

HARIMOHAN GHOSE COLLEGE  
DEPRTMANT OF PHYSIOLOGY  
LESSON PLAN PHYA CCF (ACADEMIC YEAR 2023-24)

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-1	Follow the latest notification of CU	PHY-CC11-TH-P01	Unit-I: History of Physiology and medicine and contribution of Indian Scientists in the field of Physiology and allied health sciences and Brief Overview of Physiological Systems	AC	3
				Unit-II: Cellular Basis of Physiology	SS	
				Unit-III: Chemistry of Biomolecules-I	ZZ, DB	
				Unit-IV: Chemistry of Biomolecules-II	SSK	
				Unit-V: Chemistry of Biomolecules-III	AS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-1	Follow the latest notification of CU	PHY-CC11-PR-P02	1. Study of Models / Charts of different body organ systems & organs – Anatomical position, Structure & Functions.	DB	1
				2. Examination and staining of fresh tissues: Squamous, Ciliated and Columnar Epithelium by Methylene Blue stain.	DB	
				3. 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	

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2023-24	Sem-1	Follow the latest notification of CU	PHY-SEC11-TH-P01	Unit – I: Clinical Importance of Biomolecules	SS	2
				Unit – II: Protein Disorders	AS	
				Unit – III: Age Related Health Issues	DB	
				Unit IV: Work and Exercise Physiology-I	SSK	
				Unit V: Work and Exercise Physiology-II	AC	

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2023-24	Sem-1	Follow the latest notification of CU	PHY-SEC11-PR-P02	<p><b>Unit I:</b> Preparation of solution, calculation of molecular weight &amp; equivalent weight, preparation of molar solutions, normal solutions, percent solutions &amp; reagents, dilution techniques.</p> <p>Preparation of N/10 NaOH, N/10 Oxalic Acid, N/10 HCl, N/10 H<sub>2</sub>SO<sub>4</sub> solution, N/100 KMnO<sub>4</sub> solution, N/100 Sodium Oxalate Solution. Standardization of approx N/10 NaOH, N/10 HCl, N/10 H<sub>2</sub>SO<sub>4</sub> solution against standard N/10 Oxalic acid solution. Standardization of approx N/100 KMnO<sub>4</sub> Solution against Standard Sodium Oxalate Solution.</p>	SS	2
				<p><b>Unit II:</b> Determination of BMI, BSA, PI, waist hip ratio, body fat percentage.</p> <p>Determination of physical fitness by Harvard and modified Harvard Step Tests</p> <p>Measurement of systolic and diastolic arterial blood pressure by sphygmomanometer and determination of pulse and mean pressure.</p> <p>Determination of heart rate by palpation.</p>	AC	

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2023-24	Sem-2	Follow the latest notification of CU	PHY-CC21-TH-P03	Unit – II: Enzyme – I	SS	3
				Unit – III: Enzyme – II	DB	
				Unit – IV: Biophysics and Biophysical Principles I	DB	
				Unit – IV: Biophysics and Biophysical Principles – I	ZZ	
				Unit – II: Enzyme – I	AC	

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2023-24	Sem-2	Follow the latest notification of CU	PHY-CC21-PR-P04	<p>1. Study and identification of stained section of different mammalian tissues and organs: Parotid gland, Submaxillary gland, Sublingual gland, Tongue, Oesophagus, Stomach, Duodenum, Jejunum, Ileum, Large intestine, Liver, Kidney, Ureter, Pancreas, Spleen, Lymph gland, Lung, Trachea, Thyroid gland, Adrenal gland, Ureter, Kidney, Skin, Ovary, Testis, Uterus, Spinal Cord, Cerebellum, Cerebrum, Cardiac muscle, Skeletal Muscle, Smooth muscle, Artery, Vein, Bone, Cartilage.</p> <p>2. Study of charts on Cell signaling</p> <p><b>Demonstration:</b> Preparation of Buffer and pH measurement.</p>	SS DB	1

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2023-24	Sem-2	Follow the latest notification of CU	PHY-SEC21-P03	Unit – I: Clinical Biochemistry –I	DB	2
				Unit – II: Clinical Biochemistry – II	AS	
				Unit – III: Laboratory Automation, Management and Safety	SS	
				Unit – IV: Histological Techniques for Pathological Identification - I	SSK	
				Unit – V: Histological Techniques for Pathological Identification - II	SSK	

