HARIMOHAN GHOSE COLLEGE
DEPRTMANT OF PHYSIOLOGY
LESSON PLAN PHYA CBCS (ACADEMIC YEAR 2021-22)

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-1	Follow the latest notification of CU	(CC1) TH	**Cellular Basis of Physiology** **Cell Structure and function-** Electron microscopic structure and functions of Nucleus, endoplasmic reticulum, ribosomes, Golgi bodies, mitochondria, lysosomes, peroxisomes, cytoskeletal elements, centrosomes and plasma membrane. **Intercellular communication**-Basic idea of tight junctions, gap junctions, adherent junctions, desmosomes and cell adhesion molecules. Extra cellular matrix components.	AB	4
				Cellular transport- Passive and active transport. Ion channels, ionophores.	SS	
				Genetics **Chromosome Structure-** Morphology. Chromosomal DNA packaging-nucleosomes and higher level of organization of chromatin. Euchromatin and heterochromatin. Human genome and its characteristics. Mitochondrial DNA. Epistasis, Penetrance, Expressivity, Pleiotropism. Karyotyping. **Cell cycle-** Events and regulatory role of cyclin. Cell division- Mitosis & Meiosis phases and their significance. Crossing-over, Linkage.	SS	

				Enzymes- Classification-EC nomenclature, Concept of apoenzyme, holoenzyme, coenzyme, cofactors and prosthetic group. Mechanism of enzymes. Concept of initial rate, maximum velocity and steady-state kinetics. Michaelis constant, Michaelis-Menten equation, Graphical representation of hyperbolic kinetics- Lineweaver-Burk plot. Significance of Km and Vmax. Factors influencing enzyme-catalyzed reactions: substrate concentration, enzyme concentration, pH, temperature. Competitive, noncompetitive and uncompetitive inhibitions. Regulation of enzyme activities-covalent modifications, allosteric modifications: K- and M- series. Feed-back inhibition. Rate limiting enzymes. Isozymes, Ribozymes and Abzymes.	DB	

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2021-22	Sem-1	Follow the latest notification of CU	(CC1)P	Study of various stages of meiosis from grasshopper testis Cell viability study by Trypan blue staining.	SS	2
				Osmotic fragility test of goat blood R.B.C	DB	
				Staining of adipose tissue using Sudan III or IV	SS	

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2021-22	Sem-1	Follow the latest notification of CU	(CC2) TH	**Biophysical Principles** **Diffusion:** characteristics, factors influencing and physiological applications. **Osmosis:** Osmotic pressure – laws, determination – freezing point depression method and physiological applications. **Surface tension & viscosity:** Physiological applications. **pH& Buffer:** Henderson Hasselbalch- equation (quantitative problems). Determination of pH. **Colloids:** Classification, properties – optical, electrical, electrokinetic. Physiological importance of colloids. **Gibbs-Donnan membrane equilibrium**.	AC	4
				Thermodynamics: Type of surroundings and systems. First Law– Internal energy, enthalpy. Second Law – Entropy, Free energy change, Endergonic and Exergonic reactions, Reversible and Irreversible processes, Equilibrium constant. Physiological steady-state, Living body as a thermodynamic system	AC	
				Instruments: Principles of construction, uses and advantages and disadvantages: Compound microscope, Phase contrast microscope, Fluorescence microscope, polarizing microscope, Confocal microscopy, Transmission and Scanning electron microscope. Photoelectric colorimeter, Spectrophotometer and pH meter.	SS	
				Carbohydrates: Definition and classification. *Monosaccharides*- Classification, structure, stereoisomerism, optical isomerism, optical activity, epimerism. Cyclic structures- Pyranose and furanose forms, anomerism, mutarotation and its mechanism. Chemical reactions of monosaccharides (Glucose & Fructose): Reactions with concentrated mineral acids, alkali, phenyl hydrazine and their biochemical importance. Derivatives of monosaccharides- Amino sugars, deoxy sugars, sugar alcohols, sugar acids, sugar esters, their biochemical and physiological importance.	ZZ	
				Disaccharides- Maltose, Lactose and Sucrose: Structure, Occurrence and Physiological importance. *Polysaccharides*- Starch, Glycogen, Dextrin, Cellulose, Glycosaminoglycans, Glycoproteins, Sialic acids.	DB	

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2021-22	Sem-1	Follow the latest notification of CU	(CC2) TH	**Lipids:** Definition and classification. Fatty acids - Classification, systemic nomenclature and structure. Mono-, Di- and Triglycerides. Properties of Fat and Fatty acids Hydrolysis, Saponification number, Iodine number, Acetyl number, Acid number, Reichert-Meissl number. Cis-trans isomerism. Eicosanoids, Phospholipids, Glycolipids, Sphingolipids, Cholesterol & its ester- their structure and physiological importance. Lipoproteins - Structure and classification.	AB	4
				Amino acids: Classification, Structure, Nomenclature and Optical properties. Protonic equilibria of amino acids – Zwitterions, Isoelectric point, titration curve of amino acids. Reactions with ninhydrin and formaldehyde. **Peptides and Proteins:** Structure and properties of peptide bonds – Phiand Psi angles. Reactions with Sanger's and Edman's reagent. Biuretreaction. Different levels of protein structure -- Primary, Secondary (α-helixand β-pleated sheet), Tertiary and Quarternary. Forces stabilizing the structures. Denaturation and Renaturation.	AS	
				Purine& Pyrimidine: Structure, nomenclature and tautomerism. **Nucleic acids:** Nucleosides and Nucleotides- structure. Polynucleotides. DNA doublehelix- Primary, Secondary and Tertiary structure. A-DNA, B-DNA and Z-DNA. RNA -Structure and types. Denaturation and annealing of DNA. Hyperchromicity, melting temperature and half Cot value.	SS	

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2021-22	Sem-1	Follow the latest notification of CU	(CC2)P	**Qualitative tests for the identification of physiologically important substances:** Hydrochloric acid, Lactic Acid, Uric Acid, Albumin, Gelatin, Peptone, Starch, Dextrin, Glucose, Fructose, Lactose, Sucrose, Urea, Acetone, Glycerol and Bile salts	DB	2
				Preparation Of Buffer and pH measurement	DB	

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2021-22	Sem-2	Follow the latest notification of CU	(CC3) TH	**Cell Signalling:** Cell surface receptor proteins – ion channel coupled, G-protein coupled and enzyme-coupled. Intracellular messengers – cAMP, cGMP, IP3, DAG, Protein kinases, Ca^{2+},CO,NO. Signal transduction pathways: Phosphatidyl inositides, MAP kinase, JAK-STAT, SMAD.	SS	4
				Nerve: Structure, classification and functions of neurons and neuroglia. Cytoskeletal elements and axoplasmic flow. Myelinogenesis. The resting membrane potential. The action potential. Electrotonic potentials. Current of injury. Propagation of nerve impulse indifferent types of nerve fibers. Compound action potentials. Properties of nerve Fibers: excitability, conductivity, all or none law, accommodation, adaptation, summation, refractory period, indefatigability. Chronaxie, rheobase and utilization time. Synapses: types, structure, synaptic transmission of the impulse, synaptic potentials neurotransmitters, co-transmitters, neuromodulators. The neuromuscular junction: structure, transmission, end-plate potential, MEPP, post-tetanic potentiation. Motor unit. Motor point. Injury to peripheral nerves – degeneration and regeneration in nerve Fiber, changes in the nerve cell body, trans neuronal degeneration, changes in receptors and motor end-plates, denervation hypersensitivity. Thermal changes of nerve during activity. Nerve growth factors.	ZZ	
				Muscle: Microscopic and electron microscopic structure of skeletal, smooth and cardiac muscles. The sarco tubular system. Red and white striated muscle fibers. Single-unit and multi-unit smooth muscle. Muscle groups: antagonists and agonists. Properties of skeletal muscle: excitability, contractility, all or none law, summation of stimuli, summation of contractions, effects of repeated stimuli, genesis of tetanus, onset of fatigue, refractory period, tonicity, conductivity, extensibility and elasticity. Optimal load, optimal length of fibers. Muscle proteins. Mechanism of skeletal and smooth muscle contraction and relaxation: Excitation-contraction coupling. Dihydropyridine receptors & Ryanodine receptors. Mechanical components of muscle. Isometric and isotonic contractions – muscle length, tension and velocity relationships. Chemical, thermal and electrical changes in skeletal muscle during contraction and relaxation. Electromyography.	DB	

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2021-22	Sem-2	Follow the latest notification of CU	(CC3)P	Staining of isolated nerve fibre by silver nitrate method	SS	2
				Staining of skeletal & cardiac muscle by methylene blue		
				Staining of collagen in tissue sections		

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2021-22	Sem-2	Follow the latest notification of CU	(CC4) TH	**The Nervous System** Structural organization of different parts of brain and spinal cord. Reflex action – definition, reflex arc, classification and properties. **Autonomic nervous system:** organization, outflow, ganglia, centers and functions. Chemical transmission in autonomic nervous systems. **CSF:** Formation, circulation and functions. Blood-CSF and Blood-Brain barrier. **Ascending and descending tracts:** origin, courses, termination and functions. **Functions of the spinal cord** with special reference to functional changes following hemi-section and complete section of spinal cord. Pain production, perception and regulation. Referred pain.	ZZ	4
				Muscle spindle and Golgi tendon organ: their structure, innervations and functions, postural reflexes. Decorticate, decerebrate rigidity and spinal animal. **Brain:** Structure, nerve connections and functions of brainstem, cerebellum, reticular formation, hypothalamus, thalamus, basal nuclei and cerebral cortex- Speech and aphasia. Structure and functions of vestibular apparatus. **Limbic system:** Structure, connections and functions. .Physiology of sleep, learning, memory, and emotion. Cerebral circulation & stroke. Principles, uses, advantages and disadvantages of CT scan, MRI and PET scan	AB	
				Molecular neurobiology: General concept of ionotropic and metabotropic receptors. Structure, sub-types and functions of nicotinic and muscarinic acetylcholine receptors, adrenoceptors, glutamate receptors (NMDA and AMPA receptors), GABA, opiate, serotonin, dopamine and histamine receptors.	SS	

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2021-22	Sem-2	Follow the latest notification of CU	(CC4) P	Study and use of Kymograph, induction coil, key, Gastrocnemius-sciatic nerve preparation and kymographic recording of isotonic muscle twitch, effects of two successive stimuli and load (afterload) on muscle twitch.	DB	2

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2021-22	Sem-3	Follow the latest notification of CU	(CC5) TH	**Bone marrow:** Formed elements of blood–origin, formation, functions and fate. **Plasma proteins** Origin and functions. **Erythropoiesis** Role of erythropoietin and leucopoiesis. **Haemoglobin:** Structure, reactions, biosynthesis and catabolism. Foetal haemoglobin. Abnormal haemoglobins- Sickle-cell anemia and Thalassemia. **Blood volume:** Regulation and determination by dye and radioisotope methods.	ZZ	4
				Hemostasis: Factors, mechanism, anticoagulants, procoagulants. Disorders of hemostasis- Hemophilia, Thrombosis and Embolism. **Blood group:** ABO and Rh systems (Chemical nature of relevant biomolecules).Erythroblastosis foetalis. Blood transfusion and its hazards.	DB	
				Lymph and tissue fluids: Formation, circulation, functions and fate. **Lymphatic organs:** Histological structures and functions of lymph gland and spleen. Splenomegaly causes and effects. **Circulatory disorder:** Oedema**.**	SS	

