

DEPARTMENT OF PHYSIOLOGY

| Competency | Domains | Levels | Specific Learning Objective (K/S/A-c) | T-L Method | Assessment |
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| Topic : GENERAL PHYSIOLOGY | | | | | |
| PY.1.1 Describe the structure and functions of a mammalian cell | K | KH | At the end of session phase I MBBS student must be able to - 1. Draw the structure of a cell 2. Explain the function of cell organelles 3. Describe the Structure of cell membrane 4. Mention the function of different components of cell membrane. 5. Enumerate functions of cell membrane. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.1.2 Describe and discuss the principles of homeostasis | K | KH | At the end of session phase I MBBS student must be able to - 1. Define key terms related to homeostasis 2. Explain the feedback mechanism of homeostatic regulation 3. Explain homeostatic regulation of each system 4. Discuss what happens if homeostasis is not maintained. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.1.3 Describe intercellular communication | K | KH | At the end of session phase I MBBS student must be able to - 1. Name various cytoskeletons & molecular motors of cell 2. Enumerate functions of cytoskeleton & molecular motors of cell. 3. Classify intercellular Junctions. 4. Discuss the function of intercellular Junction. 5. Describe the importance of gap Junction in health & disease 6. Classify cell adhesion molecules. 7. Mention function of cell adhesion molecules 4. Discuss the function of intercellular connection. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.1.4 Describe apoptosis - programmed cell death | K | KH | At the end of session phase I MBBS student must be able to - 1. Define apoptosis 2. Describe the mechanisms of apoptosis 3. Explain how apoptosis is regulated 4. Describe the steps of apoptosis 5. Discuss the importance of apoptosis. | Lecture, Small group discussion | Written/ Vivavoce |

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| <p>PY.1.5 Describe and discuss transport mechanism across cell membranes</p> | <p>K</p> | <p>KH</p> | <p>student must be able to -</p> <ol style="list-style-type: none"> 1. Elicit common ion channels in the cell membrane. 2. Describe the gating of ion channels. 3. List the different types of carrier proteins with examples. 4. Classify transport processes. 5. Compare & contrast passive & active transport mechanisms. 6. Discuss factors that determine rate of diffusion or osmosis. 7. Explain the primary & secondary action transport process with example. 8. Describe the structure of Na⁺ - K⁺ ATPase. 9. Describe the Mechanism of action of Na⁺- K⁺ ATPase 10. Describe the function of Na⁺- K⁺ pump. 11. Briefly describe other types of ATPases. 12. Discuss the mechanisms & importance of vesicular transport. 13. Compare & contrast exocytosis & endocytosis. 14. Compare & contrast Phagocytosis Pinocytosis & receptor mediated endocytosis. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.1.6 Describe the fluid compartments of the body, its ionic composition & measurements</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Describe the various body fluid compartments 2. Define transcellular fluid & mention its significance 3. Describe the composition of E.C.F & I.C.F 4. Explain Gibbs - Donnan effect 5. Discuss the distribution of water in extracellular & intracellular body fluid compartments. 6. Explain the importance of electrolytes in body fluid composition. 7. Differentiate between iso- osmolality & isotonicity. 8. Discuss the units of measurement 9. List some of the indicators used. 10. Describe the basic principle & method of measurement of body fluid volume of different compartments. 11. Explain why dehydration is common & often seen in children. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.1.7 Describe the concept of Ph & Buffer systems in the body</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define PH & Highlight its importance 2. Enumerate sources of acids in the body fluid 3. Explain the concept of buffer system 4. Enumerate the buffers of body fluid 5. Explain how buffers of body fluid work. 6. Describe the respiratory regulation of PH 7. Explain how pH is regulated by renal mechanisms 8. Elucidate the rate of plasma K⁺ & intracellular & arterial PH is regulating H⁺ secretion. 9. Highlight the significance of ammonium & phosphate buffer in regulating pH. 10. Describe the types & causes of acid - base disturbance 11. Describe respiratory acidosis & alkalosis & their compensatory mechanisms. 12. Describe metabolic acidosis & alkalosis & their compensatory mechanisms. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |

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| <p>PY.1.8 Describe and discuss the molecular basis of resting membrane potential and action potential in excitable tissue</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define resting membrane potential (RMP) 2. Describe the mechanism of genesis & maintenance of RMP 3. Explain how is the RMP calculated 4. Enumerate normal values of RMP of different excitable tissues & Equilibrium Potential of Important ions 5. Discuss the principle of recording of RMP. 6. Describe the distribution & working of ion channels on neuronal membrane 7. Explain the importance of electrotonic potentials. 8. Draw a labeled schematic diagram of action potential. 9. Describe the ionic basis of each phase of action potential. 10. Define refractory periods of nerve action potential. 11. Explain importance of refractory period. 12. Explain the mechanism of propagation of action potential along the axon. 13. Explain the Importance of saltatory conduction. 14. Differentiate between graded potential & Action potential. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.1.9 Demonstrate the ability to describe and discuss the methods used to demonstrate the functions of the cells and its products, its communications and their applications in Clinical care and research.</p> | | | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Discuss the methods used to demonstrate the functions of the cells and its products, its communications 2. Describe their applications in Clinical care and research. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |

Topic : HAEMATOLOGY

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| <p>PY2.1 Describe the composition and functions of blood components</p> | | | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define blood and give the composition. 2. Describe the functions of the blood. 3. Describe the layers of blood after centrifugation, name the cells present in buffy coat and give uses of buffy coat preparation. 4. Discuss the normal value of blood volume in adults and children. 5. Describe the methods of blood volume measurement. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.2.2 Discuss the origin, forms, variations and functions of plasma proteins</p> | | | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define plasma & serum. 2. Differentiate between plasma & serum. 3. List the composition of plasma. 4. Discuss plasma proteins. 5. Describe their synthesis of plasma protein. 6. Describe the function of albumin, globulin & fibrinogen. 7. Define protease inhibitors & explain their function. 8. Explain the functions of carrier proteins. 9. List a brief account on functions of acute phase proteins. 10. Explain the various methods that can be used for separation of plasma proteins with explain in brief each of them. 11. Explain the consequence of fall in plasma proteins during starvation. 12. Discuss briefly afibrinogenemia & other hereditary disorders of plasma protein. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.2.3 Describe and discuss the synthesis and functions of Haemoglobin and explain its breakdown. Describe variants of haemoglobin</p> | | | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Describe the structure of haemoglobin 2. Explain the biosynthesis of haemoglobin. 3. Explain the effects of Pco₂, OpH, & 2,3-BPG on the oxyhemoglobin dissociation curve. 4. Explain the physiological significance of hexosemonophosphate shunt & 2,3bisphosphoglycerated shunt. 5. Discuss the site and mechanism of red cell destruction. 6. Describe the fate of destroyed red cells. 7. List the common causes of hemolytic jaundice 8. Explain why hemolytic jaundice is common in newborns. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |