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2023-24	Sem-2	Follow the latest notification of CU	PHY-SEC21-PR-P04	<b>Unit I:</b> 1. Estimations of Cholesterol, Triglyceride, HDL and LDL by standard biochemical kit. 2. Estimations of urea, Creatinine, Uric acid by standard biochemical kit.	SS	2
				<b>Unit II:</b> Haematoxylin and eosin staining of paraffin tissue sections (Liver, Kidney, Ovary, Testis, Pancreas, Lung).	AS	

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**LESSON PLAN PHYA CBCS (ACADEMIC YEAR 2023-24)**

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-3	Follow the latest notification of CU	(CC5) TH	<b>Bone marrow:</b> Formed elements of blood—origin, formation, functions and fate. <b>Plasma proteins</b> Origin and functions. <b>Erythropoiesis</b> Role of erythropoietin and leucopoiesis. <b>Haemoglobin:</b> Structure, reactions, biosynthesis and catabolism. Foetal haemoglobin. Abnormal haemoglobins- Sickle-cell anemia and Thalassemia. <b>Blood volume:</b> Regulation and determination by dye and radioisotope methods.	ZZ	4
				<b>Hemostasis:</b> Factors, mechanism, anticoagulants, procoagulants. Disorders of hemostasis- Hemophilia, Thrombosis and Embolism. <b>Blood group:</b> ABO and Rh systems (Chemical nature of relevant biomolecules).Erythroblastosis foetalis. Blood transfusion and its hazards.	DB	
				<b>Lymph and tissue fluids:</b> Formation, circulation, functions and fate. <b>Lymphatic organs:</b> Histological structures and functions of lymph gland and spleen. Splenomegaly causes and effects. <b>Circulatory disorder:</b> Oedema.	SS	



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2023-24	Sem-3	Follow the latest notification of CU	(CC5) P	<b>Haematological experiments:</b> 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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2023-24	Sem-3	Follow the latest notification of CU	(CC6) TH	<b>Cardiovascular System</b> Anatomy of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Heart Block. <b>Cardiac cycle:</b> Pressure and volume changes. Heart sounds. Murmurs. <b>Cardiac output:</b> Measurement by application of Fick's principle & factors affecting. Starling's law of heart. <b>The pulse:</b> 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. <b>Blood pressure:</b> Its measurement and factors affecting. Cardiovascular adjustment after haemorrhage.	AS	4
				<b>Electrocardiography:</b> 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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2023-24	Sem-3	Follow the latest notification of CU	(CC6) P	<b>Cardiovascular Physiology Experiments:</b> 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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2023-24	Sem-3	Follow the latest notification of CU	(CC7) TH	<b>Anatomy and histology</b> of the lung and airways. <b>Mechanics of breathing:</b> Role of respiratory muscles, glottis. Compliance of lungs and chest wall, pressure-volume relationships, alveolar surface tension and surfactant, work of breathing. <b>Spirometry:</b> Lung volumes and capacities. Dead space.	AB	4
				<b>Pulmonary Circulation:</b> Ventilation- perfusion ratio. <b>Transport of gases in body:</b> 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. <b>Disorders of Breathing:</b> Hypoxia-Types& effects. Asphyxia, Voluntary hyperpnoea, Apnoea, Cyanosis, Periodic breathing, Asthma, Emphysema. Non-respiratory functions of lung.	AC	

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2023-24	Sem-3	Follow the latest notification of CU	(CC7) P	<b>Respiratory Human Experiments:</b> 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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2023-24	Sem-3	Follow the latest notification of CU	SEC A	<b>Haematological Techniques</b> 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, Ghrelin and Leptin in health and diseases. Definition, determination and significance of TC, DC, ESR, Arneith 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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2023-24	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	
				<b>Carbohydrate:</b> Glycolysis, R-L cycle. TCA cycle, Gluconeogenesis – Coricycle, Anaplerotic reactions and Amphibolic nature of TCA cycle. Pentose phosphate pathway. Glycogenesis and Glycogenolysis.	AB	
				<b>Lipid:</b> $\beta$ -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	
				<b>Amino acids:</b> 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. <b>Purines and Pyrimidines:</b> Biosynthesis: <i>de novo</i> and salvage pathways. Catabolism. (Regulation of the above mentioned biochemical pathways/cycle not required)	AS	