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2021-22	Sem-3	Follow the latest notification of CU	(CC5) P	**Haematological experiments:** Preparation and staining of blood film with Leishman's stain. Identification of blood cells. Total count of W.B.C and R.B.C. Differential count of W.B.C. Haemoglobin estimation by Sahli's hemoglobinometer. Preparation of haemin crystals. Preparation and staining of bone marrow. Measurement of diameter of megakaryocytes. Reticulocyte staining.	SS	2

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2021-22	Sem-3	Follow the latest notification of CU	(CC6) TH	**Cardiovascular System** Anatomy of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Heart Block. **Cardiac cycle:** Pressure and volume changes. Heart sounds. Murmurs. **Cardiac output:** Measurement by application of Fick's principle & factors affecting. Starling's law of heart. **The pulse:** Arterial and venous. Hemodynamics of blood flow. Cardiac and vasomotor centers, baroreceptors and chemoreceptors, innervation of the heart and blood vessels, cardiac and vasomotor reflexes. Cardiovascular homeostasis – neural and chemical control of cardiac functions and blood vessels. Atherosclerosis. Coronary Circulation. **Blood pressure:** Its measurement and factors affecting. Cardiovascular adjustment after haemorrhage.	AS	4
				Electrocardiography: The normal electrocardiogram, electrocardiographic leads, vectorial analysis, the vectorcardiogram and the mean electrical axis of heart. The His bundle electrogram. Principles of Echocardiography. Cardiac Arrhythmias &.Myocardial Infarctions.	AB	

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2021-22	Sem-3	Follow the latest notification of CU	(CC6) P	**Cardiovascular Physiology Experiments:** Determination of Blood pressure by Auscultatory Method. Determination of mean pressure, pulse pressure and pulse rate. Preparation of Amphibian Ringer Solution. Interpretation of Kymographic recording of the movements of perfused heart of toad and the effects of acetylcholine and adrenaline on the contraction of heart. ECG.	AS	2

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2021-22	Sem-3	Follow the latest notification of CU	(CC7) TH	**Anatomy and histology** of the lung and airways. **Mechanics of breathing:** Role of respiratory muscles, glottis. Compliance of lungs and chest wall, pressure-volume relationships, alveolar surface tension and surfactant, work of breathing. **Spirometry:** Lung volumes and capacities. Dead space.	AB	4
				Pulmonary Circulation: Ventilation- perfusion ratio. **Transport of gases in body:** Partial pressure and composition of normal atmospheric gases in inspired, expired, alveolar airs and blood. Oxygen dissociation curve of hemoglobin and myoglobin- factors affecting. Carbon dioxide dissociation curve. Regulation of respiration- neural and chemical, respiratory centers, chemoreceptors, baroreceptors, pulmonary receptors. **Disorders of Breathing:** Hypoxia-Types& effects. Asphyxia, Voluntary hyperpnoea, Apnoea, Cyanosis, Periodic breathing, Asthma, Emphysema. Non-respiratory functions of lung.	AC	

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2021-22	Sem-3	Follow the latest notification of CU	(CC7) P	**Respiratory Human Experiments:** Pneumographic recording of effects of hyperventilation, breath-holding and talking. Lung function tests using Spirometry(Digital) and analysis of the results.	AC	2

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2021-22	Sem-3	Follow the latest notification of CU	SEC A	**Haematological Techniques** Blood groups - ABO and Rh. Immunological basis of identification of ABO and Rh blood groups. Biochemical basis of ABO system and Bombay phenotype. Blood transfusion -precaution and hazards. Concept of Blood Bank. Erythropoietin and thrombopoietin. Abnormal haemoglobins. thalassaemia and sickle-cell anaemia. Glycemic index, Glycated haemoglobin, C peptide C-reactive protein, Ghrehlin and Leptin in health and diseases. Definition, determination and significance of TC, DC, ESR, Arneth count, PCV,MCV,MHC, MCHC, bleeding time, clotting time and prothrombin time. Anaemia– types(definition and causes).Leucocytosis, leucopenia and leukaemia. Purpura.	ZZ & DB	2

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2021-22	Sem-4	Follow the latest notification of CU	(CC8) TH	Anatomy and histology of alimentary canal. Digestive glands – histological structures of salivary glands, pancreas, liver. Deglutition. Movements of alimentary canal and their regulations. Composition, functions and regulation of the secretion of salivary, gastric, pancreatic and intestinal juices and bile. Enterohepatic circulation. Digestion and absorption of carbohydrates, lipids, proteins and nucleic acids. Defecation. GALT. Basic concepts of Peptic Ulcer, Jaundice and Gallstones.	AC	4
				Redox potential. Mitochondrial Electron Transport Chain. Oxidative phosphorylation- inhibitors and uncouplers	ZZ	
				Carbohydrate: Glycolysis, R-L cycle. TCA cycle, Gluconeogenesis – Coricycle, Anaplerotic reactions and Amphibolic nature of TCA cycle. Pentose phosphate pathway. Glycogenesis and Glycogenolysis.	AB	
				Lipid: β-oxidation and biosynthesis of saturated and mono unsaturated fatty acids. Biosynthesis of lecithin. Biosynthesis of Cholesterol. Ketone body metabolism. (Hormonal regulation of the above-mentioned biochemical pathways not required)	ZZ	
				Amino acids: Amino acids - Amino acid pool. Deamination, transamination, amination and decarboxylation. Synthesis of Urea and Nitric oxide. Glucogenic and ketogenic amino acids. Metabolism of glycine, methionine, tryptophan and phenylalanine. **Purines and Pyrimidines:** Biosynthesis: *de novo* and salvage pathways. Catabolism. (Regulation of the above mentioned biochemical pathways/cycle not required)	AS	

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2021-22	Sem-4	Follow the latest notification of CU	(CC8)P	**Dale's Experiment:** Kymographic recording of normal movements of rat's intestine using Dale's apparatus and effects of acetylcholine and adrenaline on normal intestinal movements of rats.	SS	2
				Biochemical estimations: Quantitative estimation of amino nitrogen by Sorensen's formol titration method (percentage as well as total quantity to be done).	AS	

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2021-22	Sem-4	Follow the latest notification of CU	(CC9) TH	**DNA replication-** Meselson and Stahl Experiment, DNA Polymerases, Ligases and other regulatory proteins. **Transcription**- RNA Polymerase and other regulatory mechanism in prokaryotes. **Genetic code**- properties and wobble hypothesis. **Translation**- codon-anticodon interaction and mechanism in prokaryotes. **Regulation of gene expression**- operon concept – the lac operon. Gene mutation – agents and types. DNA repairing processes. Concept of oncogenes and properties of cancer cells. Recombinant DNA technology in brief and its applications – gene therapy, transgenic animal.	SS	4
				Methodologies: Chromatography: Principles and uses of: TLC, Gel filtration, Affinity chromatography, ion-exchange chromatography. Electrophoresis: Principles and method, uses of Agarose gel electrophoresis, SDS – PAGE. Ultracentrifugation: moving boundary and density gradient ultracentrifugation. Radioactivity – Classification and properties. Their use– radio-labelling of biomolecules and its detection by autoradiography. Principles of RIA, ELISA. Western, Northern and Southern blotting techniques. Polymerase chain reaction-basic concept.	AB	

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2021-22	Sem-4	Follow the latest notification of CU	(CC9)P	**Biochemical estimations:** 1.Colorimetric methods- i) Estimation of serum protein by Lowry method and serum albumin by Bromocresol green dye method and calculation of A/G ratio. ii) Estimation of blood glucose by Folin–Wu method. (iii) Estimation of serum urea by DAM method. 2.Paper chromatography.	AB	2

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2021-22	Sem-4	Follow the latest notification of CU	(CC10) TH	**Vitamins:** Thiamin, Riboflavin, Niacin, Pyridoxine, Pantothenic Acid, Biotin, Cyanocobalamin, Folic Acid, Ascorbic Acid, Inositol. Vitamins A, D, E and K Dietary sources, daily requirements, biochemical functions, deficiency symptoms, hypervitaminosis, antivitamins. **Minerals:** Sources, biological functions of sodium, potassium, calcium, phosphorus, iron, zinc, iodine and fluoride. **SDA, RQ and BMR:** Factors affecting. Determination of BMR. Fuel Values of Food. Body calorie requirements – adult consumption unit. Dietary requirements of carbohydrate, protein, lipid and other nutrients. Balanced diet and principles of formulation of balanced diets for adult man, adult woman, lactating woman and pregnant women. Nitrogen balance. Proteinsparers. Supplementary value of proteins. Biological value of proteins.Net protein utilization. Protein efficiency ratio. Dietary fibers.	DB	4

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2021-22	Sem-4	Follow the latest notification of CU	(CC10) P	Composition and nutritional value of common foodstuff.	AS	2
				Diet survey report of a family as per ICMR specification.	AC	
				Qualitative analysis of milk, potato, flour, rice, pulses.	SS	

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2021-22	Sem-4	Follow the latest notification of CU	SEC-B	Definition, examples and health hazards of food additives/adulterants. Tests for identifying Food Adulterants in food samples and their pathophysiological effects: Metanil yellow, Rhodamin B, Saccharin, Monosodium glutamate, Aluminium foil, Chicory, Bisphenol A and Bisphenol S, Margarine, Lead, Arsenic, Mercury, Polychlorinated Biphenyls, Dioxin and Urea. Concept of Xenobiotics- Types, sources and fate. Types of reactions in detoxification and their mechanisms- oxidation, reduction, hydrolysis and conjugation.	SS	2

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2021-22	Sem-5	Follow the latest notification of CU	(CC11) TH	Characteristics of special senses, Sensory Coding -- Weber-Fechner law, Steven's power law. **Vision:** Structure of eyeball. Histological details of retina, peripheral retina, fovea and blind spot. Retinal detachment. Visual pathway and centers. Effects of lesion in visual pathway. Mechanism of accommodation. Errors of refraction and their corrections. Formation and Circulation of Aqueous Humour. Cataract and Glaucoma. Photopic and scotopic vision. Chemical and electrical changes in retina on exposure to light. Visual processing in the retina. Positive and negative after- images. Contrast phenomenon. Light and dark adaptation. Colour vision—Trichromatic, Single and Double Opponent mechanism. Colour blindness. Visual field-- perimetry. Visual acuity- measurement, mechanism and factors affecting. Critical fusion frequency-Ferry-Porter law.	AS	4
				Hearing: Structure and functional significance of auditory apparatus. Organ of Corti. Auditory pathways and centers. Mechanism of hearing – Excitation ofHair Cells, Conversion of Sound Waves into Action Potentials in the Auditory Nerve. Mechanism of discrimination of sound frequencies and intensities. Localization of sound source. Deafness. **Olfaction and Gustation:** Structure and functions of the receptor organs, nerve pathways, Centers. Signal Transduction of olfactory and gustatory stimuli. Olfactory and Gustatory Coding. Abnormalities of olfactory and taste sensation.	AB	

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2021-22	Sem-5	Follow the latest notification of CU	(CC11)P	Determination of Visual Acuity by Snellen's Chart Determination of Colour Blindness by Ishihara Chart. Determination of Deafness by Tuning Fork Tests. Silver nitrate preparation of corneal cell space.	AS	2
				Study and identification of stained sections of different mammalian tissues and organs: Cardiac muscle, Skeletal muscle, Smooth muscle, Trachea, Lung, Hyaline cartilage, Artery, Vein, Cerebellum, Cerebral cortex, Spinal cord,	AC	