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| <p>PY.2.4 Describe RBC formation (erythropoiesis & its regulation) and its functions</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define erythropoiesis, give the stages and sites of erythropoiesis, 2. Differentiate extramedullary from medullary erythropoiesis. 3. Describe different steps of erythropoiesis with the help of schematic diagram of cells. 4. Describe the details of regulation of erythropoiesis. 5. Give the source, mechanism of action and functions of erythropoietin, and regulation of erythropoietin secretion. 6. List the differences between red cells and reticulocytes. 7. Discuss structure and normal count of reticulocyte and alteration in reticulocyte count in different conditions. 8. Enumerate the importance of reticulocyte response. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.2.5 Describe different types of anaemias & Jaundice</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define anemia. 2. Classify anemia, and give the common causes of each category of anemia. 3. Discuss the salient blood picture of common types of anemia. 4. Define jaundice. 5. Classify jaundice. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.2.6 Describe WBC formation (granulopoiesis) and its regulation</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Classify leucocytes, give the percentage of different leucocytes in blood. 2. Describe the steps of leucopoiesis. 3. Discuss the general life history of leucocytes. 4. Describe the structure and functions of leucocytes. 5. List the common causes of decrease and increase of each type of leucocyte. 6. Explain the mechanism of phagocytosis and killing of organisms by neutrophil. 7. List the components of mononuclear-phagocyte system (MPS). 8. Describe the general role of leucocytes in defence mechanisms of the body. 9. Define and classify leukemia. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |

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| <p>PY.2.7 Describe the formation of platelets, functions and variations.</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Explain the steps of thrombopoiesis 2. Describe regulation of thrombopoiesis 3. Describe the structure (cytoskeletal systems and granules) of platelet and correlate the structure with platelet functions. 4. List the causes of thrombocytosis and thrombocytopenia. 5. List the platelet function tests. 6. Discuss common platelet dysfunctions. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.2.8 Describe the physiological basis of hemostasis and, anticoagulants. Describe bleeding & clotting disorders (Hemophilia, purpura)</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define hemostasis. 2. List the major steps of hemostasis. 3. Explain the properties of platelet, especially platelet adhesion, aggregation and release reaction. 4. Explain the role of platelet in hemostasis, with special reference to the role in temporary hemostatic plug formation. 5. Describe clotting factors with the mechanisms (intrinsic and extrinsic) of blood coagulation. 6. Enumerate the importance of clot retraction. 7. Explain the anticlotting mechanism (process of fibrinolysis). 8. Discuss the physiological basis of use of fibrinolytic agents in coronary artery disease and stroke. 9. List the anticoagulants. 10. List the investigations for detection of defects in temporary and definitive hemostatic plug formation. 11. Enumerate the common abnormalities of coagulation. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.2.9 Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. List the uses of blood groups, classify blood groups, give the physiological basis of blood grouping. 2. Describe the agglutinogens, agglutinins in ABO system, give % distribution of ABO blood groups in population. 3. Describe the mechanism of inheritance of ABO blood groups. 4. Define Landsteiner's law and give its physiological basis. 5. Describe the antigens and antibodies in Rh system, and the mechanism of Rh incompatibility. 6. Explain the etiology, features, physiological basis of treatment and prevention of erythroblastosis fetalis. 7. Discuss the concept of universal donor, universal recipient, and major and minor cross matching. 8. List the usual hazards of blood transfusion. | <p>Lecture, Small group discussion, ECE- Visit to blood bank</p> | <p>Written/ Viva voce</p> |
| <p>PY.2.10 Define and classify different types of immunity. Describe the development of immunity and its regulation</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define immunity. 2. Classify immunity and give examples for each. 3. Classify lymphocytes and give their functions. 4. List the nonspecific defence mechanisms, and list the functions of NK cells. 5. List the cells of mononuclear phagocyte system. 5. Understand how inflammation and fever defend the body from microorganism. 6. Describe the primary and secondary lymphoid organs and outline the general principles of immunity. 7. Describe the mechanism of cellular and humoral immunity. 8. List the antibodies and give their functions. 9. Describe the complements and give their functions. 10. Explain the mechanism of immunological tolerance. 11. Discuss the physiological basis of rejection of organ transplants and the prevention of its rejection. 12. Classify immunological disorders and give one example of each disorder. 13. Discuss the dysfunctions in AIDS to the pathophysiological problems. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |

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| PY.2.11 Estimate Hb, RBC, TLC, RBC indices, DLC, Blood groups, BT/CT | S | SH | At the end of session phase I MBBS student must be able to - 1. Indicate the relevance of the experiment. 2. Identify the instruments. 3. Demonstrate the procedure of experiment. 4. Perform the procedure of experiment. | DOAP sessions | Practical/ OSPE Viva voce |
| PY.2.12 Describe test for ESR, Osmotic fragility, Hematocrit. Note the findings and interpret the test results etc | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe the relevance of doing experiment. 2. Identify the instruments. 3. Demonstrate the procedure of experiment. 4. Perform the procedure of experiment. | Demonstration | Written/ Vivavoce |
| PY.2.13 Describe steps for reticulocyte and platelet count | | | At the end of session phase I MBBS student must be able to - 1. Indicate the relevance of the experiment. 2. Identify the instruments. 3. Demonstrate the procedure of experiment. 4. Perform the procedure of experiment. | Demonstration sessions | Written/ Vivavoce |
| Topic : NERVE AND MUSCLE PHYSIOLOGY | | | | | |
| PY.3.1- Describe the structure and function of a neuron and neuroglia; Discuss Nerve Growth factor & other growth factor / cytokines | K | KH | At the end of session phase I MBBS student must be able to - 1. Draw a well labelled diagram of neuron 2. Describe the structure of neuron 3. Describe the function of neuron 4. Describe the types of neuron 5. Describe the structure of neuroglia 6. Describe the function of neuroglia 7. Discuss factors promoting neuronal growth. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.2 Describe the types, function & properties of nerve fibers | K | KH | At the end of session phase I MBBS student must be able to - 1. Classfy the different types of nerve fibres. 2. Describe the functions of nerve fibres 3. Describe the properties of nerve fibres | Lecture, Small group discussion | Written/ Vivavoce |