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2023-24	Sem-4	Follow the latest notification of CU	(CC8)P	<b>Dale's Experiment:</b> 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
				<b>Biochemical estimations:</b> 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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2023-24	Sem-4	Follow the latest notification of CU	(CC9) TH	<p><b>DNA replication-</b> Meselson and Stahl Experiment, DNA Polymerases, Ligases and other regulatory proteins. <b>Transcription-</b> RNA Polymerase and other regulatory mechanism in prokaryotes. <b>Genetic code-</b> properties and wobble hypothesis. <b>Translation-</b> codon-anticodon interaction and mechanism in prokaryotes. <b>Regulation of gene expression-</b> 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.</p>	SS	4
				<p><b>Methodologies:</b> 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.</p>	AB	

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2023-24	Sem-4	Follow the latest notification of CU	(CC9)P	<p><b>Biochemical estimations:</b>  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.</p>	AB	2

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2023-24	Sem-4	Follow the latest notification of CU	(CC10) TH	<p><b>Vitamins:</b> 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.</p> <p><b>Minerals:</b> Sources, biological functions of sodium, potassium, calcium, phosphorus, iron, zinc, iodine and fluoride.</p> <p><b>SDA, RQ and BMR:</b> Factors affecting. Determination of BMR.</p> <p>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.</p>	DB	4

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2023-24	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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2023-24	Sem-4	Follow the latest notification of CU	SEC-B	<p>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.</p> <p>Concept of Xenobiotics- Types, sources and fate. Types of reactions in detoxification and their mechanisms- oxidation, reduction, hydrolysis and conjugation.</p>	SS	2

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2023-24	Sem-5	Follow the latest notification of CU	(CC11) TH	<p>Characteristics of special senses, Sensory Coding-- Weber-Fechner law, Steven's power law.</p> <p><b>Vision:</b> 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.</p>	AS	4
				<p><b>Hearing:</b> Structure and functional significance of auditory apparatus. Organ of Corti. Auditory pathways and centers. Mechanism of hearing – Excitation of Hair 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.</p> <p><b>Olfaction and Gustation:</b> 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.</p>	AB	



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2023-24	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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2023-24	Sem-5	Follow the latest notification of CU	(CC12) TH	<p><b>Hypothalamus</b> 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.</p> <p><b>Pineal gland-</b> Histological structure. Chemical nature, biosynthesis, molecular mechanism of action, functions and regulation of secretion of melatonin.</p> <p><b>Thyroid and Parathyroid-</b> 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.</p> <p><b>Adrenal cortex and medulla-</b> 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.</p> <p><b>Heart</b> as an endocrine organ.</p> <p><b>Pancreatic islets-</b> 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.</p> <p><b>Gastro-intestinal hormones-</b> Chemical nature, molecular mechanism of action, functions and regulation of secretion of the hormones.</p>	AC & DB	4

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2023-24	Sem-5	Follow the latest notification of CU	(CC12)P	<p>1. PAS staining of Liver sections</p> <p>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.</p>	AC	2