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2021-22	Sem-5	Follow the latest notification of CU	(CC12) TH	**Hypothalamus** as a neuroendocrine organ. Anterior and posterior pituitary- histological structure of the gland. Chemical nature, molecular mechanism of action, functions and regulation of secretion of their hormones. Hypo and hyperactive states of the gland. **Pineal gland-** Histological structure. Chemical nature, biosynthesis, molecular mechanism of action, functions and regulation of secretion of melatonin. **Thyroid and Parathyroid-** Histological structure of the glands. Chemical nature, molecular mechanism of action, functions and regulation of secretion of the hormones. Hypo- and hyperactive states of the glands. **Adrenal cortex and medulla-** Histological structure of the gland. Chemical nature, molecular mechanism of action, functions and regulation of secretion of the hormones. Biosynthesis of catecholamines. Hypo- and hyperactive states of the gland. **Heart** as an endocrine organ. **Pancreatic islets-** Histological structure. Chemical nature, molecular mechanism of action, functions and regulation of secretion of the hormones. Hormonal control of blood sugar. Hyperinsulinism and diabetes mellitus. **Gastro-intestinal hormones-** Chemical nature, molecular mechanism olfaction, functions and regulation of secretion of the hormones.	AC & DB	4

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2021-22	Sem-5	Follow the latest notification of CU	(CC12)P	1. PAS staining of Liver sections 2.Study and identification of stained sections of different mammalian tissues and organs: Parotid gland, Submaxillary gland, Sublingual gland,Tongue, Oesophagus, Stomach, Duodenum, Jejunum, Ileum, Large intestine and Liver.	AC	2

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2021-22	Sem-5	Follow the latest notification of CU	DSE-A2TH	**Classification of microorganisms:** Techniques employed for the identification of microorganisms- microscopic and biochemical methods. **Control of microbial growth:** Physical and Chemical methods used in sterilization, disinfection and pasteurization. **Bacteriology:** Bacterial classification based on staining techniques(Gram stain and Acid-fast stain) and morphological aspect. Bacterial structure: cell-wall, LPS layer, pili, flagella, chromosome, plasmid, spores and cysts. **Culture of bacteria:** Nutritional requirement- complex and synthetic media, preparation of media; physical factors required for growth (temperature, pH and gaseous requirement); bacterial growth curve: different phases and their significance; quantitative estimation of bacterial growth; continuous growth culture and its utility. **Food microbiology:** Beneficial and harmful microorganisms in food, causative organisms of food-borne infections- mode of transmission and methods of prevention.	AS	4
				Bacterial metabolism: Fermentation, Glyoxalate cycle and Entner-Doudoroff pathway. **Bacterial genetics:** Transformation, conjugation and transduction. **Treatment of bacterial infection: C**hemotherapeutic agents. antibiotics- definition, bactericidal and bacteriostatic and their mechanism of action. **Virology:** Viral structure- virion, prion and bacteriophages; classification of viruses based on nucleic acid composition and hostsystem, replication of bacteriophages- lytic and lysogenic cycle. **Overview of innate and acquired immunity:** Elements of acquired immunity: Characteristics of immune response, cells and organs involved in immune response. **Immunogens and antigens:** Requirements of immunogenicity, epitopes recognized by B- & T- cells, haptens, adjuvants, cross-reactivity. Antibody structure, classification and functions. **Kinetics of antibody responses:** Primary & secondary. Antigen – antibody interactions - Primary interaction: association constant, affinity & avidity. Secondary interaction: precipitation & agglutination. B-cell receptor. **MHC molecules:** structure of class I and II molecules, brief idea of peptide binding by MHC molecules, cellular distribution. **Antigen processing and presentation:** T-cell receptor. T-cell maturation and differentiation - thymic selection in brief. B-cell activation &differentiation: thymus dependent and independent antibodies, T-B co-operation, the carrier effect. **Cytokines:** Produced by TH1 & TH2 cells, regulating specific immune response only. **Complement:** Activation components – classical, alternative and lectin. Biological consequence of complement activation. Cell-mediated effector responses: CTLS, NK cells, K cells. Brief idea of autoimmunity, cancer immunotherapy and AIDS. Hypersensitivity reactions and their types **Vaccination:** Passive and active immunization, types and uses of vaccine. **Toxins and toxoids. Hybridoma technology**	SS	

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2021-22	Sem-5	Follow the latest notification of CU	DSE-A2P	1. Gram staining of bacteria and identification of Gram positive and Gram negative bacteria. 2. Determination of human blood group using immunological method.	AS	2
				3. Quantitation of antigen or antibody by precipitin test. 4. Isolation and staining of splenocytes. 5. Lactophenol cotton blue staining of yeast cells.	SS	

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2021-22	Sem-5	Follow the latest notification of CU	DSE-B1TH	**Introduction to work physiology:** Definitions in work and exercise Physiology, Fundamental concepts of work; work characteristics, work cycle and work pauses Different categories of work, Different approaches to describe work and work load. **Physiological basis of work:** Physiology of muscle action, Physical work load; Static and dynamic work, Physiological responses to static and dynamic work, Relationship between oxygen consumption and heart rate, Effect of heat stress on physiological responses to work load. **Work load assessment:** Physiological assessment of work load, work load classification, cardiovascular and respiratory indices for evaluating work load. acceptable work load. **Work Organization:** Fundamental concept of work organization, Principles of reducing stress from physical work load.	AB	4
				Exercise and Physical fitness: Exercise, physical activity and physical fitness. Benefits of exercise Components of fitness and their evaluation. **Physical Working Capacity:** Concept of maximal physical working capacity VO2max. and its estimation by different methods. Factors affecting VO2max. Step test, bicycle ergometry and treadmill exercise for assessment of Physical working capacity. **Bioenergetics:** Work power and energy, sources of energy. Aerobic and anaerobic capacity, EPOC, lactate threshold and lactate tolerance and their limitations. Determination of energy cost by direct and indirect methods, Athletic performance based on aerobic capacity and O_2 debt **Training Principles:** Training principles, different training methods. Training principles for different sports activities. Over training and detraining and their physiological effects. Ergogenic aids. **Body composition:** Determination of Physical growth status. Methodologies for body composition analysis.	AC	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-5	Follow the latest notification of CU	DSE-B1P	1.Determination of BMI, BSA, PI, waist hip ratio, body fat percentage and body type 2.Determination of VO2max by Queen's College Test and physical fitness by modified Harvard step test 3.Determination of agility, flexibility and anaerobic power by shuttle run, sit and reachand vertical jump test 4.Recording of heart rate and blood pressure during static and dynamic work, determination of workload from heart rate and cardiac indices and classification of work load.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	(CC13) TH	**Reproductive Physiology:** Primary and accessory sex organs and secondary sex characters. Histology of testis. Endocrine functions of testis. Spermatogenesis. Hypothalamic control of testicular functions. Histology of ovary. Ovarian hormones and their functions. Oogenesis and ovulation. Formation and functions of corpus luteum. Hypothalamic control of ovarian functions. Physiology of puberty. Menstrual cycle and its regulation. Abnormalities in menstrual cycle. Onset of menopause and postmenopausal changes. Structure and functions of placenta. Maintenance of pregnancy and the bodily changes during pregnancy. Parturition. Pregnancy tests. Development of mammary glands, lactation and their hormonal control.	AC	4
				Developmental Biology **Stem cell:** Characteristics and applications. Totipotency, Differentiation. **Ultrastructure:** Sperm and Ovum. **Fertilization, Blastulation, Implantation, Gastrulation**(Concept of induction, determination and differentiation). **Organogenesis:** Development of Heart, urinary system and genital system. **Fetal Circulation.**	AB	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	(CC13) P	1. Study and identification of stained sections of different mammalian tissues and organs: Kidney, Ureter, Skin, Uterus, Testis, Ovary, Thyroid gland, Pancreas, Spleen, Lymph gland. 2. Pregnancy Test by immunological method using kit. 3.Silver nitrate preparation of urinary bladder for study of cell spaces.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	(CC14) TH	**Kidney:**Anatomy of kidney. Histology of nephron. Renal circulation –peculiarities and autoregulation. Formation of urine – glomerular function and tubular functions. Counter-current multiplier and exchanger. Renal regulation of osmolarity and volume of blood fluids. Diabetes insipidus. Formation of hypertonic urine. Renal regulation of acid-base balance, acidification of urine. Renal function tests – creatinine, inulin, urea, and PAH clearance tests. Physiology of urinary bladder and micturition. Constituents of urine. Abnormal constituents of urine, and pathophysiological significance. Renal dialysis. Non-excretory functions of kidney.	AC	4
				Skin and Body Temperature Regulation: Structure and functions of skin. Cutaneous circulation. Sweat glands- structure and composition of sweat. Mechanism of sweat formation, secretion and its regulation. Insensible perspiration. Regulation of body temperature in homeotherms- its physical and physiological processes, roles of neural and hormonal processes. Pyrexia, hyperthermia and hypothermia.	SS	
				Environmental Pollutants and Human Health: Sources and effects of Chlorinated hydrocarbons, Organophosphorus, Organocarbamates, Lead, Arsenic, Fluorine, Aluminium, Ionizing and non-ionizing radiations.	ZZ	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	(CC14) P	1.Identification of normal and abnormal constituents of urine. 2**.** Staining and identification of histological sections of liver, adrenal gland, thyroid gland, ovary, testes, and kidney.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	DSE-A4 TH	Basic idea about community, public health issues. Malnutrition in a community, over nutrition and possible remedial measures. Diet management of obese, diabetic, hypertensive individuals and athletes. Iron and iodine deficiency. Population problem – principles and methods of family planning, Problem of infertility and Assisted	DB	4
				Reproductive Technologies. PCM- Marasmus, Kwashiorkor, Marasmic Kwashiorkor, endemic goiter, nutritional anemias, rickets, osteomalacia, xeropthalmia, beriberi and their social implications. Principles and social importance of immunization against diseases. Etiology, epidemiology and prevention- Communicable diseases: Cholera, Malaria, Swine flu, Japanese Encephalitis, Rabies, Dengue, Hepatitis and AIDS; Non-communicable diseases – Hypertension and Obesity.	ZZ	

Academic Year	Semester	Tentative Dates of University Exam	DSEA4 TH	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	DSE-A4 P	1. Calculation of Body Surface Area (using nomogram), Body Mass Index and Ponderal Index from anthropometric measurements. 2. A report (hand-written) on the basis of field survey from ONE of the followings: a) Physiological parameters of human (at least three parameters). b) Anthropometric measurements on human (at least three parameters). c) Epidemiological studies on human.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	DSE-B3 TH	Chronobiology and Stress Physiology (DSE B3TH) Different types of physiological rhythms – ultradian, circadian, infradian. Different zeitgebers and their relation with circadian clock. Hormonal biorhythms and their significance: adrenocortical, pineal and prolactin. Neural basis of biological clock and role of suprachiasmatic nuclei. Sleep-wakefulness cycle. Body temperature rhythm. Time keeping genes. Jet-lag and shift work.	AB	4
				Stress : Physical and Emotional Stressors. General Adaptation Syndrome. Role of Hypothalamic-Pituitary-Adrenal Axis and Sympathoadrenal Medullary Axes in coping stress. Effects of chronic stress: Immunological, Cardiovascular Disease, Emotional. Heat disorders and its preventive measures. Effects of hypobaric and hyperbaric environment. Caisson disease. Preventive measures for hypobaric and hyperbaric effects. Oxidative stress-Formation of Reactive Oxygen Species and the role of Catalase, Superoxide Dismutase, Glutathione. Peroxidase and Glutathione Reductase in combating oxidative stress – role of vitamins.	SS	

