

THIRUVALUVAR UNIVERSITY

SYLLABUS FOR COMMON ENTRANCE TEST

BIOCHEMISTRY

UNIT – I: CHEMISTRY OF MACROMOLECULES & INTERMEDIARY METABOLISM.

Structure and functions of carbohydrates, proteins, lipids and nucleic acids – glycolysis, TCA, β - oxidation of fatty acid, urea cycle, transamination, deamination, denovo and salvage pathway for purine and pyrimidine nucleotides, electron transport chain and oxidative phosphorylation.

UNIT II: ANALYTICAL BIOCHEMISTRY.

Spectroscopy – Principle of spectroscopy, UV- Visible, NMR, IR, CD, X-Ray and Mass spectroscopy. Chromatography – Gas liquid chromatography, High pressure liquid chromatography, HPTLC, Affinity chromatography and LCMS. Molecular techniques – Blotting techniques, PCR, RAPD, RFLP. Molecular markers analysis – DNA fragmentation assay, DNA Fingerprinting and HLA typing.

UNIT III: ADVANCED ENDOCRINOLOGY, HUMAN PHYSIOLOGY AND NUTRITION:

Endocrine glands, basic mechanism of hormones. Hormones and disease. Cardiovascular system – structure and functions of heart, ECG, Cardiac cycle, Blood pressure. Respiratory system – anatomy of lungs and exchange of gases. Nervous system – structure of neuron and transmission of nerve impulses. Structure of muscle and muscle contraction. Excretory system – structure and functions of kidney, nephron , mechanism of urine formation. Regulation of water balance, blood volume, blood pressure and electrolytes.

UNIT IV: BIOTECHNOLOGY AND MOLECULAR BIOLOGY:

Recombinant technology, generation of genomic and c-DNA libraries in plasmid, BAC and YAC Vector. Methods of genetic transfer, transgenic animals and plants, molecular approaches to

diagnosis, genomics and its applications to health and agriculture including gene therapy, microbial fermentation and production of ethanol, citric acid and streptomycin.

Expression of genetic information, prokaryotic and eukaryotic replication mechanism and its regulation, operon concept, transcription – mechanism of transcription in prokaryotes and eukaryotes and its regulation. Genetic code. Post transcriptional modification, mechanism of translation and its control, post translational modification.

UNIT V: IMMUNOLOGY AND MICROBIOLOGY:

Structure of lymphoid organs, immunoglobulins, types of immunity and human cells. Generation of antibody diversity, Monoclonal antibody, MHC Molecule, Hypersensitivity, autoimmune disease, immune deficiency disorders – SCID and AIDS. Immunological techniques – RIA, ELISA and complement fixation test, fluorescence immune assay.

Microbial metabolism – photosynthesis in microbes, Calvin cycle, sulphur, nitrogen cycle, methods in microbial identification, pure culture technique, isolation of chemoautotrophs, heterotrophs and photosynthetic microbes. Structure of virus and bacteria. Lytic cycle and lysogeny.

UNIT VI: RESEARCH METHODOLOGY.

Collection, classification and tabulation of data. Importance and need of research, formulation of hypothesis, Standard deviation, Student T-test, Chi-Square test, level of significance of ANOVA, Database search – FASTA, BLAST and Clustal. Ethics in animal experimentation. CPCSEA Guidelines. Designing of research work, components of research. Patenting organism, ethical issue in human gene therapy and human cloning.

UNIT VII: ADVANCED CLINICAL BIOCHEMISTRY.

Disorders of carbohydrate and lipid metabolism – Diabetes mellitus, glycogen storage disease, lipoprotein abnormalities, fatty liver, disorders of protein metabolism – inborn errors of metabolism, marker enzymes, tumour markers, liver function test, kidney function test, gastric function test. Antioxidant and free radical scavengers, cancer biology.

UNIT VIII: CELL DYNAMICS AND ENVIRONMENTAL BIOLOGY.

Origin of unicellular and multicellular organism, prokaryotic and eukaryotic cell architecture, cell wall, plasma membrane, structure and functions of cell organelles- Vacuoles, Mitochondria, plastids, golgi apparatus, endoplasmic reticulum, peroxisomes and glyoxysomes. Cell cycle, regulation of cell cycle, protein secretion and targeting, cell division, growth and differentiation.

Environment – physical environment, biotic and abiotic environment. Concept of habitat and niche, population ecology – characteristic of population, population growth curve, paleontology and evolutionary history – evolutionary timescale, eras, periods and epoch.

UNIT IX: ADVANCED ENZYMOLOGY.

Enzymes, structure conformation, classification, assay, isolation, purification and characterization, enzyme kinetics, catalysis specificity, mechanism of action, active site, regulation of enzyme activity, multi enzyme complexes, immobilized enzymes and protein engineering, immobilized enzymes and their applications. Industrial application of enzymes.

UNIT X: HERBAL TECHNOLOGY.

Indian system of Medicine – Siddha, Ayurvedha and Unani system, Classification of crude drugs. Geographical source, collection and processing for market and commerce in crude drugs, biomedical importance of medicinal plants. Drugs acting on cardiac diseases, cerebral diseases, nasal diseases, nervous system, urogenital diseases. Psychoactive plants. Drug adulteration, food processing and packaging, herbal sale, export of medicinal plants.