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| PY.3.3 Describe the degeneration and regeneration in peripheral nerves | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe the structure of peripheral nerve 2. Classify the grading of nerve injury 3. Describe the stage of degeneration 4. Describe the stage of Regeneration. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.4 Describe the structure of neuro-muscular junction and transmission | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe the structure of neuromuscular junction 2. Describe the sequence of events occurring at the neuro muscular junction. | Lecture, Small group discussion | Written/ Vivavoce |
| PY. 3.5 Discuss the action of neuro-muscular blocking agents | K | KH | At the end of session phase I MBBS student must be able to - 1. Classify drugs action at the neuromuscular junction 2. Describe the mechanism of action drugs action at NMT. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.6 Describe the pathophysiology of Myasthenia gravis | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe the basis & features of Myasthenia gravis | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.7 Describe the different types of muscle fibres and their structure | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe the different types of muscle fibres 2. Describe the structure of skeletal muscle fibres 3. Describe the structure of smooth muscle fibres Describe the sarcotubular system | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.8 Describe action potential and its properties in different muscle types (Skeletal & smooth) | K | KH | At the end of session phase I MBBS student must be able to - 1. Draw a well labelled diagram of action potential of skeletal muscle 2. Describe the ionic basis of each of the phases of action potential of skeletal muscle. 3. Describe the electrical properties of skeletal muscle. 4. Describe the mechanical properties of skeletal muscle. 5. Draw a well labelled diagram of action potential of smooth muscle 6. Describe the ionic basis of each of the phases of action potential of smooth muscle. 7. Describe the properties of smooth muscle. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.9 Describe the molecular basis of muscle contraction in skeletal and in smooth muscles | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe the functional unit of the skeletal muscle - the sarconerve 2. Describe the steps innolved in action - myosin interaction & generation of the power stroke. 3. Describe the process of excitatrility & contractility of smooth muscle. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.10 Describe the mode of muscle contraction (isotonic) | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe the mode of muscle contraction 2. Differentiate b/w isotonic & isometric contraction | Lecture, Small group discussion | Written/ Vivavoce |

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| PY.3.11 Explain energy source and muscle metabolism | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe the source of energy for muscle contraction 2. Describe the fenn effect 3. Describe the basis of rigor mortis. | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.12 Explain the gradation of muscular activity | K | KH | At the end of session phase I MBBS student must be able to - 1. Discuss factors increasing the power of muscle contraction | Lecture, Small group discussion | Written/ Vivavoce |
| PY. 3.13 Describe muscle dystrophy: myopathies | K | KH | At the end of session phase I MBBS student must be able to - 1. Describe duchenne's muscular dystrophy 2. Describe decter's muscular dysprophy 3. Describe myotonia 4. Describe fibrillation 5. Describe denervation hypersensensitivity | Lecture, Small group discussion | Written/ Vivavoce |
| PY.3.14 Perform Ergography | S | SH | At the end of session phase I MBBS student must be able to - 1.Purpose of performacy ergography 2. Identify ergograph 3.Demonstrate the procedure of ergography 4. Classify the WHO critesia of grading of exercise 5. Calculate the work done. | DOAP sessions | Practical/ OSPE Viva voce |
| PY.3.15 Demonstrate effect of mild, moderate and severe exercise and record changes in cardiorespiratory parameters | S | SH | At the end of session phase I MBBS student must be able to - 1. Demonstrate the procedure of recording blood pressure. 2. Demonstrate the procedure of recording heart rate & respiratory rate. 3. Describe the grade of exercise according to WHO. 4. Demonstrate the drocedure to see the effect of mild moderate severe exercise on different cardiorespiratory parameters 5. Indicate the purpose of this experiment. | DOAP sessions | Practical/ OSPE Viva voce |
| PY.3.16 Demonstrate Harvard step test and describe the impact on induced physiologic parameters in a simulated envirobment | S | SH | At the end of session phase I MBBS student must be able to - 1. Describe the purpose of this experiment 2. Demonstrate Harvard step test 3. Interpret the effect of test on various physiologic parameters | DOAP sessions | Practical/ OSPE Viva voce |
| PY.3.17 Describe Strength-duration curve | K | KH | At the end of session phase I MBBS student must be able to - 1. Draw, strength - duration curve 2. Describe Strength - duration curve 3. Define Rheobase 4. Define Chronaxie 5. Define utilization time | Lecture, Small group discussion | Written/ Vivavoce |

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| <p>PY.3.18 Observe with Computer assisted learning (i) amphibian nerve - muscle experiment (ii) amphibian cardiac experiments</p> | <p>S</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to - (i) 1. Demonstrate the gastronenuis muscle & sciatic nerve preparation of frog 2. Recording of a simple muscle twittch 3. Demonstrate the effect of temperature on the simple muscle twitch 4. Demonstrate the effect of two succesive stimuli on skeletal muscle contraction 5. Demonstrate the increasing strength of stimulus on skeletal muscle contraction 6. Demonstrate the effect of increasing frequcnay of stimuli on skeletal muscle contraction 7. Demonstrate the effect of load on skeletal muscle conrtraction 8. Demonstrate the effet of fatigue in skeletal muscle Determine the conduction velocity of the sciatic nerve (ii) 1. Recording of a normal cardiogram 2. Demonstrate the effect of temp.on cardiac muscle. 3. Demonstrate the properties of cardiac muscle 4. Demonstrate the effect of stimulation of the vague nerve & white crescentic time on the cardiogram.</p> | <p>Demonstration, computer assisted learning methods</p> | <p>Practical/ Viva voce</p> |
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Topic : GASTRO-INTESTINAL PHYSIOLOGY