Academic Year	Semester	Tentative Dates of University Exam	DSEA4 TH	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	DSE-3 P	DSE3P 1.Project work on assessment of individual differences in human circadian rhythms (chronotype in human population) by questionnaire method among school children and college students. 2.Assessment of environmental heat load. 3.Assessment of noise level using noise level meter. 4.Determination of diurnal and /or circalunar rhythm of body temperature of college going students.	PM	2

HARIMOHAN GHOSE COLLEGE
DEPRTMANT OF PHYSIOLOGY
LESSON PLAN PHYG(MDC) CBCS (ACADEMIC YEAR 2021-22)

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-1	Follow the latest notification of CU	CC1 TH/ GEN 1 TH	**Cellular Basis of Physiology** Structure and functions of plasma membrane, nucleus and different cell organelles – Endoplasmic reticulum, Golgi bodies, Mitochondria, Lysosome and Peroxisome.	AB	4
				Biophysical Principles, Enzymes and Chemistry of Bio-molecules Physiological importance of the following physical processes: Diffusion, Osmosis and Surface tension. pH and Buffers – Significance in human body and maintenance of pH in the blood. Colloids - Classification and physiological importance. **Enzymes:** Classification, factors affecting enzyme action. Concept of coenzymes and isozymes.	DB	
				Carbohydrates: Definition and classification. *Monosaccharides* – Classification, structure, physiological importance. *Disaccharides* – Maltose, Lactose and Sucrose: Structure, occurrence and physiological importance. *Polysaccharides* – Starch, Glycogen, Dextrin, Cellulose.	ZZ	
				Lipids: Definition and classification. Fatty acids Classification. Definition and importance of, Saponification number and, Iodine number. Phospholipids, Cholesterol &its ester- physiological importance.	SS	
				Amino acids, Peptides and Proteins: Classification and structure. Structure of peptide bonds. **Nucleic acids:** Structure of DNA and RNA.	AS	
				Digestion & Metabolism Structure in relation to functions of alimentary canal and digestive glands. Composition, functions and regulation of secretion of digestive juices including bile. Digestion and absorption of carbohydrate, protein and lipid. Movements of the stomach and small intestine.	AC	
				Glycolysis, TCA cycle, Importance of Glycogenesis, Glycogenolysis and. Gluconeogenesis. Beta oxidation of saturated fatty acid. Importance of Ketone bodies, Deamination & Transamination. Formation of urea.	AB	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-1	Follow the latest notification of CU	CC1P/ GEN1 P	**Examination and staining of fresh tissues:** Squamous, Ciliated and Columnar Epithelium by Methylene Blue stain.	SS	2
				Qualitative tests for identification of: Glucose, Fructose, Lactose, Sucrose,Starch, Dextrin, Lactic acid, Hydrochloric acid, Albumin, Acetone, Glycerol and Bile Salts. **Quantitative estimation** of amino nitrogen by Sorensen's formol titration method (percentage to be done)	AS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-2	Follow the latest notification of CU	CC2TH/ GEN2 TH	**Blood and Body Fluids** Blood: composition and functions. Plasma proteins: origin and functions. Blood cells- their morphology and functions. Erythropoiesis. Haemoglobin: different types of compounds and derivatives. Coagulation of blood: mechanism, procoagulants, anticoagulants. Lymph and tissue fluids: composition, formation, and functions.	ZZ	4
				Cardiovascular System Anatomy and histology of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Cardiac cycle: Events. Heart sounds. Heart rate. Cardiac output: Determination by following Fick principle, factors affecting. Pulse - arterial and venous. Blood pressure and factors controlling. Baro- and chemoreceptors. Vasomotor reflexes. Peculiarities of regional circulations: coronary and cerebral.	DB	
				Respiratory System Anatomy and histology of the respiratory passage and organs. Role of respiratory muscles in breathing. Lung volumes and capacities. Exchange of respiratory gases between lung and blood and between blood and tissues. Transport of oxygen and carbon dioxide in blood. Regulation of respiration - neural and chemical. Hypoxia.	AC	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-2	Follow the latest notification of CU	CC2P/ GEN2 P	Preparation and staining of human blood film with Leishman's stain and identification of different types of blood cells. Preparation of hemin crystals.	ZZ	2
				Demonstration- kymographic recording of the un-perfused heart of toad and effects of warm and cold saline.	DB	
				1. Measurement of systolic and diastolic pressure by sphygmomanometer and determination of pulse and mean pressure. 2. Measurement of peak expiratory flow rate. 3. Pneumographic recording of normal respiratory movements and effects of Hy perventilation and breath-holding.	ZZ	

Academic Year	Semester	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-3	CC3TH/ GEN3 TH	**Nerve-muscle Physiology** Structure of neurons. Origin and propagation of nerve impulse. Velocity of impulsein different types of nerve fiber. Properties of nerve fibers: all or none law, rheobase and chronaxie, refractory period. indefatiguability. Synapses: structure, mechanism of synaptic transmission. Motor unit. Myoneural junction: structure, mechanism of impulse transmission. Degeneration and regeneration in nerve fibers. Different types of muscle and their structure. Red and white muscle. Muscular contraction: structural, mechanical and chemical changes in skeletal muscle during contraction and relaxation. Isotonic and isometric contractions. Properties of muscle: all or none law, beneficial effect, summation, refractory period, tetanus, fatigue.	AS	4
			Nervous System A brief outline of organization and basic functions (sensory, motor and association)of the nervous system, central and peripheral nervous system. Ascending tracts carrying touch, kinesthetic, temperature and pain sensations. Descending tracts: pyramidal tract and brief outline of the extra-pyramidal tracts. Reflex action - definition, reflex arc, classification, properties. Functions of the spinalcord. Outline of functions of brain stem. A brief idea of the structure, connections and functions of cerebellum. Different nuclei and functions of thalamus and hypothalamus. Cerebral cortex: histological structure and localization of functions.	AB	
			CSF: composition, formation, circulation and functions. A brief description of the organization of the autonomic (sympathetic and parasympathetic) nervous system. Functions of sympathetic and parasympathetic nervous system. A brief idea of speech, aphasia, conditioning, learning and memory.	ZZ	
			Special Senses *Olfaction and Gustation:* Structure of sensory organ, neural pathway of olfactory and gustatory sensation. Mechanism of olfactory and gustatory sensation. Olfactory and gustatory adaptation. After-taste.	AB	
			Audition: Structure of ear, auditory pathway, mechanism of hearing.	ZZ	
			Vision: Structure of the eye. Histology of retina. Visual pathway. Light reflex. Chemical changes in retina on exposure to light. Accommodation - mechanism. Errors of refraction. Light and dark adaptation. Elementary idea of colour vision and colour blindness.	AS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-3	Follow the latest notification of CU	CC3P/ GEN3 P	1. Silver Nitrate preparation of nodes of Ranvier. 2. Silver nitrate preparation of corneal cell space. 3. Examination and staining of skeletal and cardiac muscles by Methylene Blue stain. 4. Demonstration: Use of kymograph, induction coil and mercury key. Recording of simple muscle curve with sciatic-gastrocnemius muscle preparation of toad. 5. Determination of visual acuity by Snellen's chart / Landolt's C chart. 6. Determination of colour blindness by Ishihara chart. 7. Exploration of conductive and perceptive deafness by tuning fork method.	SS & AS	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-4	Follow the latest notification of CU	CC4TH/ GEN4TH	**Endocrinology** Hormones - classification. Elementary idea of mechanism of hormone action. *Hypothalamus:* Basic concept of neurohormone. Hypothalamo-hypophyseal tract and portal system. *Pituitary:* Histological structure, hormones, functions. Hypo and hyper active states of pituitary gland. *Thyroid:* Histological structure. Functions of thyroid hormones (T4T3).Thyrocalcitonin. Hypo and hyper-active states of thyroid. *Parathyroid:* Histological structure, functions of parathyroid hormone. Tetany. *Adrenal Cortex:* Histological structure and functions of different hormones. Hypo and hyper-active states of adrenal cortex. *Adrenal Medulla:* Histological structure and functions of medullary hormones. The relation of adrenal medulla with the sympathetic nervous system. *Pancreas:* Histology of islets of Langerhans. Origin and functions of pancreatic hormones. Diabetes mellitus. Brief idea of the origin and functions of renin-angiotensin, prostaglandins. erythropoietin and melatonin. Elementary idea of gastrointestinal hormone.	AC	4
				Reproductive Physiology Primary and accessory sex organs and secondary sex characters. Testis: histology, spermatogenesis, testicular hormones and their functions. Ovary: histology, oogenesis, ovarian hormones and their functions. Menstrual cycle and its hormonal control. Maintenance of pregnancy – role of hormones. Development of mammary gland and lactation - role of hormones.	AB	
				Excretory Physiology Structure and function relationship of kidney. Mechanism of formation of urine. Normal and abnormal constituents of urine. Physiology of micturition. Renal regulation of acid-base balance. Non-excretory functions of kidney. Structure and functions of skin. Insensible and sensible perspiration Regulation of body temperature- physical and physiological processes involved in it. Physiology of sweat secretion and its regulation.	AB	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-4	Follow the latest notification of CU	CC4P/GEN4P	**Study and Identification of Stained Sections of Different Mammalian Tissues and Organs:** Esophagus, Stomach, Small Intestine, Large Intestine, Liver, Lung, Trachea, Spinal cord, Cerebral cortex, Cerebellum, Thyroid Gland, Adrenal Gland, Pancreas, Spleen, Testes, Ovary, Kidney, Artery and Vein. **Identification of:** Normal constituents of urine: Chloride, Sulphate, Phosphate, Creatinine and Urea; Abnormal constituents of urine: Glucose, Protein, Acetone, Bile pigment and Bile Salt.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-4		SEC B2	Basic idea about community, public health issues. Malnutrition in a community, over nutrition and possible remedial measures. Diet management of obese, diabetic. Basic idea of PCM and their prevention. PCM- Marasmus, kwashiorkor. Endemic goiter, rickets, osteomalacia, xeropthalmia, beriberi and their social implications. Etiology, epidemiology and prevention of: Communicable diseases: Malaria, Dengue, Hepatitis and AIDS; Non-communicable diseases – Hypertension and Obesity. Population problem – principles and methods of family planning, and Assisted Reproductive Technologies. Principles of formulation of diet chart of growing children, pregnant & lactating womenand diabetic patients.	ZZ & DB	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-5	Follow the latest notification of CU	DSE-A2 TH	Blood groups - ABO and Rh. Immunological basis of identification of ABO and Rh blood groups. Biochemical basis of ABO system and Bombay phenotype. Blood transfusion - precaution and hazards. Concept of blood bank. Erythropoietin and thrombopoietin. Foetal haemoglobin. Abnormal haemoglobins- thalassaemia and sickle-cell anaemia. Definition, determination and significance of TC, DC, ESR, Arneth count, PCV, MCV, MHC, MCHC, bleeding time, clotting time and prothrombin time. Anaemia - types (definition and causes). Leucocytosis, Leucopenia and Leukaemia. Purpura. Disorders of coagulation.	ZZ	2

Academic Year	Semester	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-5	DSE-A2 P	DC of WBC, Estimation of haemoglobin, Blood group determination, Bleeding time and Clotting time.	SS	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	DSE-B2 TH	Basic constituents of food and their nutritional significance. Vitamins-Classification, functions, deficiency symptoms and daily requirements. Hypervitaminosis. Mineral metabolism – Ca, P, Fe. BMR: definition, factors affecting. Respiratory quotient: definition, factors affecting and significance. Biological value of proteins. Essential and non-essential amino acids. Nitrogen balance. SDA: definition and importance. Body calorie requirements – adult consumption unit. Dietary requirements of carbohydrate, protein, lipid and other nutrients. Dietary fibres. Principles of diet survey. Composition and nutritional value of common food stuffs.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2021-22	Sem-6	Follow the latest notification of CU	DSE-B2 P	Diet survey report (hand-written) of a family (as per ICMR specification): Each student has to submit a report on his/her own family.	ZZ	2

