



**Name of the Department:** Physiology

**Name and Distinctive number of the paper:** MAJOR (MJ)

**Topics:** Fundamental concept of immune System, Physiology of Respiratory System

**Session:** 2023-24

**Semester:** I

| Name of faculty who teaches the topics | Broad topic in university syllabus   | Course Outcome  |
|--|--------------------------------------|---|
| Dr. Parimal Dua                        | Fundamental concept of Immune System | <p>Through the study of the fundamental concepts of the immune system, students acquire:</p> <ol style="list-style-type: none"><li><b>1. Basic Immunology Concepts:</b> Understanding immune system components, including innate and adaptive immunity.</li><li><b>2. Immune Response Mechanisms:</b> Knowledge of innate defences (e.g., barriers, phagocytosis) and adaptive responses (e.g., antigen presentation, memory formation).</li><li><b>3. Cellular and Molecular Interactions:</b> Insights into antigen-antibody interactions and signal transduction pathways.</li><li><b>4. Immune Disorders:</b> Awareness of autoimmunity, immunodeficiencies, and hypersensitivities.</li><li><b>5. Clinical Applications:</b> Understanding of vaccination, immunotherapy, and diagnostic techniques.</li><li><b>6. Evolution and Adaptation:</b> Knowledge of immune system evolution and pathogen evasion strategies.</li><li><b>7. Research Skills:</b> Proficiency in immunology research techniques, data analysis, and critical evaluation.</li><li><b>8. Ethical and Societal Implications:</b> Awareness of bioethics and the role of the immune system in public health.</li></ol> |



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| <p>Dr. Parimal Dua</p> | <p>Physiology of<br/>Respiratory system</p> | <p>Through the study of the physiology of the respiratory system, students acquire:</p> <ol style="list-style-type: none"><li>1. <b>Anatomy and Structure:</b> Understanding the components of the respiratory system, including the lungs, airways, diaphragm, and related structures.</li><li>2. <b>Respiratory Mechanics:</b> Knowledge of the mechanics of breathing, including inspiration and expiration, and the role of the diaphragm and intercostal muscles.</li><li>3. <b>Gas Exchange:</b> Insights into the processes of oxygen and carbon dioxide exchange in the alveoli and the transport of these gases in the blood.</li><li>4. <b>Control of Respiration:</b> Understanding how breathing is regulated by neural and chemical mechanisms.</li><li>5. <b>Lung Volumes and Capacities:</b> Familiarity with different lung volumes and capacities (e.g., tidal volume, vital capacity) and their measurement.</li><li>6. <b>Pathophysiology:</b> Awareness of common respiratory disorders and diseases (e.g., asthma, COPD, pneumonia) and their physiological basis.</li><li>7. <b>Respiratory Physiology in Exercise:</b> Knowledge of how exercise affects respiratory function and gas exchange.</li><li>8. <b>Research and Diagnostic Skills:</b> Proficiency in techniques to assess respiratory function, such as spirometry and blood gas analysis.</li></ol> <p>By studying these topics, students gain a comprehensive understanding of how the respiratory system functions, its importance in overall health, and the basis for various respiratory conditions and their treatments.</p> |
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| Suman Kalyan<br>Khanra                 | Blood & Body fluid                 | <p>Through the study of blood and body fluids, students acquire:</p> <ol style="list-style-type: none"><li>1. <b>Components of Blood:</b> Understanding the different components of blood, including red blood cells, white blood cells, platelets, and plasma.</li><li>2. <b>Functions of Blood:</b> Knowledge of the roles of blood, such as oxygen and nutrient transport, waste removal, immune response, and clotting.</li><li>3. <b>Haematopoiesis:</b> Insights into the process of blood cell formation in the bone marrow.</li><li>4. <b>Blood Typing and Transfusion:</b> Understanding blood types, the Rh factor, and principles of blood transfusion compatibility.</li><li>5. <b>Body Fluids:</b> Knowledge of the various body fluids (e.g., lymph, interstitial fluid, cerebrospinal fluid) and their roles.</li><li>6. <b>Fluid Balance and Homeostasis:</b> Awareness of mechanisms regulating fluid balance and electrolyte homeostasis in the body.</li><li>7. <b>Blood Disorders:</b> Familiarity with common blood disorders and diseases, such as anaemia, leukaemia, and clotting disorders.</li><li>8. <b>Diagnostic Techniques:</b> Proficiency in techniques for analyzing blood and body fluids, such as complete blood count (CBC), blood smears, and biochemical tests.</li></ol> <p>By studying these topics, students gain a comprehensive understanding of the composition and functions of blood and body fluids, the physiological processes involved, and the basis for various haematological and fluid balance-related conditions.</p> |