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2023-24	Sem-5	Follow the latest notification of CU	DSE-A2TH	<p><b>Classification of microorganisms:</b> Techniques employed for the identification of microorganisms- microscopic and biochemical methods.</p> <p><b>Control of microbial growth:</b> Physical and Chemical methods used in sterilization, disinfection and pasteurization.</p> <p><b>Bacteriology:</b> 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.</p> <p><b>Culture of bacteria:</b> 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.</p> <p><b>Food microbiology:</b> Beneficial and harmful microorganisms in food, causative organisms of food-borne infections- mode of transmission and methods of prevention.</p>	AS	4
				<p><b>Bacterial metabolism:</b> Fermentation, Glyoxalate cycle and Entner-Doudoroff pathway.</p> <p><b>Bacterial genetics:</b> Transformation, conjugation and transduction.</p> <p><b>Treatment of bacterial infection:</b> Chemotherapeutic agents. antibiotics- definition, bactericidal and bacteriostatic and their mechanism of action.</p> <p><b>Virology:</b> Viral structure- virion, prion and bacteriophages; classification of viruses based on nucleic acid composition and hostsystem, replication of bacteriophages- lytic and lysogenic cycle.</p> <p><b>Overview of innate and acquired immunity:</b> Elements of acquired immunity: Characteristics of immune response, cells and organs involved in immune response.</p> <p><b>Immunogens and antigens:</b> Requirements of immunogenicity, epitopes recognized by B- &amp; T- cells, haptens, adjuvants, cross-reactivity. Antibody structure, classification and functions.</p> <p><b>Kinetics of antibody responses:</b> Primary &amp; secondary. Antigen – antibody interactions- Primary interaction: association constant, affinity &amp; avidity. Secondary interaction: precipitation &amp; agglutination. B-cell receptor.</p> <p><b>MHC molecules:</b> structure of class I and II molecules, brief idea of peptide binding by MHC molecules, cellular distribution.</p> <p><b>Antigen processing and presentation:</b> T-cell receptor. T-cell maturation and differentiation - thymic selection in brief. B-cell activation &amp; differentiation: thymus dependent and independent antibodies, T-B co-operation, the carrier effect.</p> <p><b>Cytokines:</b> Produced by TH1 &amp; TH2 cells, regulating specific immune response only.</p> <p><b>Complement:</b> 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</p> <p><b>Vaccination:</b> Passive and active immunization, types and uses of vaccine.</p> <p><b>Toxins and toxoids. Hybridoma technology</b></p>	SS	

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2023-24	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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2023-24	Sem-5	Follow the latest notification of CU	DSE-B1TH	<p><b>Introduction to work physiology:</b> 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.</p> <p><b>Physiological basis of work:</b> 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.</p> <p><b>Work load assessment:</b> Physiological assessment of work load, work load classification, cardiovascular and respiratory indices for evaluating work load. acceptable work load.</p> <p><b>Work Organization:</b> Fundamental concept of work organization, Principles of reducing stress from physical work load.</p>	AB	4
				<p><b>Exercise and Physical fitness:</b> Exercise, physical activity and physical fitness. Benefits of exercise Components of fitness and their evaluation.</p> <p><b>Physical Working Capacity:</b> Concept of maximal physical working capacity VO<sub>2</sub>max. and its estimation by different methods. Factors affecting VO<sub>2</sub>max. Step test, bicycle ergometry and treadmill exercise for assessment of Physical working capacity.</p> <p><b>Bioenergetics:</b> 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<sub>2</sub> debt</p> <p><b>Training Principles:</b> Training principles, different training methods. Training principles for different sports activities. Over training and detraining and their physiological effects. Ergogenic aids.</p> <p><b>Body composition:</b> Determination of Physical growth status. Methodologies for body composition analysis.</p>	AC	

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2023-24	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 reach and 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

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2023-24	Sem-6	Follow the latest notification of CU	(CC13) TH	<p><b>Reproductive Physiology:</b> 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.</p> <p>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.</p>	AC	4
				<p><b>Developmental Biology</b></p> <p><b>Stem cell:</b> Characteristics and applications. Totipotency, Differentiation.</p> <p><b>Ultrastructure:</b> Sperm and Ovum.</p> <p><b>Fertilization, Blastulation, Implantation, Gastrulation</b>(Concept of induction, determination and differentiation).</p> <p><b>Organogenesis:</b> Development of Heart, urinary system and genital system.</p> <p><b>Fetal Circulation.</b></p>	AB	

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2023-24	Sem-6	Follow the latest notification of CU	(CC13) P	<ol style="list-style-type: none"> <li>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.</li> <li>2. Pregnancy Test by immunological method using kit.</li> <li>3. Silver nitrate preparation of urinary bladder for study of cell spaces.</li> </ol>	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-6	Follow the latest notification of CU	(CC14) TH	<b>Kidney:</b> 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
				<b>Skin and Body Temperature Regulation:</b> 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	
				<b>Environmental Pollutants and Human Health:</b> 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
2023-24	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
2023-24	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, xerophthalmia, 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
2023-24	Sem-6	Follow the latest notification of CU	DSE-A4 P	<ol style="list-style-type: none"> <li>1. Calculation of Body Surface Area (using nomogram), Body Mass Index and Ponderal Index from anthropometric measurements.</li> <li>2. A report (hand-written) on the basis of field survey from ONE of the followings: <ol style="list-style-type: none"> <li>a) Physiological parameters of human (at least three parameters).</li> <li>b) Anthropometric measurements on human (at least three parameters).</li> <li>c) Epidemiological studies on human.</li> </ol> </li> </ol>	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-6	Follow the latest notification of CU	DSE-B3 TH	<b>Chronobiology and Stress Physiology (DSE B3TH)</b> 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
2023-24	Sem-6	Follow the latest notification of CU	DSE-3 P	<b>DSE3P</b> 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) CCF (ACADEMIC YEAR 2023-24)**