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| <p>PY.4.1 Describe the structure and functions of digestive system</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to - 1. Discribe the functional anatomy of GI tract. 2. List the function of GI tract. 3. Describe the layers of wall of GI tract with their functional importance 4. Differentiate in sympathetic & parasympathetic stimulation an GI functions. 5. Describe the organization of enteric nervous system. 6. List the principles of GI regulations. 7. Describe the innervation of GI tract 8. Describe the principle of GI regulations.</p> | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
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Department of Physiology
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| <p>PY.4.2 Describe the composition, mechanism of secretion, functions, and regulation of saliva, gastric, pancreatic, intestinal juices and bile secretion</p> | <p>K</p> | <p>KH</p> <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Describe the phases of GI secretion their physiological importance. 2. List the general function of GI secretion. 3. Describe the salivary glands. 4. Discuss the composition of saliva with its function. 5. Describe the mechanism of salivary secretion. 6. List the dysfunctions that occur due to abnormalities of salivary secretion. 7. Describe the regulation of salivary secretion. 8. Enumerate the physiological basis of salivary dysfunctions. 9. List the functions of stomach. 10. Describe the structure of gastric gland. 11. Differentiate in the structure of resting with activated parietal cell. 12. Discuss the composition with functions of gastric juice. 13. Describe the mechanism of gastric secretion. 14. Describe the regulation of gastric secretion 15. Discuss gastric function test with their normal values. 16. Describe the physiological basis of etiology of peptic ulcer. 17. Describe the importance of exocrine pancreas in digestion with absorption of food. 18. List the composition of pancreatic juice with its functions. 19. Describe the mechanism of pancreatic secretion. 20. Describe the regulation in different phases of pancreatic secretion. 21. Describe the pancreatic function tests. 22. List the composition of bile with its function. 23. Describe the composition with function of bile. 24. List the differences between hepatic gallbladder bile. 25. Describe bile salt with acids give their functions. 26. Discuss the importance of enterohepatic circulation. 27. Describe the mechanism with regulation of bile secretion. 28. Explain the physiological basis on gallstone formation. 29. Describe the regulation of bile secretion. 30. Describe the importance of intestinal secretion in digestion with absorption of nutrients. 31. Discuss the mucosal modifications in intestinal epithelium to increase the surface area for absorption. 32. List the composition with functions of intestinal secretions. 33. Discuss the importance of Intestinal flora in GI physiology. 34. Describe the physiological basis of malabsorption syndrome. 35. Describe the Importance of physiology of the colon. 36. Discuss the importance of colonic bacteria. 37. Describe the physiology of water absorption with secretion through GI tract. 38. Describe the electrophysiology of smooth muscle with GI movement. 39. Describe a labeled diagram of slow wave of GI smooth muscle. 40. List the types of GI motilities and give their functions. 41. Describe the role of various sphincters in GI tract. 42. Discuss the applied aspects of physiology of GI motility. 43. List the gastric motilities. 44. Describe the electrophysiology gastric smooth muscle. 45. List the type of gastric relaxation with its importance. 46. Describe the mechanism with regulation of gastric emptying. 47. Discuss the mechanism of vomiting. 48. Describe the importance of intestinal movements in mixing propelling with absorption of food materials in GI tract. 49. Describe the intestinal motilities, give their mechanism with functions. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
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| <p>PY.4.3 Describe GIT movements, regulation and functions. Describe defecation reflex. Explain role of dietary fibre.</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. List the gastric motilities. 2. Describe the electrophysiology gastric smooth muscles. 3. Explain the type of gastric relaxations with importance. 4. Describe the mechanism with regulation of gastric emptying 5. Describe pathway of defecation reflex with mechanism. 6. Describe the role of Dietary fibre. 7. Explain the physiology of colonic movement, colonic reflex with their functions. 7. Describe the mechanism with significance of colonic movement. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.4.4 Describe the physiology of digestion and absorption of nutrients</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Describe the principle of digestion with absorption of carbohydrate protein fat, with other nutrients from GIT. 2. Explain the Physiological basis of common malabsorption syndromes 3. Discuss the importance of digestion with absorption of various nutrients 4. Describe the mechanism of digestion and absorption of each category of nutrients. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.4.5 Describe the source of GIT hormones, their regulation and functions</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Classify GI hormones 2. Describe the structure source with functions of GI hormones. 3. Describe the role of GI hormones in the regulation of GI functions. 4. Discuss the dysfunctions of produced by alteration in secretion of GI hormones. 5. Describe the details of GI hormones. 6. Explain the role of GI hormones in GI functions and dysfunctions | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.4.6 Describe the Gut-Brain Axis</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Describe the Gut-Brain Axis | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.4.7 Describe & discuss the structure and functions of liver and gall bladder</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. List the functions of Liver. 2. Describe the bilirubin metabolism. 3. Describe the functional architecture of hepatic lobuli. 4. Classification of jaundice. 5. Explain the pathophysiology of jaundice. 6. Describe the physiological abnormalities in gallstone formation. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |

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| <p>PY.4.8 Describe & discuss gastric function tests, pancreatic exocrine function tests & liver function tests</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Describe liver function test. 2. Describe gastric function test. 3. Describe the pancreatic function test. 4. Describe exocrine function test. 5. Describe liver function test. | <p>Lecture, Small group discussion Demonstration Escophageal Manometry & endoscopy</p> | <p>Written/ Vivavoce</p> |
| <p>PY.4.9 Discuss the physiology aspects of: peptic ulcer, gastrooesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Describe peptic ulur. 2. List gestrooesophageal reflex desease. 3. Describe vomitting reflex with mechanism. 4. Explain diarrhoea. 5. Explain the physiological basis of Hirsehprung disease irritable. 6. Describe constipation. 7. Describe adynamic ileus. 8. Explain gastrosophageal reflex disease. 9. Explain bowel syndrome. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.4.10 Demonstrate the correct clinical examination of the abdomen in a normal volunteer or simulated environment</p> | <p>S</p> | <p>SH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Interpret the different abdominal regions for clinical purposes. 2. Indentify the Important signs & syntptoms of GIT disease. 3. Demonstrate palpation of abdomen for spleen, liver and kidneys . 4. Demonstrate the presence of free fluid in the abdominal cavity. 5. Auscustate the abdomen for bowel sound , correlate these with intestinal dysfunctions | <p>DOAP sessions</p> | <p>Skill assessment/ Viva voce/ OSCE</p> |

Topic : CARDIOVASCULAR PHYSIOLOGY (CVS)

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| <p>PY.5.1 Describe the functional anatomy of heart including chambers, sounds; and Pacemaker tissue and conducting system.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the structure of heart including different chamber's valves, layers like pericardium myocardium and endocardium. 2. Discuss different types of heart sounds their location on precordium, their timing in cardiac cycle and abnormalities. 3. Discuss in detail about normal pacemaker and conducting tissue of heart. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.5.2 Describe the properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe structure of cardiac muscle. 2. List the different mechanical and electrical properties of cardiac muscle. 3. Discuss different metabolic functions of cardiac muscle. 4. Differentiate between structure and function of cardiac, skeletal and smooth muscle. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.5.3 Discuss the events occurring during the cardiac cycle</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. List the different phases of cardiac cycle 2. Describe the pressure and volume change in each phase of cardiac cycle. 3. Describe the genesis of the heart sounds. 4. Enumerate event during a single cardiac cycle. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.5.4 Describe generation, conduction of cardiac impulse</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the mechanism of generation of cardiac impulse in the S.A node and pacemaker potential. 2. List the sequence of pathway of electrical excitation of the heart. 3. Describe the functional significance of A-V nodal delay. 4. List the effect of sympathetic and parasympathetic stimulation on generation and conduction of the cardiac impulse. 5. Describe the consequences of different abnormalities of aberrant excitation in heart including 1.ectopic pacemaker.2. walf - parkinson - white syndome. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.5.5 Discribe the physiogy of electro cardiogram (ECG) its application and cardiac axis.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the electrical basis of the electrocardiogram (ECG). 2. Discuss the relationship of the ventricular muscle action potential and the waves of the ECG. 3. Describe different waves, segment and intervals of a normal electrocardiogram and match the parts to electrical events in the heart. 4. Discuss Einthovens law. 5. Describe the various type of of ECG leads regarding their location and polarity and configuration of waves in the ECG. 6. Discuss definition of mean cardiac axis methods to determine mean cardiac axis and its application in diagnosing different heart disease. 7. Discuss the use of ECG in determining different cardiac parametors like heart rate, rhythms etc. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |

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| <p>PY.5.6 Describe abnormal ECG arrhythmic heart block and myocardial infarction</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the changes in the ECG that occur with disturbance in the conducting system of the heart including common arrhythmias. 2. Discuss change in ECG during first, second and third degree heart block. 3. Discuss ECG change which are evident during right and left ventricular hypertrophy. 4. Describe the changes in the ECG that occur with myocardial ischemia and infarction. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.5.7 Describe and discuss haemodynamics of circulatory system</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the relation between flow, pressure and resistance as by Poiseuille's law. 2. Differentiate between laminar and turbulent blood flow and discuss Reynold's number. 3. Describe in detail about autoregulation of blood flow. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.5.8 Describe and discuss local and system cardiovascular regulation mechanism.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the acute and long term mechanism of control of blood flow. 2. Define autoregulation and describe the mechanism by which it might act. 3. Describe how metabolic regulation of local blood flow take place. 4. Define the terms reactive hyperemia and active hyperemia. 5. List the major vasoconstrictor and vasodilator substance and describe the mechanism of their actions. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.5.9 Describe factors affecting heart rate, regulation of cardiac output and blood pressure.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. List factors affecting heart rate. 2. Discuss different mechanism including neural and humoral which increase or decrease heart rate. 3. Define cardiac output and its resting value in different physiological conditions. 4. Discuss different methods of measurement of cardiac output. 5. List different determinants of cardiac output and venous return. 6. Describe the intrinsic regulation of cardiac output. 7. Describe the control of cardiac output by the autonomic nervous system extracellular ions and other factors. 8. Define blood pressure and discuss its different component like systolic diastolic, pulse and mean arterial blood pressure. 9. List the different factors which determine arterial blood pressure. 10. Discuss the diagram of arterial pulse pressure trace and its different parts. 11. Define vascular compliance and list its determinants. 12. Describe physio-anatomy of the baroreceptors. 13. Describe the role of baroreceptors in maintaining arterial blood pressure. 14. Discuss how the baroreceptors are adapted. 15. Describe the role of Bainbridge reflex, Cushing reflex, CNS ischemic response and chemoreceptor reflex. 16. Discuss the role of baroreceptor reflex in preventing blood pressure drop during posture changes from lying to standing. 17. Describe the role of renal body fluid mechanisms in arterial blood pressure regulation. 18. Describe the components of the renin-angiotensin system. 19. Describe the role of renin-angiotensin system in long term regulation arterial blood pressure. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |

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| <p>PY5.10 Describe the discuss regional circulation including microcirculation, lymphatic circulation coronary, cerebral, capillary, skin foetal pulmonary and splanchnic circulation</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the regional blood flow of the major organs in the body as a percentage cardiac output as per unit tissue mass. 2. Describe the structure of the microcirculation. 3. List the functions of microcirculation. 4. Describe how blood flow through microcirculation controlled. 5. Discuss the role of Starling forces in fluid exchange in capillaries. 6. List the factors that affect the exchange of nutrients in the capillaries. 7. Describe the mechanism of formation of lymph. 8. List different functions of lymphatic system in human body. 9. List the factors that influence lymphatic flow. 10. Describe the physiology of the coronary circulation. 11. List the determinants of coronary blood flow. 12. Discuss the pathophysiology of ischemic heart diseases. 13. Describe the physiology of the cerebral circulation, 14. Discuss factors that affect cerebral blood flow. 15. Describe the micro anatomy of cutaneous circulation. 16. Describe functional anatomy of fetal circulation, 17. Discuss the change fetal circulation at birth, 18. Discuss the circulatory adjustments that occur with (a) patent ductus arteriosus (b) Tetralogy of Fallot. 19. List the peculiar features of pulmonary circulation. 20. Discuss different determinants of regional variations of circulation. 21. List the factors that regulate pulmonary circulation. 22. Discuss the regional variations of ventilation-perfusion ratio. 23. Discuss the concept of physiological dead space. 24. Discuss the structure of splanchnic circulation. 25. Describe the counter-current blood flow mechanism in villi. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.5.11 Describe the pathophysiology of shock syncope and heart failure</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Define shock and describe different negative and positive feedback mechanisms operated in different types of shock. 2. Classify different types of shock according to etiology. 3. Discuss different stages of shock like compensated, decompensated and irreversible shock. 4. Describe the principles of management of shock patient. 5. Discuss the pathophysiology of syncope and its management. 6. Discuss the circulatory dynamics changes involved in cardiac failure. 7. Differentiate left heart failure with right heart failure. 8. Differentiate between compensated and decompensated heart failure. 9. Discuss how to manage a patient of cardiac failure. 10. Discuss the concept of cardiac reserve. | <p>Lecture, Small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY 5.12 Record blood pressure and pulse at rest and in different grades of exercise and posture in a volunteer or simulated in environment</p> | | | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Record blood pressure at rest. 2. Perform independently arterial pulse examination. 3. Demonstrate effect of different grades of exercise on blood pressure and pulse. 4. Demonstrate effect of posture change on blood pressure and pulse. | <p>DOAP sessions</p> | <p>Practical/OS PE/ Viva voce</p> |

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| <p>PY5.13 Record and interpret normal ECG in a volunteer or simulated in environment</p> | | | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Record ECG in a volunteer. 2. Interpret normal ECG of a volunteer regarding heart rate, rhythm, different intervals, segments and voltage. 3. Perform determination of mean cardiac axis. | DOAP sessions | Practical/ OSPE/ Viva voce |
| <p>PY5.14 Observe cardiac autonomic function test in a volunteer or simulated in environment</p> | | | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Demonstrate cardiac sympathetic function tests in a volunteer. 2. Demonstrate cardiac parasympathetic function tests in a volunteer. | DOAP sessions | Skill assessment/ Viva voce |
| <p>PY 5.15 Demonstrate the correct clinical examination of the cardiovascular system in a normal volunteer or simulated environment.</p> | | | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Perform independently clinical examination of cardiovascular system. 2. Interpret the abnormal signs and symptoms on clinic examination of cardiovascular system | DOAP sessions | Practical/ OSPE/ Viva voce |
| <p>PY 5.16 Record arterial pulse tracing using finger plethysmography in a volunteer or simulated environment</p> | | | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Demonstrate recording of arterial pulse tracing using finger plethysmography 2. Interpret the record of arterial pulse tracing | DOAP sessions Computer assisted learning methods | Practical/ OSPE/ Viva voce |