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| <p>Suman Kalyan<br/>Khanra</p> | <p><b>Cardiovascular<br/>System</b></p> | <p>Through the study of the cardiovascular system, students acquire:</p> <ol style="list-style-type: none"><li>1. <b>Anatomy of the Heart:</b> Understanding the structure of the heart, including chambers, valves, and major blood vessels.</li><li>2. <b>Cardiac Cycle:</b> Knowledge of the phases of the cardiac cycle, including systole and diastole, and how the heart pumps blood.</li><li>3. <b>Electrical Conduction:</b> Insights into the heart's electrical conduction system, including the sinoatrial (SA) node, atrioventricular (AV) node, and the conduction pathways.</li><li>4. <b>Blood Vessels:</b> Understanding the types and functions of blood vessels (arteries, veins, capillaries) and the principles of blood flow and pressure.</li><li>5. <b>Blood Circulation:</b> Knowledge of systemic and pulmonary circulation and how oxygenated and deoxygenated blood are transported throughout the body.</li><li>6. <b>Cardiac Output:</b> Understanding factors that influence cardiac output, such as heart rate and stroke volume.</li><li>7. <b>Regulation of Blood Pressure:</b> Awareness of mechanisms that regulate blood pressure, including neural and hormonal controls.</li><li>8. <b>Cardiovascular Diseases:</b> Familiarity with common cardiovascular diseases, such as hypertension, atherosclerosis, myocardial infarction, and heart failure.</li><li>9. <b>Diagnostic Techniques:</b> Proficiency in techniques used to assess cardiovascular function, such as electrocardiography (ECG), echocardiography, and blood pressure measurement.</li><li>10. <b>Preventive and Therapeutic Measures:</b> Knowledge of lifestyle factors and medical treatments that can prevent or manage cardiovascular diseases.</li></ol> <p>By studying these topics, students gain a comprehensive understanding of how the cardiovascular system functions, its role in maintaining health, and the basis for various cardiovascular conditions and their treatments.</p> |
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**Session:** 2023-24

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**Name of the Department:** Physiology

**Name and Distinctive number of the paper:** MAJOR (MJ)

**Topics:** Fundamentals of body fluids, Immunity, Circulation and Respiration

**Session:** 2023-24

**Semester:** I

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**Name of the Department:** Physiology

**Name and Distinctive number of the paper:** MINOR (MI)

**Topics:** Fundamental concept of immune System, Physiology of Respiratory System

**Session:** 2023-24

**Semester:** II

| Name of faculty who teaches the topics | Broad topic in university syllabus | Course Outcome   |
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| Dr. Parimal Dua                        | Cellular Physiology                | <p>The course outcome of studying cellular physiology typically includes:</p> <ol style="list-style-type: none"><li><b>1. Understanding Cellular Structure and Function:</b> Grasping the fundamental components of cells, such as membranes, organelles, and cytoskeleton, and their specific functions.</li><li><b>2. Cellular Metabolism:</b> Learning about metabolic pathways, including glycolysis, the citric acid cycle, oxidative phosphorylation, and how these processes are regulated.</li><li><b>3. Cell Differentiation and Apoptosis:</b> Understanding how cells differentiate into specific types and the processes regulating programmed cell death (apoptosis).</li><li><b>4. Application to Disease:</b> Applying knowledge of cellular physiology to understand various diseases, including cancer, metabolic disorders, and neurodegenerative diseases, and exploring potential therapeutic interventions.</li></ol> |



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| Dr. Parimal Dua | <b>Biophysical Principles</b> | <p>The course outcome of studying biophysical principles typically includes:</p> <ol style="list-style-type: none"><li>1. <b>Fundamental Biophysics Knowledge:</b><br/>Understanding the basic principles of physics as they apply to biological systems, including mechanics, thermodynamics, and electromagnetism.</li><li>2. <b>Molecular and Cellular Biophysics:</b><br/>Learning how physical principles govern the behaviour of molecules and cells, including protein folding, molecular motors, and membrane dynamics.</li><li>3. <b>Structure-Function Relationships:</b><br/>Understanding how the structure of biological molecules, such as proteins and nucleic acids, relates to their function and dynamics.</li><li>4. <b>Research and Experimental Design:</b><br/>Developing skills in designing and conducting biophysical experiments, as well as analyzing and interpreting data.</li><li>5. <b>Application to Health and Disease:</b><br/>Applying biophysical principles to understand physiological processes and pathologies, and exploring their implications for medical research and biotechnology.</li></ol> |
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| Suman Kalyan<br>Khanra                 | <b>Chemistry of Biomolecules</b><br>(Carbohydrate) | <p>The course outcome of studying carbohydrates typically includes:</p> <ol style="list-style-type: none"><li>1. <b>Carbohydrate Structure and Classification:</b> Understanding the basic structures of carbohydrates, including monosaccharides, disaccharides, oligosaccharides, and polysaccharides, and their classification based on these structures.</li><li>2. <b>Chemical Properties and Reactions:</b> Learning about the chemical properties of carbohydrates and their reactions, including glycosidic bond formation, isomerization, oxidation, and reduction.</li><li>3. <b>Carbohydrate Metabolism:</b> Gaining a thorough understanding of carbohydrate metabolism, including glycolysis, gluconeogenesis, the citric acid cycle, and the pentose phosphate pathway, as well as the regulation of these metabolic pathways.</li><li>4. <b>Function and Role in Biological Systems:</b> Understanding the roles of carbohydrates in biological systems, such as energy storage, structural components, signaling molecules, and recognition sites on cell surfaces.</li><li>5. <b>Glycobiology:</b> Exploring the field of glycobiology, which studies the structure, biosynthesis, and function of glycans (carbohydrate chains) and glycoconjugates (molecules with carbohydrate components).</li><li>6. <b>Application in Biotechnology and Industry:</b> Exploring the applications of carbohydrates in biotechnology and industry, including the production of biofuels, biopolymers, and pharmaceuticals.</li></ol> |