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-1	Follow the latest notification of CU	PHY-CC11-TH-P01	Unit- I: History of Physiology and medicine and contribution of Indian Scientists in the field of Physiology and allied health sciences and Brief Overview of Physiological Systems	AB	3
				Unit – II: Cellular Basis of Physiology	DB	
				Unit – III: Chemistry of Biomolecules- I	ZZ	
				Unit – IV: Chemistry of Biomolecules- II	SS	
				Unit – V: Chemistry of Biomolecules- III	AS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-1	Follow the latest notification of CU	PHY-CC11-PR- P02	1. Study of Models / Charts of different body organ systems & organs – Anatomical position, Structure & Functions.	AC	1
				2. Examination and staining of fresh tissues: Squamous, Ciliated and Columnar Epithelium by Methylene Blue stain.	AS	
				3. 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.	AS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-1	Follow the latest notification of CU	PHY-IDC11-TH-P01	Unit-I: Cellular Basis of Physiology	SS	3
				Unit-II: Biophysical Principles	AC	
				Unit-III: Enzymes	DB	
				Unit-IV: Biomolecules	AS	
				Unit-V: Digestion & Metabolism	ZZ	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-1	Follow the latest notification of CU	PHY-IDC11-PR-P02	1.Examination and staining of fresh tissues: Squamous, Ciliated and Columnar Epithelium by Methylene Blue stain.	ZZ	1
				2.Qualitative tests for identification of : Glucose, Fructose, Lactose, Sucrose, Starch, Dextrin, Lactic acid, Hydrochloric acid , urea, Albumin, peptone, Acetone, Glycerol and Bile Salts.	DB	
				3.Quantitative estimation of ammonia and amino nitrogen by Sorensen's formol titration method (percentage and total to be done)	ZZ	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-2	Follow the latest notification of CU	PHY-CC21-TH-P03	Unit – I: Cell signalling	ZZ	3
				Unit – II: Enzyme – I	DB	
				Unit – III: Enzyme – II	AC	
				Unit – IV: Biophysics and Biophysical Principles- I	SS	
				Unit – V: Biophysics and Biophysical Principles- II	AS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-2	Follow the latest notification of CU	PHY-CC21-PR- P04	1. Study and identification of stained section of different mammalian tissues and organs: Parotid gland, Submaxillary gland, Sublingual gland, Tongue, Oesophagus, Stomach, Duodenum, Jejunum, Ileum, Large intestine, Liver, Kidney, Ureter, Pancreas, Spleen, Lymph gland, Lung, Trachea, Thyroid gland, Adrenal gland, Ureter, Kidney, Skin, Ovary, Testis, Uterus, Spinal Cord, Cerebellum, Cerebrum, Cardiac muscle, Skeletal Muscle, Smooth muscle, Artery, Vein, Bone, Cartilage.	ZZ	1
				2. Study of charts on Cell signalling	DB	
				Demonstration: Preparation of Buffer and pH measurement.	ZZ	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-2	Follow the latest notification of CU	PHY- IDC21-TH-P03	Unit-I: Blood and Body Fluids.	ZZ	3
				Unit-II: Cardiovascular System	DB	
				Unit-III: Respiratory System	AC	
				Unit-IV: Nerve-muscle Physiology	AS	
				Unit-V: Renal Physiology	SS	

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-2	Follow the latest notification of CU	PHY- IDC21-PR-P04	1. Preparation and staining of human blood film with Leishman's stain and identification of different types of blood cells.	ZZ	1
				2. Determination of haemoglobin by Shali's haemoglobinometer, bleeding time and Clotting time determination.	DB	
				3. Measurement of systolic and diastolic pressure by sphygmomanometer and determination of pulse pressure and mean pressure by auscultatory method.	AC	
				4. Pneumographic recording of normal respiratory movements and effects of hyperventilation and breath-holding.	AS	