HARIMOHAN GHOSE COLLEGE
DEPRTMANT OF PHYSIOLOGY
LESSON PLAN PHYA CBCS (ACADEMIC YEAR 2022-23)

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-1	Follow the latest notification of CU	(CC1) TH	**Cellular Basis of Physiology** **Cell Structure and function-** Electron microscopic structure and functions of Nucleus, endoplasmic reticulum, ribosomes, Golgi bodies, mitochondria, lysosomes, peroxisomes, cytoskeletal elements, centrosomes and plasma membrane. **Intercellular communication**-Basic idea of tight junctions, gap junctions, adherent junctions, desmosomes and cell adhesion molecules. Extra cellular matrix components.	SSK	4
				Cellular transport- Passive and active transport. Ion channels, ionophores.	SS	
				Genetics **Chromosome Structure-** Morphology. Chromosomal DNA packaging-nucleosomes and higher level of organization of chromatin. Euchromatin and heterochromatin. Human genome and its characteristics. Mitochondrial DNA. Epistasis, Penetrance, Expressivity, Pleiotropism. Karyotyping. **Cell cycle-** Events and regulatory role of cyclin. Cell division- Mitosis & Meiosis phases and their significance. Crossing-over, Linkage.	SS	
				Enzymes- Classification-EC nomenclature, Concept of apoenzyme, holoenzyme, coenzyme, cofactors and prosthetic group. Mechanism of enzymes. Concept of initial rate, maximum velocity and steady-state kinetics. Michaelis constant, Michaelis-Menten equation, Graphical representation of hyperbolic kinetics- Lineweaver-Burk plot. Significance of Km and Vmax. Factors influencing enzyme-catalyzed reactions: substrate concentration, enzyme concentration, pH, temperature. Competitive, noncompetitive and uncompetitive inhibitions. Regulation of enzyme activities-covalent modifications, allosteric modifications: K- and M- series. Feed-back inhibition. Rate limiting enzymes. Isozymes, Ribozymes and Abzymes.	DB	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-1	Follow the latest notification of CU	(CC1)P	Study of various stages of meiosis from grasshopper testis Cell viability study by Trypan blue staining.	SS	2
				Osmotic fragility test of goat blood R.B.C	DB	
				Staining of adipose tissue using Sudan III or IV	SS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-1	Follow the latest notification of CU	(CC2) TH	**Biophysical Principles** **Diffusion:** characteristics, factors influencing and physiological applications. **Osmosis:** Osmotic pressure – laws, determination – freezing point depression method and physiological applications. **Surface tension & viscosity:** Physiological applications. **pH& Buffer:** Henderson Hasselbalch- equation (quantitative problems). Determination of pH. **Colloids:** Classification, properties – optical, electrical, electrokinetic. Physiological importance of colloids. **Gibbs-Donnan membrane equilibrium**.	AC	4
				Thermodynamics: Type of surroundings and systems. First Law– Internal energy, enthalpy. Second Law – Entropy, Free energy change, Endergonic and Exergonic reactions, Reversible and Irreversible processes, Equilibrium constant. Physiological steady-state, Living body as a thermodynamic system	AC	
				Instruments: Principles of construction, uses and advantages and disadvantages: Compound microscope, Phase contrast microscope, Fluorescence microscope, polarizing microscope, Confocal microscopy, Transmission and Scanning electron microscope. Photoelectric colorimeter, Spectrophotometer and pH meter.	SS	
				Carbohydrates: Definition and classification. *Monosaccharides*- Classification, structure, stereoisomerism, optical isomerism, optical activity, epimerism. Cyclic structures- Pyranose and furanose forms, anomerism, mutarotation and its mechanism. Chemical reactions of monosaccharides (Glucose & Fructose): Reactions with concentrated mineral acids, alkali, phenyl hydrazine and their biochemical importance. Derivatives of monosaccharides- Amino sugars, deoxy sugars, sugar alcohols, sugar acids, sugar esters, their biochemical and physiological importance.	ZZ	
				Disaccharides- Maltose, Lactose and Sucrose: Structure, Occurrence and Physiological importance. *Polysaccharides*- Starch, Glycogen, Dextrin, Cellulose, Glycosaminoglycans, Glycoproteins, Sialic acids.	DB	

Academic Year	Semester	**Tentative Dates of University Exam**	**Course Code**	**Brief Description of the Topics**	**Teachers Assigned**	No. of Credits
2022-23	Sem-1	Follow the latest notification of CU	(CC2) TH	**Lipids:** Definition and classification. Fatty acids - Classification, systemic nomenclature and structure. Mono-, Di- and Triglycerides. Properties of Fat and Fatty acids Hydrolysis, Saponification number, Iodine number, Acetyl number, Acid number, Reichert-Meissl number. Cis-trans isomerism. Eicosanoids, Phospholipids, Glycolipids, Sphingolipids, Cholesterol & its ester- their structure and physiological importance. Lipoproteins - Structure and classification.	SSK	4
				Amino acids: Classification, Structure, Nomenclature and Optical properties. Protonic equilibria of amino acids – Zwitterions, Isoelectric point, titration curve of amino acids. Reactions with ninhydrin and formaldehyde. **Peptides and Proteins:** Structure and properties of peptide bonds – Phiand Psi angles. Reactions with Sanger's and Edman's reagent. Biuretreaction. Different levels of protein structure -- Primary, Secondary (α-helixand β-pleated sheet), Tertiary and Quarternary. Forces stabilizing the structures. Denaturation and Renaturation.	AS	
				Purine& Pyrimidine: Structure, nomenclature and tautomerism. **Nucleic acids:** Nucleosides and Nucleotides- structure. Polynucleotides. DNA doublehelix- Primary, Secondary and Tertiary structure. A-DNA, B-DNA and Z-DNA. RNA -Structure and types. Denaturation and annealing of DNA. Hyperchromicity, melting temperature and half Cot value.	SS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Lectures
2022-23	Sem-1	Follow the latest notification of CU	(CC2)P	**Qualitative tests for the identification of physiologically important substances:** Hydrochloric acid, Lactic Acid, Uric Acid, Albumin, Gelatin, Peptone, Starch, Dextrin, Glucose, Fructose, Lactose, Sucrose, Urea, Acetone, Glycerol and Bile salts	DB	2
				Preparation Of Buffer and pH measurement	DB	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-2	Follow the latest notification of CU	(CC3) TH	**Cell Signalling:** Cell surface receptor proteins – ion channel coupled, G-protein coupled and enzyme-coupled. Intracellular messengers – cAMP, cGMP, IP3, DAG, Protein kinases, Ca^{2+},CO,NO. Signal transduction pathways: Phosphatidyl inositides, MAP kinase, JAK-STAT, SMAD.	SS	4
				Nerve: Structure, classification and functions of neurons and neuroglia. Cytoskeletal elements and axoplasmic flow. Myelinogenesis. The resting membrane potential. The action potential. Electrotonic potentials. Current of injury. Propagation of nerve impulse indifferent types of nerve fibers. Compound action potentials. Properties of nerve Fibers: excitability, conductivity, all or none law, accommodation, adaptation, summation, refractory period, indefatigability. Chronaxie, rheobase and utilization time. Synapses: types, structure, synaptic transmission of the impulse, synaptic potentials neurotransmitters, co-transmitters, neuromodulators. The neuromuscular junction: structure, transmission, end-plate potential, MEPP, post-tetanic potentiation. Motor unit. Motor point. Injury to peripheral nerves – degeneration and regeneration in nerve Fiber, changes in the nerve cell body, trans neuronal degeneration, changes in receptors and motor end-plates, denervation hypersensitivity. Thermal changes of nerve during activity. Nerve growth factors.	ZZ	
				Muscle: Microscopic and electron microscopic structure of skeletal, smooth and cardiac muscles. The sarco tubular system. Red and white striated muscle fibers. Single-unit and multi-unit smooth muscle. Muscle groups: antagonists and agonists. Properties of skeletal muscle: excitability, contractility, all or none law, summation of stimuli, summation of contractions, effects of repeated stimuli, genesis of tetanus, onset of fatigue, refractory period, tonicity, conductivity, extensibility and elasticity. Optimal load, optimal length of fibers. Muscle proteins. Mechanism of skeletal and smooth muscle contraction and relaxation: Excitation-contraction coupling. Dihydropyridine receptors & Ryanodine receptors. Mechanical components of muscle. Isometric and isotonic contractions – muscle length, tension and velocity relationships. Chemical, thermal and electrical changes in skeletal muscle during contraction and relaxation. Electromyography.	DB	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Lectures
2022-23	Sem-2	Follow the latest notification of CU	(CC3)P	Staining of isolated nerve fibre by silver nitrate method	SS	2
				Staining of skeletal & cardiac muscle by methylene blue		
				Staining of collagen in tissue sections		