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| <p>Suman Kalyan<br/>Khanra</p> | <p>Chemistry of<br/>Biomolecules</p> | <p><b>Proteins</b></p> <ol style="list-style-type: none"><li><b>Protein Structure and Function:</b><ul style="list-style-type: none"><li>Understanding the primary, secondary, tertiary, and quaternary structures of proteins.</li><li>Learning about protein folding, stability, and the forces that determine protein conformation.</li></ul></li><li><b>Protein Synthesis and Degradation:</b><ul style="list-style-type: none"><li>Exploring the mechanisms of protein biosynthesis, including transcription, translation, and post-translational modifications.</li><li>Studying protein degradation pathways, such as the ubiquitin-proteasome system and autophagy.</li></ul></li><li><b>Protein Function and Interaction:</b><ul style="list-style-type: none"><li>Examining the diverse functions of proteins, including enzymatic catalysis, signal transduction, transport, and structural roles.</li><li>Studying protein-protein interactions and their role in cellular processes.</li></ul></li></ol> <p><b>Nucleic Acids</b></p> <ol style="list-style-type: none"><li><b>Structure and Properties of Nucleic Acids:</b><ul style="list-style-type: none"><li>Understanding the chemical and physical properties of DNA and RNA.</li><li>Learning about the double-helix structure of DNA and the various structural forms of RNA.</li></ul></li><li><b>Gene Regulation and Expression:</b><ul style="list-style-type: none"><li>Examining the regulation of gene expression at the transcriptional, post-transcriptional, translational, and post-translational levels.</li><li>Understanding the role of non-coding RNAs in gene regulation.</li></ul></li></ol> <p><b>Lipids</b></p> <ol style="list-style-type: none"><li><b>Lipid Structure and Classification:</b><ul style="list-style-type: none"><li>Understanding the basic structures of lipids, including fatty acids, triglycerides, phospholipids, sphingolipids, and sterols.</li></ul></li></ol> |
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| Suman Kalyan Khanra                    | Digestive System & Metabolism      | <p><b>Digestive System</b></p> <ol style="list-style-type: none"> <li>1. <b>Anatomy and Physiology of the Digestive System:</b> <ul style="list-style-type: none"> <li>○ Understanding the structure and function of the digestive organs, including the mouth, esophagus, stomach, intestines, liver, pancreas, and gallbladder.</li> <li>○ Learning about the histology of the digestive tract and the role of different cell types in digestion.</li> </ul> </li> <li>2. <b>Digestive Processes and Enzymes:</b> <ul style="list-style-type: none"> <li>○ Studying the mechanical and chemical processes of digestion, including the role of digestive enzymes and bile in breaking down food into absorbable nutrients.</li> <li>○ Understanding the process of nutrient absorption in the small intestine and the role of the large intestine in water and electrolyte balance.</li> </ul> </li> <li>3. <b>Regulation of Digestion:</b> <ul style="list-style-type: none"> <li>○ Exploring the neural and hormonal regulation of digestive processes, including the enteric nervous system and the role of hormones such as gastrin, cholecystokinin, and secretin.</li> <li>○ Understanding the feedback mechanisms that control digestive enzyme secretion and gastrointestinal motility.</li> </ul> </li> <li>4. <b>Nutrient Assimilation and Transport:</b> <ul style="list-style-type: none"> <li>○ Learning how carbohydrates, proteins, fats, vitamins, and minerals are</li> </ul> </li> </ol> |



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|  |  | <p>digested, absorbed, and transported in the body.</p> <ul style="list-style-type: none"><li>○ Studying the impact of different diets and dietary components on digestion and nutrient absorption.</li></ul> <p><b>5. Disorders of the Digestive System:</b></p> <ul style="list-style-type: none"><li>○ Understanding common digestive disorders and diseases, such as gastroesophageal reflux disease (GERD), peptic ulcers, inflammatory bowel disease (IBD), and irritable bowel syndrome (IBS).</li><li>○ Learning about the causes, symptoms, diagnosis, and treatment of these disorders.</li></ul> <p><b>6. Clinical and Diagnostic Techniques:</b></p> <ul style="list-style-type: none"><li>○ Gaining knowledge of clinical techniques used to diagnose and treat digestive system disorders, such as endoscopy, colonoscopy, imaging studies, and laboratory tests.</li></ul> |
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