**HARIMOHAN GHOSE COLLEGE**  
**DEPARTMENT OF PHYSIOLOGY**  
**LESSON PLAN PHYG (MDC) CBCS (ACADEMIC YEAR 2023-24)**

Academic Year	Semester	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-3	CC3TH/ GEN3 TH	<p><b>Nerve-muscle Physiology</b>            Structure of neurons. Origin and propagation of nerve impulse. Velocity of impulse in different types of nerve fiber. Properties of nerve fibers: all or none law, rheobase and chronaxie, refractory period. indefatigability. 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.</p>	AS	4
			<p><b>Nervous System</b>            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 spinal cord.            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.</p>	AB	
			<p>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.</p>	ZZ	
			<p><b>Special Senses</b>  <i>Olfaction and Gustation:</i> Structure of sensory organ, neural pathway of olfactory and gustatory sensation. Mechanism of olfactory and gustatory sensation. Olfactory and gustatory adaptation. After-taste.</p>	AB	
			<p><i>Audition:</i> Structure of ear, auditory pathway, mechanism of hearing.</p>	ZZ	
			<p><i>Vision:</i> 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.</p>	AS	



Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-3	Follow the latest notification of CU	CC3P/ GEN3 P	<ol style="list-style-type: none"> <li>1. Silver Nitrate preparation of nodes of Ranvier.</li> <li>2. Silver nitrate preparation of corneal cell space.</li> <li>3. Examination and staining of skeletal and cardiac muscles by Methylene Blue stain.</li> <li>4. Demonstration: Use of kymograph, induction coil and mercury key. Recording of simple muscle curve with sciatic-gastrocnemius muscle preparation of toad.</li> <li>5. Determination of visual acuity by Snellen's chart / Landolt's C chart.</li> <li>6. Determination of colour blindness by Ishihara chart.</li> <li>7. Exploration of conductive and perceptive deafness by tuning fork method.</li> </ol>	SS & AS	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-4	Follow the latest notification of CU	CC4TH/ GEN4TH	<b>Endocrinology</b> Hormones- classification. Elementary idea of mechanism of hormone action. <i>Hypothalamus</i> : Basic concept of neurohormone. Hypothalamo-hypophyseal tract and portal system. <i>Pituitary</i> : Histological structure, hormones, functions. Hypo and hyper active states of pituitary gland. <i>Thyroid</i> : Histological structure. Functions of thyroid hormones (T4T3).Thyrocalcitonin. Hypo and hyper-active states of thyroid. <i>Parathyroid</i> : Histological structure, functions of parathyroid hormone. Tetany. <i>Adrenal Cortex</i> : Histological structure and functions of different hormones. Hypo and hyper-active states of adrenal cortex. <i>Adrenal Medulla</i> : Histological structure and functions of medullary hormones. The relation of adrenal medulla with the sympathetic nervous system. <i>Pancreas</i> : 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
				<b>Reproductive Physiology</b> 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	
				<b>Excretory Physiology</b> 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
2023-24	Sem-4	Follow the latest notification of CU	CC4P/GEN4P	<p><b>Study and Identification of Stained Sections of Different Mammalian Tissues and Organs:</b> 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.</p> <p><b>Identification of:</b> Normal constituents of urine: Chloride, Sulphate, Phosphate, Creatinine and Urea; Abnormal constituents of urine: Glucose, Protein, Acetone, Bile pigment and Bile Salt.</p>	AC	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	Sem-4		SEC B2	<p>Basic idea about community, public health issues. Malnutrition in a community, over nutrition and possible remedial measures. Diet management of obese, diabetic.</p> <p>Basic idea of PCM and their prevention. PCM- Marasmus, kwashiorkor. Endemic goiter, rickets, osteomalacia, xerophthalmia, beriberi and their social implications. Etiology, epidemiology and prevention of: Communicable diseases: Malaria, Dengue, Hepatitis and AIDS; Non-communicable diseases – Hypertension and Obesity.</p> <p>Population problem – principles and methods of family planning, and Assisted Reproductive Technologies.</p> <p>Principles of formulation of diet chart of growing children, pregnant &amp; lactating women and diabetic patients.</p>	ZZ & DB	2

Academic Year	Semester	Tentative Dates of University Exam	Course Code	Brief Description of the Topics	Teachers Assigned	No. of Credits
2023-24	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
2023-24	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
2023-24	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
2023-24	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