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-2	Follow the latest notification of CU	(CC4) TH	**The Nervous System** Structural organization of different parts of brain and spinal cord. Reflex action – definition, reflex arc, classification and properties. **Autonomic nervous system:** organization, outflow, ganglia, centers and functions. Chemical transmission in autonomic nervous systems. **CSF:** Formation, circulation and functions. Blood-CSF and Blood-Brain barrier. **Ascending and descending tracts:** origin, courses, termination and functions. **Functions of the spinal cord** with special reference to functional changes following hemi-section and complete section of spinal cord. Pain production, perception and regulation. Referred pain.	ZZ	4
				Muscle spindle and Golgi tendon organ: their structure, innervations and functions, postural reflexes. Decorticate, decerebrate rigidity and spinal animal. **Brain:** Structure, nerve connections and functions of brainstem, cerebellum, reticular formation, hypothalamus, thalamus, basal nuclei and cerebral cortex- Speech and aphasia. Structure and functions of vestibular apparatus. **Limbic system:** Structure, connections and functions. .Physiology of sleep, learning, memory, and emotion. Cerebral circulation & stroke. Principles, uses, advantages and disadvantages of CT scan, MRI and PET scan	SSK	
				Molecular neurobiology: General concept of ionotropic and metabotropic receptors. Structure, sub-types and functions of nicotinic and muscarinic acetylcholine receptors, adrenoceptors, glutamate receptors (NMDA and AMPA receptors), GABA, opiate, serotonin, dopamine and histamine receptors.	SS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-2	Follow the latest notification of CU	(CC4) P	Study and use of Kymograph, induction coil, key, Gastrocnemius-sciatic nerve preparation and kymographic recording of isotonic muscle twitch, effects of two successive stimuli and load (afterload) on muscle twitch.	DB	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-3	Follow the latest notification of CU	(CC5) TH	**Bone marrow:** Formed elements of blood–origin, formation, functions and fate. **Plasma proteins** Origin and functions. **Erythropoiesis** Role of erythropoietin and leucopoiesis. **Haemoglobin:** Structure, reactions, biosynthesis and catabolism. Foetal haemoglobin. Abnormal haemoglobins- Sickle-cell anemia and Thalassemia. **Blood volume:** Regulation and determination by dye and radioisotope methods.	ZZ	4
				Hemostasis: Factors, mechanism, anticoagulants, procoagulants. Disorders of hemostasis- Hemophilia, Thrombosis and Embolism. **Blood group:** ABO and Rh systems (Chemical nature of relevant biomolecules).Erythroblastosis foetalis. Blood transfusion and its hazards.	DB	
				Lymph and tissue fluids: Formation, circulation, functions and fate. **Lymphatic organs:** Histological structures and functions of lymph gland and spleen. Splenomegaly causes and effects. **Circulatory disorder:** Oedema**.**	SS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-3	Follow the latest notification of CU	(CC5) P	**Haematological experiments:** Preparation and staining of blood film with Leishman's stain. Identification of blood cells. Total count of W.B.C and R.B.C. Differential count of W.B.C. Haemoglobin estimation by Sahli's hemoglobinometer. Preparation of haemin crystals. Preparation and staining of bone marrow. Measurement of diameter of megakaryocytes. Reticulocyte staining.	SS	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-3	Follow the latest notification of CU	(CC6) TH	**Cardiovascular System** Anatomy of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Heart Block. **Cardiac cycle:** Pressure and volume changes. Heart sounds. Murmurs. **Cardiac output:** Measurement by application of Fick's principle & factors affecting. Starling's law of heart. **The pulse:** Arterial and venous. Hemodynamics of blood flow. Cardiac and vasomotor centers, baroreceptors and chemoreceptors, innervation of the heart and blood vessels, cardiac and vasomotor reflexes. Cardiovascular homeostasis – neural and chemical control of cardiac functions and blood vessels. Atherosclerosis. Coronary Circulation. **Blood pressure:** Its measurement and factors affecting. Cardiovascular adjustment after haemorrhage.	AS	4
				Electrocardiography: The normal electrocardiogram, electrocardiographic leads, vectorial analysis, the vectorcardiogram and the mean electrical axis of heart. The His bundle electrogram. Principles of Echocardiography. Cardiac Arrhythmias &.Myocardial Infarctions.	SSK	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-3	Follow the latest notification of CU	(CC6) P	**Cardiovascular Physiology Experiments:** Determination of Blood pressure by Auscultatory Method. Determination of mean pressure, pulse pressure and pulse rate. Preparation of Amphibian Ringer Solution. Interpretation of Kymographic recording of the movements of perfused heart of toad and the effects of acetylcholine and adrenaline on the contraction of heart. ECG.	AS	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-3	Follow the latest notification of CU	(CC7) TH	**Anatomy and histology** of the lung and airways. **Mechanics of breathing:** Role of respiratory muscles, glottis. Compliance of lungs and chest wall, pressure-volume relationships, alveolar surface tension and surfactant, work of breathing. **Spirometry:** Lung volumes and capacities. Dead space.	SSK	4
				Pulmonary Circulation: Ventilation- perfusion ratio. **Transport of gases in body:** Partial pressure and composition of normal atmospheric gases in inspired, expired, alveolar airs and blood. Oxygen dissociation curve of hemoglobin and myoglobin- factors affecting. Carbon dioxide dissociation curve. Regulation of respiration- neural and chemical, respiratory centers, chemoreceptors, baroreceptors, pulmonary receptors. **Disorders of Breathing:** Hypoxia-Types& effects. Asphyxia, Voluntary hyperpnoea, Apnoea, Cyanosis, Periodic breathing, Asthma, Emphysema. Non-respiratory functions of lung.	AC	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-3	Follow the latest notification of CU	(CC7) P	**Respiratory Human Experiments:** Pneumographic recording of effects of hyperventilation, breath-holding and talking. Lung function tests using Spirometry(Digital) and analysis of the results.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-3	Follow the latest notification of CU	SEC A	**Haematological Techniques** Blood groups - ABO and Rh. Immunological basis of identification of ABO and Rh blood groups. Biochemical basis of ABO system and Bombay phenotype. Blood transfusion -precaution and hazards. Concept of Blood Bank. Erythropoietin and thrombopoietin. Abnormal haemoglobins. thalassaemia and sickle-cell anaemia. Glycemic index, Glycated haemoglobin, C peptide C-reactive protein, Ghrehlin and Leptin in health and diseases. Definition, determination and significance of TC, DC, ESR, Arneth count, PCV,MCV,MHC, MCHC, bleeding time, clotting time and prothrombin time. Anaemia– types(definition and causes).Leucocytosis, leucopenia and leukaemia. Purpura.	ZZ & DB	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-4	Follow the latest notification of CU	(CC8) TH	Anatomy and histology of alimentary canal. Digestive glands – histological structures of salivary glands, pancreas, liver. Deglutition. Movements of alimentary canal and their regulations. Composition, functions and regulation of the secretion of salivary, gastric, pancreatic and intestinal juices and bile. Enterohepatic circulation. Digestion and absorption of carbohydrates, lipids, proteins and nucleic acids. Defecation. GALT. Basic concepts of Peptic Ulcer, Jaundice and Gallstones.	AC	4
				Redox potential. Mitochondrial Electron Transport Chain. Oxidative phosphorylation- inhibitors and uncouplers	ZZ	
				Carbohydrate: Glycolysis, R-L cycle. TCA cycle, Gluconeogenesis – Coricycle, Anaplerotic reactions and Amphibolic nature of TCA cycle. Pentose phosphate pathway. Glycogenesis and Glycogenolysis.	SSK	
				Lipid: β-oxidation and biosynthesis of saturated and mono unsaturated fatty acids. Biosynthesis of lecithin. Biosynthesis of Cholesterol. Ketone body metabolism. (Hormonal regulation of the above-mentioned biochemical pathways not required)	ZZ	
				Amino acids: Amino acids - Amino acid pool. Deamination, transamination, amination and decarboxylation. Synthesis of Urea and Nitric oxide. Glucogenic and ketogenic amino acids. Metabolism of glycine, methionine, tryptophan and phenylalanine. **Purines and Pyrimidines:** Biosynthesis: *de novo* and salvage pathways. Catabolism. (Regulation of the above mentioned biochemical pathways/cycle not required)	AS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-4	Follow the latest notification of CU	(CC8)P	**Dale's Experiment:** Kymographic recording of normal movements of rat's intestine using Dale's apparatus and effects of acetylcholine and adrenaline on normal intestinal movements of rats.	SS	2
				Biochemical estimations: Quantitative estimation of amino nitrogen by Sorensen's formol titration method (percentage as well as total quantity to be done).	AS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-4	Follow the latest notification of CU	(CC9) TH	**DNA replication-** Meselson and Stahl Experiment, DNA Polymerases, Ligases and other regulatory proteins. **Transcription**- RNA Polymerase and other regulatory mechanism in prokaryotes. **Genetic code**- properties and wobble hypothesis. **Translation**- codon-anticodon interaction and mechanism in prokaryotes. **Regulation of gene expression**- operon concept – the lac operon. Gene mutation – agents and types. DNA repairing processes. Concept of oncogenes and properties of cancer cells. Recombinant DNA technology in brief and its applications – gene therapy, transgenic animal.	SS	4
				Methodologies: Chromatography: Principles and uses of: TLC, Gel filtration, Affinity chromatography, ion-exchange chromatography. Electrophoresis: Principles and method, uses of Agarose gel electrophoresis, SDS – PAGE. Ultracentrifugation: moving boundary and density gradient ultracentrifugation. Radioactivity – Classification and properties. Their use– radio-labelling of biomolecules and its detection by autoradiography. Principles of RIA, ELISA. Western, Northern and Southern blotting techniques. Polymerase chain reaction-basic concept.	SSK	

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2022-23	Sem-4	Follow the latest notification of CU	(CC9)P	**Biochemical estimations:** 1.Colorimetric methods- i) Estimation of serum protein by Lowry method and serum albumin by Bromocresol green dye method and calculation of A/G ratio. ii) Estimation of blood glucose by Folin–Wu method. (iii) Estimation of serum urea by DAM method. 2.Paper chromatography.	SSK	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-4	Follow the latest notification of CU	(CC10) TH	**Vitamins:** Thiamin, Riboflavin, Niacin, Pyridoxine, Pantothenic Acid, Biotin, Cyanocobalamin, Folic Acid, Ascorbic Acid, Inositol. Vitamins A, D, E and K Dietary sources, daily requirements, biochemical functions, deficiency symptoms, hypervitaminosis, antivitamins. **Minerals:** Sources, biological functions of sodium, potassium, calcium, phosphorus, iron, zinc, iodine and fluoride. **SDA, RQ and BMR:** Factors affecting. Determination of BMR. Fuel Values of Food. Body calorie requirements – adult consumption unit. Dietary requirements of carbohydrate, protein, lipid and other nutrients. Balanced diet and principles of formulation of balanced diets for adult man, adult woman, lactating woman and pregnant women. Nitrogen balance. Proteinsparers. Supplementary value of proteins. Biological value of proteins.Net protein utilization. Protein efficiency ratio. Dietary fibers.	DB	4

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-4	Follow the latest notification of CU	(CC10) P	Composition and nutritional value of common foodstuff.	AS	2
				Diet survey report of a family as per ICMR specification.	AC	
				Qualitative analysis of milk, potato, flour, rice, pulses.	SS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-4	Follow the latest notification of CU	SEC-B	Definition, examples and health hazards of food additives/adulterants. Tests for identifying Food Adulterants in food samples and their pathophysiological effects: Metanil yellow, Rhodamin B, Saccharin, Monosodium glutamate, Aluminium foil, Chicory, Bisphenol A and Bisphenol S, Margarine, Lead, Arsenic, Mercury, Polychlorinated Biphenyls, Dioxin and Urea. Concept of Xenobiotics- Types, sources and fate. Types of reactions in detoxification and their mechanisms- oxidation, reduction, hydrolysis and conjugation.	SS	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	(CC11) TH	Characteristics of special senses, Sensory Coding -- Weber-Fechner law, Steven's power law. **Vision:** Structure of eyeball. Histological details of retina, peripheral retina, fovea and blind spot. Retinal detachment. Visual pathway and centers. Effects of lesion in visual pathway. Mechanism of accommodation. Errors of refraction and their corrections. Formation and Circulation of Aqueous Humour. Cataract and Glaucoma. Photopic and scotopic vision. Chemical and electrical changes in retina on exposure to light. Visual processing in the retina. Positive and negative after- images. Contrast phenomenon. Light and dark adaptation. Colour vision—Trichromatic, Single and Double Opponent mechanism. Colour blindness. Visual field-- perimetry. Visual acuity- measurement, mechanism and factors affecting. Critical fusion frequency-Ferry-Porter law.	AS	4
				Hearing: Structure and functional significance of auditory apparatus. Organ of Corti. Auditory pathways and centers. Mechanism of hearing – Excitation ofHair Cells, Conversion of Sound Waves into Action Potentials in the Auditory Nerve. Mechanism of discrimination of sound frequencies and intensities. Localization of sound source. Deafness. **Olfaction and Gustation:** Structure and functions of the receptor organs, nerve pathways, Centers. Signal Transduction of olfactory and gustatory stimuli. Olfactory and Gustatory Coding. Abnormalities of olfactory and taste sensation.	SSK	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	(CC11)P	Determination of Visual Acuity by Snellen's Chart Determination of Colour Blindness by Ishihara Chart. Determination of Deafness by Tuning Fork Tests. Silver nitrate preparation of corneal cell space.	AS	2
				Study and identification of stained sections of different mammalian tissues and organs: Cardiac muscle, Skeletal muscle, Smooth muscle, Trachea, Lung, Hyaline cartilage, Artery, Vein, Cerebellum, Cerebral cortex, Spinal cord,	AC	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	(CC12) TH	**Hypothalamus** as a neuroendocrine organ. Anterior and posterior pituitary- histological structure of the gland. Chemical nature, molecular mechanism of action, functions and regulation of secretion of their hormones. Hypo and hyperactive states of the gland. **Pineal gland-** Histological structure. Chemical nature, biosynthesis, molecular mechanism of action, functions and regulation of secretion of melatonin. **Thyroid and Parathyroid-** Histological structure of the glands. Chemical nature, molecular mechanism of action, functions and regulation of secretion of the hormones. Hypo- and hyperactive states of the glands. **Adrenal cortex and medulla-** Histological structure of the gland. Chemical nature, molecular mechanism of action, functions and regulation of secretion of the hormones. Biosynthesis of catecholamines. Hypo- and hyperactive states of the gland. **Heart** as an endocrine organ. **Pancreatic islets-** Histological structure. Chemical nature, molecular mechanism of action, functions and regulation of secretion of the hormones. Hormonal control of blood sugar. Hyperinsulinism and diabetes mellitus. **Gastro-intestinal hormones-** Chemical nature, molecular mechanism olfaction, functions and regulation of secretion of the hormones.	AC & DB	4

