotient – compensation point – fermentation. Plant growth – growth

regulators – phytohormones – auxins – gibberellins – cytokinins – ethylene and abscisic acid. Photoperiodism and vernalization.

UNIT – VI BIOLOGY IN HUMAN WELFARE

Food production – breeding experiments – improved varieties and role of biofertilizers. Crop diseases and their control – biopesticides – genetically modified food – bio-war – biopiracy – biopatent – sustained agriculture and medicinal plants including microbes. Economic importance – food yielding (rice) – oil yielding (groundnut) – fibre yielding (cotton) and timber yielding (teak) plants.

II. ZOOLOGY

UNIT – VII HUMAN PHYSIOLOGY

Nutrition : Introduction – Carbohydrates – Proteins – Lipids – Vitamins – Minerals – Water – Balanced diet – Calorie values (ICMR standards) – Obesity – Hyperglycemia – hypoglycaemia – Malnutritions.

Digestion : Enzyme and enzyme action – Brief account of following – Dental caries – Root canal therapy – Peptic ulcer – Hernia – Appendicitis – Gall bladder stone – Liver cirrhosis – Hepatitis.

Bones and joints (Major types) : Fractures – Dislocations – Arthritis – Rickets and osteomalacia – orthopaedics – Gout.

Muscles : Muscle action – Muscle tone – Rigor mortis – Muscle pull (hernia) – Isometric and aerobic exercises (Body building) – Myasthenia gravis.

Respiration : Process of pulmonary respiration – Inspiration – Expiration – Exchange of gases at alveolar level – Control of respiration – Pneumonia – Pleurisy – Tuberculosis – Bronchitis – Breathing exercises.

Circulation – Functioning of heart – Origin and conduction of heart beat. Artificial pacemaker – Coronary blood vessel and its significance – Myocardial infarction, Angina pectoris – Angiogram, angioplasty and coronary bypass surgery – Atherosclerosis – Heart attack – Heart block – ECG and Echocardiograph – Heart valves – Rheumatic Heart Disease (RHD) – ICU – Arterial and venous systems – Blood pressure - pulse rate – Heart transplantation Resuscitation in heart attack (First Aid) – Blood components Function – Plasma – Corpuscles – Blood clotting –

Anticoagulants – Thrombosis – Embolism – blood related diseases like polycythemia, Leukemia – Lymph fluid.

Physiological - Co-ordination systems – Brain – Functioning of different regions – Memory – Sleep – Stroke – Alzheimer's disease – Meningitis/Brain fever conditioned reflex – Electroencephalography – Right brain – Left brain concept – Spinal cord – Functioning – Reflex action – CSF – Chemical co-ordination – Pituitary (Hormones of Adenohypophysis and their regulations) – Thyroid, Parathyroidal hormones – Insulin and Glucagon – Hormones of Adrenal cortex and Medulla – Reproductive Hormones – Problems related to Secretion, Non secretion of Hormones.

Receptor Organs – Eye – Focussing Mechanism & photo chemistry of retina – Shortsightedness – Longsightedness – Optometry – Retinopathy – Cataract – Lens replacement – Nyctalopia – Eye infection – Conjunctivitis – Glaucoma – Eye care – EAR – Hearing mechanism – Organ of corti – Hearing impairments and aids – Noise pollution and its importance – SKIN – Melanin – functions – Effect of solar radiations/UV – Skin grafting – Dematitis – TONGUE – Gustatory reception.

Excretion – Ureotelism – Urea Biosynthesis (Ornithine Cycle) – Nephron ultrafiltration, tubular reabsorption and tubular secretion – Renal failure – Dialysis Kidney stone formation – Kidney Transplantation – Diabetes.

Reproductive system – Brief account of spermatogenesis – Oogenesis Menstrual cycle – Invitro fertilization – Birth control.

UNIT – VIII: MICROBIOLOGY

Introduction – History of Medical Microbiology – The influence of Pasteur Koch, and Lister virology, Structure, Genetics, Culture and diseases – AIDS and its control – Bacteriology – Structure, Genetics and diseases – Protozoan microbiology – Disease oriented – Pathogenicity of Micro organism – Anti microbial resistance Chemotherapy.

UNIT – IX: IMMUNOLOGY

Innate (Non-specific) Immunity – Anatomical barriers – Physiological barriers – Phagocytic barriers – Lymphoidal organs – Thymus – Bursa of Fabricius – Peripheral Lymphoid Organs – Lymph nodes – Spleen – Antibodies – Immunoglobulins – Regions of polypeptide chain – Transplantation immunology –

Classification of grafts – Genetic basis of organ transplants – Immune system disorder.

UNIT – X: MODERN GENETICS

Introduction – Scope – Human Genetics karyotyping Chromosome gene mapping, Recombinant DNA technology and segmenting.

Genetic Disease – Human Genome project – Cloning – Transgenic organisms Genetically modified organisms (GMO) – Gene therapy – Bio informatics application – DNA sequencing and protein structure. Biological database.

UNIT – XI: ENVIRONMENTAL SCIENCE

Human population and explosion – Issue – Global warming Crisis – Green House Effect – Ozone layer depletion – Waste management – Biodiversity conservation (Biosphere reserves) Governmental and Non Governmental organizations involved – Energy crisis and Environmental impact – Poverty and environment Fresh water crisis and management.

UNIT – XII: APPLIED BIOLOGY

Livestock and management – Dairy – Breeds of Cattle – Milch breed – Draught breed - Dual purpose – Common disease and control – Exotic and cross breeds – Techniques adopted in cattle breeding.

Poultry – Farming techniques – Breeds – Farming methods – Poultry diseases – Economic value.

Pisciculture Fish farming – Edible fishes of Tamilnadu.

Medical Lab Techniques – Stethoscope – Sphygmomanometer – Heamocytometer – Urine – Sugar analysis – ECG – ‘PQRST’ wave – CT scan – Endoscopic (Laprosopic) techniques – Artificial pacemaker – Auto analyser.

UNIT – XIII: THEORIES OF EVOLUTION

Lamarckism – Neolamarckism – Darwinism – NeoDarwinism/Modern concept of natural selection – Species concept – Origin of species and Isolating Mechanisms.