Department of Physiology
Muzaffarnagar Medical College

Topic : RESPIRATORY PHYSIOLOGY

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| <p>6.1 Describe the functional anatomy of respiratory tract</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. Describe the anatomical organization of the airways. 2. Describe the organization of lungs 3. Enumerate layers of alveolus across which diffusion of gases occur. 4. Describe the physical laws applicable in respiratory physiology. 5. List the nonrespiratory functions of lungs. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.6.2 Describe the mechanics of normal respiration, pressure changes during ventilation, lung volumes and capacities, alveolar surface tension, compliance, airway resistance, ventilation, V/P ratio, diffusion capacity of lungs.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. Describe the role of muscles of inspiration and expiration. 2. Describe the pressure-flow-volume changes during respiration. 3. Define the lung volumes. 4. Define the lung capacities. 5. List the factors contributing to the stability of alveoli. 6. List the composition of surfactant. 7. Describe the functions of lung surfactant. 8. Define lung compliance. 9. Enumerate factors affecting lung compliance. 10. Define airway resistance. 11. List the factors affecting airway resistance. 12. Define Timed Vital Capacity (FEV1). 13. Describe clinical importance of FEV1. 14. Define alveolar ventilation. 15. Define dead space. 16. Define V/P ratio. 17. Describe clinical importance of V/P ratio. 18. Define diffusion capacity of lungs. 19. Enumerate factors affecting diffusion capacity. 20. Describe the arrangement of blood supply to the lungs. 21. List the special features of pulmonary circulation. 22. List the factors affecting pulmonary blood flow. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.6.3 Describe and Discuss the transport of respiratory gases: Oxygen and Carbon dioxide.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. Compare the composition of the alveolar air, inspired air and expired air. 2. Describe the methods of transport of oxygen in blood. 3. Draw a labelled diagram of O₂-haemoglobin dissociation curve. 4. List the factors that shift O₂-Hb dissociation curve. 5. Define types of Hypoxia. 6. List the methods of CO₂ transport in blood. 7. Draw CO₂-dissociation curve. 8. Draw a diagram showing transport of CO₂ by RBC. 9. Describe Bohr's effect. 10. Describe Haldane effect. 10. Define Chloride shift. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |
| <p>PY.6.4 Describe and Discuss the physiology of high altitude and deep sea diving.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. List the changes that occur on exposure to high altitude. 2. Describe Acute effects of ascent to high altitude. 3. Describe chronic mountain sickness. 4. Define Accommodation at high altitude. 5. Describe the changes that occur with deep sea diving. 6. Describe nitrogen narcosis. 7. Describe O₂ toxicity at high pressures. 8. Describe CO₂ toxicity due to deep sea diving. | <p>Lecture, Small group discussion</p> | <p>Written/ Vivavoce</p> |

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| PY.6.5 Describe and Discuss the principles of artificial respiration, oxygen therapy, acclimatization and decompression sickness. | K | KH | At the end of the session phase 1 student must be able to 1. Describe the principles of artificial respiration. 2. Describe the principles of oxygen therapy. 3. Describe SCUBA Diving. 4. Describe the physiological changes that occur during acclimatization. 5. To list changes occurring during Decompression sickness. | Lecture, Small group discussion | Written/ Viva voce |
| PY.6.6 Describe and Discuss the pathophysiology of dyspnoea, hypoxia, cyanosis, asphyxia, drowning, periodic breathing. | K | KH | At the end of the session phase 1 student must be able to 1. Describe the pathophysiology of dyspnoea. 2. Describe the pathophysiology of hypoxia. 3. List different types of hypoxia. 4. Describe the pathophysiology of cyanosis. 5. Describe the pathophysiology of asphyxia. 6. Define drowning. 7. Define periodic breathing. 8. Describe pathophysiology of periodic breathing. | Lecture, Small group discussion | Written/ Viva voce |
| PY.6.7 Describe and Discuss lung function tests and their clinical significance. | K | KH | At the end of the session phase 1 student must be able to 1. Describe lung function tests. 2. Enumerate the different types of lung function tests. 3. Describe the clinical significance of lung function tests. | Lecture, Small group discussion | Written/ Viva voce |
| PY.6.8 Demonstrate the correct technique to perform and interpret Spirometry. | S | SH | At the end of the session phase 1 student must be able to 1. Demonstrate correct technique of spirometry. 2. Perform spirometry independently. | DOAP session | Skill assessment/ Viva voce/OSCE |
| PY.6.9 Demonstrate the correct clinical examination of the respiratory system in a normal volunteer or simulated environment. | S | P | At the end of the session phase 1 student must be able to 1. Demonstrate the clinical examination of the respiratory system in a normal volunteer or simulated environment. 2. Describe the various steps of the respiratory system examination. | DOAP session | Skill assessment/ Viva voce/OSCE |
| PY.6.10 Demonstrate the correct technique to perform measurement of peak expiratory flow rate in a normal volunteer or simulated environment. | S | SH | At the end of the session phase 1 student must be able to 1. Demonstrate the technique to perform measurement of peak expiratory flow rate in a normal volunteer or simulated environment correctly. 2. Describe the clinical importance of peak expiratory flow rate. | DOAP session | Practical / OSPE/ Viva voce |

Topic : RENAL PHYSIOLOGY

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| <p>PY7.1 Describe structure and function of kidney</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. List the functions of kidney 2. Enumerate the parts of the nephron and give their main functions. 3. Report histological modification at different segments of nephron with their specific functions. 4. List the differences between cortical and juxtamedullary nephrons. 5. Describe the detail ultrastructure of glomerulo-capsular filtration barrier. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY7.2 Describe the structure and functions of juxta glomerular apparatus and role of renin-angiotensin System</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the details of structure and functions of JG apparatus. 2. List the chemicals that cause contraction, and chemicals that cause relaxation of mesangial cells of kidney 3. Describe the functions of renin-angiotensin system. 4. Describe the role of JG apparatus in health and disease. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY7.3 Describe the mechanism of urine formation involving processes of filtration, tubular reabsorption & secretion; concentration and diluting mechanism</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Define GFR and give its normal value. 2. Discuss the mechanism of glomerular filtration. 3. List the factors that affect GFR. 4. Report the principles of measurement of GFR. 5. List the conditions that alter GFR. 6. Discuss the importance of tubular functions in urine formation. 7. Elicit the basic transport mechanisms that function across the tubular epithelium. 8. Discuss the transport mechanisms of various solutes and water in different parts of renal tubule. 9. Describe the reabsorption of sodium and glucose from kidney tubules. 10. Define and explain transport maximum and renal splay. 11. Enumerate tubular functions with its dysfunctions. 12. Discuss the mechanisms of regulation of ions and water from kidney tubules. 13. Elicit the importance of tubuloglomerular feedback and glomerulotubular balance. 14. Describe the role of proximal tubule, loop of Henle, and distal tubule in urine formation. 15. Describe the mechanisms of sodium and water reabsorption from kidney tubules. 16. Discuss the mechanism of tubuloglomerular feedback and glomerulotubular balance. 17. Discuss the concept of a counter current system. 18. Describe the countercurrent mechanism of urine concentration. 19. Describe the importance of urine concentration. 20. Describe the application of counter current mechanism in different situations. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY7.4 Describe & discuss the significance & implication of Renal clearance</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Define Renal Clearance and report its formula and normal ranges. 2. Elicit the significance of renal clearance. 3. Describe the concept of clearance tests. 4. Explain its application in measurement of GFR, RBF (Renal Blood Flow), RPF (Renal Plasma Flow) 5. Explain its application in measurement of osmotic and free water clearance. 6. Report its significance of measure of excretion of waste products. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |