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	(CC12)P	1. PAS staining of Liver sections 2.Study and identification of stained sections of different mammalian tissues and organs: Parotid gland, Submaxillary gland, Sublingual gland,Tongue, Oesophagus, Stomach, Duodenum, Jejunum, Ileum, Large intestine and Liver.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	DSE-A2TH	**Classification of microorganisms:** Techniques employed for the identification of microorganisms- microscopic and biochemical methods. **Control of microbial growth:** Physical and Chemical methods used in sterilization, disinfection and pasteurization. **Bacteriology:** Bacterial classification based on staining techniques(Gram stain and Acid-fast stain) and morphological aspect. Bacterial structure: cell-wall, LPS layer, pili, flagella, chromosome, plasmid, spores and cysts. **Culture of bacteria:** Nutritional requirement- complex and synthetic media, preparation of media; physical factors required for growth (temperature, pH and gaseous requirement); bacterial growth curve: different phases and their significance; quantitative estimation of bacterial growth; continuous growth culture and its utility. **Food microbiology:** Beneficial and harmful microorganisms in food, causative organisms of food-borne infections- mode of transmission and methods of prevention.	AS	4
				Bacterial metabolism: Fermentation, Glyoxalate cycle and Entner-Doudoroff pathway. **Bacterial genetics:** Transformation, conjugation and transduction. **Treatment of bacterial infection: C**hemotherapeutic agents. antibiotics- definition, bactericidal and bacteriostatic and their mechanism of action. **Virology:** Viral structure- virion, prion and bacteriophages; classification of viruses based on nucleic acid composition and hostsystem, replication of bacteriophages- lytic and lysogenic cycle. **Overview of innate and acquired immunity:** Elements of acquired immunity: Characteristics of immune response, cells and organs involved in immune response. **Immunogens and antigens:** Requirements of immunogenicity, epitopes recognized by B- & T- cells, haptens, adjuvants, cross-reactivity. Antibody structure, classification and functions. **Kinetics of antibody responses:** Primary & secondary. Antigen – antibody interactions - Primary interaction: association constant, affinity & avidity. Secondary interaction: precipitation & agglutination. B-cell receptor. **MHC molecules:** structure of class I and II molecules, brief idea of peptide binding by MHC molecules, cellular distribution. **Antigen processing and presentation:** T-cell receptor. T-cell maturation and differentiation - thymic selection in brief. B-cell activation &differentiation: thymus dependent and independent antibodies, T-B co-operation, the carrier effect. **Cytokines:** Produced by TH1 & TH2 cells, regulating specific immune response only. **Complement:** Activation components – classical, alternative and lectin. Biological consequence of complement activation. Cell-mediated effector responses: CTLS, NK cells, K cells. Brief idea of autoimmunity, cancer immunotherapy and AIDS. Hypersensitivity reactions and their types **Vaccination:** Passive and active immunization, types and uses of vaccine. **Toxins and toxoids. Hybridoma technology**	SS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	DSE-A2P	1. Gram staining of bacteria and identification of Gram positive and Gram negative bacteria. 2. Determination of human blood group using immunological method.	AS	2
				3. Quantitation of antigen or antibody by precipitin test. 4. Isolation and staining of splenocytes. 5. Lactophenol cotton blue staining of yeast cells.	SS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	DSE-B1TH	**Introduction to work physiology:** Definitions in work and exercise Physiology, Fundamental concepts of work; work characteristics, work cycle and work pauses Different categories of work, Different approaches to describe work and work load. **Physiological basis of work:** Physiology of muscle action, Physical work load; Static and dynamic work, Physiological responses to static and dynamic work, Relationship between oxygen consumption and heart rate, Effect of heat stress on physiological responses to work load. **Work load assessment:** Physiological assessment of work load, work load classification, cardiovascular and respiratory indices for evaluating work load. acceptable work load. **Work Organization:** Fundamental concept of work organization, Principles of reducing stress from physical work load.	SSK	4
				Exercise and Physical fitness: Exercise, physical activity and physical fitness. Benefits of exercise Components of fitness and their evaluation. **Physical Working Capacity:** Concept of maximal physical working capacity VO2max. and its estimation by different methods. Factors affecting VO2max. Step test, bicycle ergometry and treadmill exercise for assessment of Physical working capacity. **Bioenergetics:** Work power and energy, sources of energy. Aerobic and anaerobic capacity, EPOC, lactate threshold and lactate tolerance and their limitations. Determination of energy cost by direct and indirect methods, Athletic performance based on aerobic capacity and O_2 debt **Training Principles:** Training principles, different training methods. Training principles for different sports activities. Over training and detraining and their physiological effects. Ergogenic aids. **Body composition:** Determination of Physical growth status. Methodologies for body composition analysis.	AC	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	DSE-B1P	1.Determination of BMI, BSA, PI, waist hip ratio, body fat percentage and body type 2.Determination of VO2max by Queen's College Test and physical fitness by modifiedHarvard step test 3.Determination of agility, flexibility and anaerobic power by shuttle run, sit and reachand vertical jump test 4.Recording of heart rate and blood pressure during static and dynamic work, determination of workload from heart rate and cardiac indices and classification of work load.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	(CC13) TH	**Reproductive Physiology:** Primary and accessory sex organs and secondary sex characters. Histology of testis. Endocrine functions of testis. Spermatogenesis. Hypothalamic control of testicular functions. Histology of ovary. Ovarian hormones and their functions. Oogenesis and ovulation. Formation and functions of corpus luteum. Hypothalamic control of ovarian functions. Physiology of puberty. Menstrual cycle and its regulation. Abnormalities in menstrual cycle. Onset of menopause and postmenopausal changes. Structure and functions of placenta. Maintenance of pregnancy and the bodily changes during pregnancy. Parturition. Pregnancy tests. Development of mammary glands, lactation and their hormonal control.	AC	4
				Developmental Biology **Stem cell:** Characteristics and applications. Totipotency, Differentiation. **Ultrastructure:** Sperm and Ovum. **Fertilization, Blastulation, Implantation, Gastrulation**(Concept of induction, determination and differentiation). **Organogenesis:** Development of Heart, urinary system and genital system. **Fetal Circulation.**	SSK	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	(CC13) P	1. Study and identification of stained sections of different mammalian tissues and organs: Kidney, Ureter, Skin, Uterus, Testis, Ovary, Thyroid gland, Pancreas, Spleen, Lymph gland. 2. Pregnancy Test by immunological method using kit. 3.Silver nitrate preparation of urinary bladder for study of cell spaces.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	(CC14) TH	**Kidney:**Anatomy of kidney. Histology of nephron. Renal circulation –peculiarities and autoregulation. Formation of urine – glomerular function and tubular functions. Counter-current multiplier and exchanger. Renal regulation of osmolarity and volume of blood fluids. Diabetes insipidus. Formation of hypertonic urine. Renal regulation of acid-base balance, acidification of urine. Renal function tests – creatinine, inulin, urea, and PAH clearance tests. Physiology of urinary bladder and micturition. Constituents of urine. Abnormal constituents of urine, and pathophysiological significance. Renal dialysis. Non-excretory functions of kidney.	AC	4
				Skin and Body Temperature Regulation: Structure and functions of skin. Cutaneous circulation. Sweat glands- structure and composition of sweat. Mechanism of sweat formation, secretion and its regulation. Insensible perspiration. Regulation of body temperature in homeotherms- its physical and physiological processes, roles of neural and hormonal processes. Pyrexia, hyperthermia and hypothermia.	SS	
				Environmental Pollutants and Human Health: Sources and effects of Chlorinated hydrocarbons, Organophosphorus, Organocarbamates, Lead, Arsenic, Fluorine, Aluminium, Ionizing and non-ionizing radiations.	ZZ	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	(CC14) P	1.Identification of normal and abnormal constituents of urine. 2. Staining and identification of histological sections of liver, adrenal gland, thyroid gland, ovary, testes, and kidney.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	DSE-A4 TH	Basic idea about community, public health issues. Malnutrition in a community, over nutrition and possible remedial measures. Diet management of obese, diabetic, hypertensive individuals and athletes. Iron and iodine deficiency. Population problem – principles and methods of family planning, Problem of infertility and Assisted	DB	4
				Reproductive Technologies. PCM- Marasmus, Kwashiorkor, Marasmic Kwashiorkor, endemic goiter, nutritional anemias, rickets, osteomalacia, xeropthalmia, beriberi and their social implications. Principles and social importance of immunization against diseases. Etiology, epidemiology and prevention- Communicable diseases: Cholera, Malaria, Swine flu, Japanese Encephalitis, Rabies, Dengue, Hepatitis and AIDS; Non-communicable diseases – Hypertension and Obesity.	ZZ	

Academic Year	Semester	Tentative Dates of University Exam	DSEA4 TH	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	DSE-A4 P	1. Calculation of Body Surface Area (using nomogram), Body Mass Index and Ponderal Index from anthropometric measurements. 2. A report (hand-written) on the basis of field survey from ONE of the followings: a) Physiological parameters of human (at least three parameters). b) Anthropometric measurements on human (at least three parameters). c) Epidemiological studies on human.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	DSE-B3 TH	Chronobiology and Stress Physiology (DSE B3TH) Different types of physiological rhythms – ultradian, circadian, infradian. Different zeitgebers and their relation with circadian clock. Hormonal biorhythms and their significance: adrenocortical, pineal and prolactin. Neural basis of biological clock and role of suprachiasmatic nuclei. Sleep-wakefulness cycle. Body temperature rhythm. Time keeping genes. Jet-lag and shift work.	SSK	4
				Stress : Physical and Emotional Stressors. General Adaptation Syndrome. Role of Hypothalamic-Pituitary-Adrenal Axis and Sympathoadrenal Medullary Axes in coping stress. Effects of chronic stress: Immunological, Cardiovascular Disease, Emotional. Heat disorders and its preventive measures. Effects of hypobaric and hyperbaric environment. Caisson disease. Preventive measures for hypobaric and hyperbaric effects. Oxidative stress-Formation of Reactive Oxygen Species and the role of Catalase, Superoxide Dismutase, Glutathione. Peroxidase and Glutathione Reductase in combating oxidative stress – role of vitamins.	SS	

Academic Year	Semester	Tentative Dates of University Exam	DSEA4 TH	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	DSE-3 P	DSE3P 1.Project work on assessment of individual differences in human circadian rhythms (chronotype in human population) by questionnaire method among school children and college students. 2.Assessment of environmental heat load. 3.Assessment of noise level using noise level meter. 4.Determination of diurnal and /or circalunar rhythm of body temperature of college going students.	PM	2

HARIMOHAN GHOSE COLLEGE
DEPRTMANT OF PHYSIOLOGY
LESSON PLAN PHYG (MDC) (ACADEMIC YEAR 2022-23)