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| PY7.5 Describe the renal regulation of fluid and electrolytes & acid-base balance. | K | KH | At the end of the session phase 1 student must be able to- 1. Discuss the concept of obligatory and facultative reabsorption of water. 2. Describe the mechanism regulation of water reabsorption in kidney tubules. 3. List the diuretics and give their mechanism of action. 4. Enumerate the functions of aquaporins 5. Enumerate the purpose of acidification of urine. 6. Enumerate the factors that contribute to acidification of urine. 7. Discuss the mechanisms of acidification of urine 8. Report the concept of metabolic acidosis and metabolic alkalosis and their compensations. | Lecture, small group discussion | Written/ Viva voce |
| PY7.6 Describe the innervations of urinary bladder, physiology of micturition and its abnormalities | K | KH | At the end of the session phase 1 student must be able to- 1. Understand the relation of functional anatomy of urinary bladder with its functions. 2. Discuss the innervation and arrangement of sphincters of urinary bladder. 3. Elicit the mechanism and control of micturition reflex. 4. Discuss the physiological basis of bladder dysfunctions. | Lecture, small group discussion | Written/ Viva voce |
| PY7.7 Describe artificial kidney, dialysis and renal transplantation | K | KH | At the end of the session phase 1 student must be able to- 1. Describe the concept of artificial kidney. 2. Enumerate the types of dialysis and their comparative efficacy. 3. Enumerate indications of dialysis. 4. Describe the principle of setup of dialysis machine, composition of dialysate fluid and functional implication of dialysis . 5. Enumerate the indication of renal transplant in chronic renal failure patients.. 6. Elicit the choice of donor criteria . | Lecture, small group discussion | Written/ Viva voce |
| PY7.8 Describe & discuss Renal Function Tests | K | KH | At the end of the session phase 1 student must be able to- 1. Classify Renal function tests (RFTs). 2. Describe the physiological basis of each RFT. 3. Report the normal values of Renal Function tests. 4. Discuss the physiological basis of genesis and management of acute and chronic renal failures. | Lecture, small group discussion | Written/ Viva voce |
| PY7.9 Describe cystometry and discuss the normal cystometrogram | K | KH | At the end of the session phase 1 student must be able to- 1. Discuss the procedure of cystometry. 2. Describe the graph of cystometrogram. 3. Report the normal cystometrogram . | Lecture, small group discussion | Written/ Viva voce |

Topic : ENDOCRINE PHYSIOLOGY

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| <p>PY.8.1 Describe the physiology of bone and calcium metabolism</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Discuss the role of osteoblasts and osteoclasts in bone matrix. 2. Elicit the concept of bone formation and resorption 3. Describe various aspects of bone physiology. 4. List the functions of calcium and phosphate. 5. Describe the mechanism of action and functions of parathyroid hormone. 6. Describe the mechanism of action and functions of calcitonin. 7. Describe functions of vitamin D. 8. Elicit the importance of learning calcium and phosphate metabolism to learn bone physiology 9. Describe the role of calcitonin and vitamin D in calcium metabolism. 10. Describe the hormonal regulation of calcium metabolism. 11. Discuss in detail the alteration of metabolism of Vit D and its effect on body. 12. Report the RDA of Vit D in children, adult and pregnant woman. 13. Learn the physiological basis of osteoporosis and osteomalacia. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY.8.2 Describe the synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper) secretion of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas and hypothalamus</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Discuss the importance of anterior pituitary as an important endocrine gland and its role in regulation of body functions. 2. List the hormones secreted from anterior and name the cells that produce them. 3. Describe the regulation, mechanism of action, functions and dysfunctions of growth hormone (GH). 4. Describe the role of GH in regulation of growth and development. 5. Report the functions and dysfunctions of other anterior pituitary hormones. 6. Enumerate signs and symptoms of Gigantism, acromegaly, Sheehan syndrome and dwarfism. 7. List the hormones secreted from middle pituitary and posterior pituitary. 8. Enumerate the physiological functions of oxytocin and vasopressin. 9. Discuss in detail the physiological alteration in diabetes insipidus. 10. Describe the regulation of secretion of ADH. 11. Discuss in detail the structure and relevant physiological anatomy of thyroid gland and parathyroid gland. 12. Describe the histological variants of cell types in thyroid gland and their functions. 13. Discuss in detail the synthesis of thyroid hormones with emphasis on structure of T3, T4 and TSH. 14. Discuss in detail the physiological functions of thyroid hormones with special emphasis on BMR regulation. 15. Discuss physiological effect of thyroid hormones on CVS, CNS, Respiratory and female reproductive physiology. 16. Discuss signs and symptoms of hyperthyroidism and hypothyroidism. 17. Discuss physiological action of parathyroid hormone in maintaining normal calcium levels. 18. Discuss the Vitamin D synthesis in detail in our body. 19. Discuss the signs and symptoms of hypercalcemia and hypocalcemia in our body. 20. Discuss in detail the synthesis of adrenal cortical hormones. 21. Discuss the classification of adrenal cortical hormones and their mechanism of actions. 22. Describe the physiological effect of cortisol on carbohydrate, fat and protein metabolism. 23. Discuss in detail the physiological action, mechanism, site of action and function of aldosterone. 24. Discuss in detail the signs and symptoms of Cushing disease and Addison disease. 25. Differentiate between sympathetic and parasympathetic system effects. 26. Discuss the structure, synthesis and role of adrenal medulla in emergencies. 27. Discuss the signs and symptoms of pheochromocytomas. 28. Discuss the endocrine structure of pancreas with reference to types of cells and hormones produced from. 29. Discuss the structure, synthesis, transport and receptors of Insulin and glucagon. 30. Discuss in detail anabolic role of Insulin. 31. Discuss in detail catabolic role of glucagon. 32. Discuss in detail the types of Diabetes mellitus and criteria for diagnosis. 33. Discuss the location of hypothalamus in body with reference to hypothalamic-pituitary axis. 34. Enumerate the various releasing factors released from hypothalamus. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |

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| PY8.3 Describe the physiology of Thymus & Pineal Gland | K | KH | At the end of the session phase 1 student must be able to- 1. Discuss the importance of pineal gland in regulation of night day cycles. 2. List the hormones secreted from Pineal gland. 3. Elicit the steps of melatonin synthesis. 4. List the functions of pineal gland. 5. Discuss the role thymus gland in cellular immunity. | Lecture, small group discussion | Written/ Viva voce |
| PY8.4 Describe function tests: Thyroid gland; Adrenal cortex, Adrenal medulla and pancreas | K | KH | At the end of the session phase 1 student must be able to- 1. Report the normal values of T3, T4 and TSH ranges. 2. Enumerate the thyroid function tests . 3. Discuss the methods of estimation of T3, T4 and TSH ranges. 4. Elicit the importance of insulin/glucagon ratio. 5. Report the method of OGT. 6. Report the results of Dexamethasone suppression test. | Lecture, small group discussion | Written/ Viva voce |
| PY8.5 Describe the metabolic and endocrine consequences of obesity & metabolic syndrome, Stress response. Outline the psychiatry component pertaining to metabolic syndrome. | K | KH | At the end of the session phase 1 student must be able to- 1. Enumerate the risk factors for obesity. 2. Elicit the criteria for defining obesity using BMI. 3. Elicit the concept of morbid obesity. 4. Discuss the endocrine disorders in obesity. 5. Discuss the signs and symptoms of metabolic syndrome. 6. Discuss the lifestyle modification and dietary changes for obesity. 7. Discuss the development of depression in young obese. | Lecture, small group discussion | Written/ Viva voce |
| PY8.6 Describe & differentiate the mechanism of action of steroid, protein and amine hormones | K | KH | At the end of the session phase 1 student must be able to- 1. Classify hormones on the basis of their composition. 2. Classify the location of hormone receptors in cells. 3. Discuss the secondary messenger system. 4. Classify hormones on basis of second messengers utilized. | Lecture, small group discussion | Written/ Viva voce |
| Topic : REPRODUCTIVE PHYSIOLOGY | | | | | |
| PY9.1 Describe and discuss sex determination; sex differentiation and their abnormalities and outline psychiatry and practical implication of sex determination. | K | KH | At the end of the session phase 1 student must be able to- 1. Describe the physiology of sex determination and differentiation. 2. Describe the mechanism of development in males and females. 3. Elicit the role of sex determination and differentiation in the physiology of reproductive system. 4. List the abnormalities of sex differentiation 5. Describe the mechanisms of dysfunctions of sex differentiation. 6. Elicit the neuropsychiatric signs and symptoms in intersexes. | Lecture, small group discussion | Written/ Viva voce |