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-1	Follow the latest notification of CU	CC1TH/ GEN1 TH	**Cellular Basis of Physiology** Structure and functions of plasma membrane, nucleus and different cell organelles – Endoplasmic reticulum, Golgi bodies, Mitochondria, Lysosome and Peroxisome.	SSK	4
				Biophysical Principles, Enzymes and Chemistry of Bio-molecules Physiological importance of the following physical processes: Diffusion, Osmosis and Surface tension. pH and Buffers – Significance in human body and maintenance of pH in the blood. Colloids - Classification and physiological importance. **Enzymes:** Classification, factors affecting enzyme action. Concept of coenzymes and isozymes.	DB	
				Carbohydrates: Definition and classification. *Monosaccharides* – Classification, structure, physiological importance. *Disaccharides* – Maltose, Lactose and Sucrose: Structure, occurrence and physiological importance. *Polysaccharides* – Starch, Glycogen, Dextrin, Cellulose.	ZZ	
				Lipids: Definition and classification. Fatty acids Classification. Definition and importance of, Saponification number and, Iodine number. Phospholipids, Cholesterol &its ester- physiological importance.	SS	
				Amino acids, Peptides and Proteins: Classification and structure. Structure of peptide bonds. **Nucleic acids:** Structure of DNA and RNA.	AS	
				Digestion & Metabolism Structure in relation to functions of alimentary canal and digestive glands. Composition, functions and regulation of secretion of digestive juices including bile. Digestion and absorption of carbohydrate, protein and lipid. Movements of the stomach and small intestine.	AC	
				Glycolysis, TCA cycle, Importance of Glycogenesis, Glycogenolysis and. Gluconeogenesis. Beta oxidation of saturated fatty acid. Importance of Ketone bodies, Deamination & Transamination. Formation of urea.	ASSK	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-1	Follow the latest notification of CU	CC1P/GEN1P	**Examination and staining of fresh tissues:** Squamous, Ciliated and Columnar Epithelium by Methylene Blue stain.	SS	2
				Qualitative tests for identification of: Glucose, Fructose, Lactose, Sucrose, Starch, Dextrin, Lactic acid, Hydrochloric acid, Albumin, Acetone, Glycerol and Bile Salts. **Quantitative estimation** of amino nitrogen by Sorensen's formol titration method (percentage to be done)	AS	

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2022-23	Sem-2	Follow the latest notification of CU	CC2TH/ GEN2 TH	**Blood and Body Fluids** Blood: composition and functions. Plasma proteins: origin and functions. Blood cells- their morphology and functions. Erythropoiesis. Haemoglobin: different types of compounds and derivatives. Coagulation of blood: mechanism, procoagulants, anticoagulants. Lymph and tissue fluids: composition, formation, and functions.	ZZ	4
				Cardiovascular System Anatomy and histology of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Cardiac cycle: Events. Heart sounds. Heart rate. Cardiac output: Determination by following Fick principle, factors affecting. Pulse - arterial and venous. Blood pressure and factors controlling. Baro- and chemoreceptors. Vasomotor reflexes. Peculiarities of regional circulations: coronary and cerebral.	DB	
				Respiratory System Anatomy and histology of the respiratory passage and organs. Role of respiratory muscles in breathing. Lung volumes and capacities. Exchange of respiratory gases between lung and blood and between blood and tissues. Transport of oxygen and carbon dioxide in blood. Regulation of respiration - neural and chemical. Hypoxia.	AC	

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2022-23	Sem-2	Follow the latest notification of CU	CC2P/ GEN2 P	Preparation and staining of human blood film with Leishman's stain and identification of different types of blood cells. Preparation of hemin crystals.	ZZ	2
				Demonstration- kymographic recording of the un-perfused heart of toad and effects of warm and cold saline.	DB	
				1. Measurement of systolic and diastolic pressure by sphygmomanometer and determination of pulse and mean pressure. 2. Measurement of peak expiratory flow rate. 3. Pneumographic recording of normal respiratory movements and effects of hyperventilation and breath-holding.	ZZ	

Academic Year	Semester	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-3	CC3TH/ GEN3 TH	**Nerve-muscle Physiology** Structure of neurons. Origin and propagation of nerve impulse. Velocity of impulsein different types of nerve fiber. Properties of nerve fibers: all or none law, rheobase and chronaxie, refractory period. indefatiguability. Synapses: structure, mechanism of synaptic transmission. Motor unit. Myoneural junction: structure, mechanism of impulse transmission. Degeneration and regeneration in nerve fibers. Different types of muscle and their structure. Red and white muscle. Muscular contraction: structural, mechanical and chemical changes in skeletal muscle during contraction and relaxation. Isotonic and isometric contractions. Properties of muscle: all or none law, beneficial effect, summation, refractory period, tetanus, fatigue.	AS	4
			Nervous System A brief outline of organization and basic functions (sensory, motor and association)of the nervous system, central and peripheral nervous system. Ascending tracts carrying touch, kinesthetic, temperature and pain sensations. Descending tracts: pyramidal tract and brief outline of the extra-pyramidal tracts. Reflex action - definition, reflex arc, classification, properties. Functions of the spinalcord. Outline of functions of brain stem. A brief idea of the structure, connections and functions of cerebellum. Different nuclei and functions of thalamus and hypothalamus. Cerebral cortex: histological structure and localization of functions.	SSK	
			CSF: composition, formation, circulation and functions. A brief description of the organization of the autonomic (sympathetic and parasympathetic) nervous system. Functions of sympathetic and parasympathetic nervous system. A brief idea of speech, aphasia, conditioning, learning and memory.	ZZ	
			Special Senses *Olfaction and Gustation:* Structure of sensory organ, neural pathway of olfactory and gustatory sensation. Mechanism of olfactory and gustatory sensation. Olfactory and gustatory adaptation. After-taste.	SSK	
			Audition: Structure of ear, auditory pathway, mechanism of hearing.	ZZ	
			Vision: Structure of the eye. Histology of retina. Visual pathway. Light reflex. Chemical changes in retina on exposure to light. Accommodation - mechanism. Errors of refraction. Light and dark adaptation. Elementary idea of colour vision and colour blindness.	AS	

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2022-23	Sem-3	Follow the latest notification of CU	CC3P/ GEN3 P	1. Silver Nitrate preparation of nodes of Ranvier. 2. Silver nitrate preparation of corneal cell space. 3. Examination and staining of skeletal and cardiac muscles by Methylene Blue stain. 4. Demonstration: Use of kymograph, induction coil and mercury key. Recording of simple muscle curve with sciatic-gastrocnemius muscle preparation of toad. 5. Determination of visual acuity by Snellen's chart / Landolt's C chart. 6. Determination of colour blindness by Ishihara chart. 7. Exploration of conductive and perceptive deafness by tuning fork method.	SS & AS	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-4	Follow the latest notification of CU	CC4TH/GEN 4 TH	**Endocrinology** Hormones - classification. Elementary idea of mechanism of hormone action. *Hypothalamus:* Basic concept of neurohormone. Hypothalamo-hypophyseal tract and portal system. *Pituitary:* Histological structure, hormones, functions. Hypo and hyper active states of pituitary gland. *Thyroid:* Histological structure. Functions of thyroid hormones (T4T3).Thyrocalcitonin. Hypo and hyper-active states of thyroid. *Parathyroid:* Histological structure, functions of parathyroid hormone. Tetany. *Adrenal Cortex:* Histological structure and functions of different hormones. Hypo and hyper-active states of adrenal cortex. *Adrenal Medulla:* Histological structure and functions of medullary hormones. The relation of adrenal medulla with the sympathetic nervous system. *Pancreas:* Histology of islets of Langerhans. Origin and functions of pancreatic hormones. Diabetes mellitus. Brief idea of the origin and functions of renin-angiotensin, prostaglandins. erythropoietin and melatonin. Elementary idea of gastrointestinal hormone.	AC	4
				Reproductive Physiology Primary and accessory sex organs and secondary sex characters. Testis: histology, spermatogenesis, testicular hormones and their functions. Ovary: histology, oogenesis, ovarian hormones and their functions. Menstrual cycle and its hormonal control. Maintenance of pregnancy – role of hormones. Development of mammary gland and lactation - role of hormones.	SSK	
				Excretory Physiology Structure and function relationship of kidney. Mechanism of formation of urine. Normal and abnormal constituents of urine. Physiology of micturition. Renal regulation of acid-base balance. Non-excretory functions of kidney. Structure and functions of skin. Insensible and sensible perspiration Regulation of body temperature- physical and physiological processes involved in it. Physiology of sweat secretion and its regulation.	SSK	

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2022-23	Sem-4	Follow the latest notification of CU	CC4P/GEN4P	**Study and Identification of Stained Sections of Different Mammalian Tissues and Organs:** Esophagus, Stomach, Small Intestine, Large Intestine, Liver, Lung, Trachea, Spinal cord, Cerebral cortex, Cerebellum, Thyroid Gland, Adrenal Gland, Pancreas, Spleen, Testes, Ovary, Kidney, Artery and Vein. **Identification of:** Normal constituents of urine: Chloride, Sulphate, Phosphate, Creatinine and Urea; Abnormal constituents of urine: Glucose, Protein, Acetone, Bile pigment and Bile Salt.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-4		SEC B2	Basic idea about community, public health issues. Malnutrition in a community, over nutrition and possible remedial measures. Diet management of obese, diabetic. Basic idea of PCM and their prevention. PCM- Marasmus, kwashiorkor. Endemic goiter, rickets, osteomalacia, xeropthalmia, beriberi and their social implications. Etiology, epidemiology and prevention of: Communicable diseases: Malaria, Dengue, Hepatitis and AIDS; Non-communicable diseases – Hypertension and Obesity. Population problem – principles and methods of family planning, and Assisted Reproductive Technologies. Principles of formulation of diet chart of growing children, pregnant & lactating women and diabetic patients.	ZZ & DB	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	Follow the latest notification of CU	DSE-A2 TH	Blood groups - ABO and Rh. Immunological basis of identification of ABO and Rh blood groups. Biochemical basis of ABO system and Bombay phenotype. Blood transfusion - precaution and hazards. Concept of blood bank. Erythropoietin and thrombopoietin. Foetal haemoglobin. Abnormal haemoglobins- thalassaemia and sickle-cell anaemia. Definition, determination and significance of TC, DC, ESR, Arneth count, PCV, MCV, MHC, MCHC, bleeding time, clotting time and prothrombin time. Anaemia - types (definition and causes). Leucocytosis, Leucopenia and Leukaemia. Purpura. Disorders of coagulation.	ZZ	2

Academic Year	Semester	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-5	DSE-A2 P	DC of WBC, Estimation of haemoglobin, Blood group determination, Bleeding time and Clotting time.	SS	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	DSE-B2 TH	Basic constituents of food and their nutritional significance. Vitamins-Classification, functions, deficiency symptoms and daily requirements. Hypervitaminosis. Mineral metabolism – Ca, P, Fe. BMR: definition, factors affecting. Respiratory quotient: definition, factors affecting and significance. Biological value of proteins. Essential and non-essential amino acids. Nitrogen balance. SDA: definition and importance. Body calorie requirements – adult consumption unit. Dietary requirements of carbohydrate, protein, lipid and other nutrients. Dietary fibres. Principles of diet survey. Composition and nutritional value of common food stuffs.	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2022-23	Sem-6	Follow the latest notification of CU	DSE-B2 P	Diet survey report (hand-written) of a family (as per ICMR specification): Each student has to submit a report on his/her own family.	ZZ	2