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| <p>PY9.2 Describe and discuss puberty: onset, progression, stages; early and delayed puberty and outline adolescent clinical and psychological association.</p> | K | KH | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Discuss the signs of puberty in males and females. 2. Discuss the age of onset of puberty. 3. Discuss the factors affecting age of onset of puberty in males and females. 4. Discuss the progression of puberty in males and females. 5. Discuss the stages of puberty in males and females. 6. Define the criteria for precocious puberty in males and females. 7. Define delayed puberty in females. 8. Discuss psychological changes at attainment of puberty. 9. Describe normal puberty curve. | Lecture, small group discussion | Written/ Viva voce |
| <p>PY9.3 Describe male reproductive system: functions of testis and control of spermatogenesis & factors modifying it and outline its association with psychiatric illness.</p> | K | KH | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Enumerate the different parts of male reproductive system, and give the functions of each. 2. List the functions of Sertoli cells and Leydig cells. 3. Describe the role of blood-testis barrier in testicular functions. 4. Enumerate the steps of spermatogenesis 5. Describe the mechanism and regulation of spermatogenesis. 5. Understand the importance of semen analysis. 6. List the testicular hormones 7. Describe the functions of testosterone. 8. List the secondary sex characteristics in males. 9. Discuss the regulation of testicular functions. 10. Describe the physiological basis of testicular abnormalities. 11. Describe the regulation of hypothalamo-pituitary-gonadal axis in males. 13. Explain the relation of psychiatric illness in reproductive abnormal males. | Lecture, small group discussion | Written/ Viva voce |
| <p>PY9.4 Describe female reproductive system: (a) functions of ovary and its control; (b) menstrual cycle - hormonal, uterine and ovarian changes</p> | K | KH | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe the functional organization of female reproductive tract and their functions. 2. Enumerate the different parts of uterus and ovary 3. List the functions of different parts of uterus and ovary 4. Describe the steps and regulation of oogenesis. 5. Discuss the mechanism and regulation of different phases of ovarian follicle. 6. Describe the structure and function of corpus luteum. 7. List the phases of menstrual cycle. 8. Describe uterine cycle 9. Describe the ovarian cycle 10. Describe the hormonal changes in menstrual cycle. 11. Define ovulation 12. Explain mechanism of ovulation 13. List the indicators of ovulation and give the importance of ovulation. 14. Classify amenorrhea and name the common causes of different types of amenorrhea. 15. Discuss the physiological causes of anovulation. 16. Discuss the physiological basis of premenstrual syndrome. 17. Describe the physiological basis of different types of menstrual irregularities. | Lecture, small group discussion | Written/ Viva voce |

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| <p>PY9.5 Describe and discuss the physiological effects of sex hormones</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. List the ovarian hormones. 2. List the testicular hormones. 3. Describe the functions of ovarian hormones. 4. Describe the functions of testosterone. 5. List the secondary sexual characteristics in females. 6. Describe the mechanisms of control of ovarian functions. 7. List the secondary sexual characteristics in males 8. Discuss the functions of estrogen 9. Discuss the functions of progesterone. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY9.6 Enumerate the contraceptive methods for male and female. Discuss their advantages & disadvantages</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Classify contraceptives for males and females. 2. Enumerate the temporary methods of contraception. 3. Enumerate the permanent methods of contraception 4. Describe the mechanism of action of contraceptives. 5. Elicit which contraceptive will be better for which type of couple. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY9.7 Describe and discuss the effects of removal of gonads on physiological functions</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Physiological effects of castration. 2. Indications of Castration. 3. Physiological effects of oophorectomy. 4. Indications of oophorectomy 5. Physiological effects of sex change operations . | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |
| <p>PY9.8 Describe and discuss the physiology of pregnancy, parturition & lactation and outline the psychology and psychiatry-disorders associated with it.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Discuss the physiology of fertilization. 2. Discuss the factors affecting fertilizations. 3. Describe the physiology at different steps of pregnancy. 4. List the placental hormones and mention their functions. 5. List the causes of female infertility. 6. Describe various systemic maternal changes in pregnancy. 7. Discuss the stages of labour. 8. Explain the foeto-maternal changes in pregnancy.. 9. Describe the development of breast in different phases of life of women. 10. Describe the mechanism of lactogenesis. 11. List the composition of human milk 12. Describe milk let down reflex 13. Discuss the abnormalities of breast development and lactation. | <p>Lecture, small group discussion</p> | <p>Written/ Viva voce</p> |

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| PY9.9 Interpret a normal semen analysis report including (a) sperm count,(b) sperm morphology and (c) sperm motility, as per WHO guidelines and discuss the results | K | KH | At the end of the session phase 1 student must be able to- 1. Discuss the WHO criteria for sterile male. 2. Report normal sperm count. 3. Report normal sperm morphology. 4. Report normal sperm motility. 5. Define azoospermia 6. Define oligozoospermia. 7. Define teratospermia. 8. Define aspermia. | Lecture, small grpou discussion | Written/ Viva voce |
| PY9.10 Discuss the physiological basis of various pregnancy tests | K | KH | At the end of the session phase 1 student must be able to- 1. Enumerate various pregnancy tests. 2. Describe the physiological basis of pregnancy strip test. 3. Discuss the estimation level of serum b HCG for pregnancy. 4. Discuss the sonographic tests for confirming pregnancy. | Lecture, small grpou discussion | Written/ Viva voce |
| PY9.11 Discuss the hormonal changes and their effects during perimenopause and menopause | K | KH | At the end of the session phase 1 student must be able to- 1. Define menopause. 2. Define perimenopause 3. Enumerate physiological changes at perimenopause and menopause 4. List the harmones level changes at menopause 5. Describe the cause of osteoporosis in menopause. | Lecture, small grpou discussion | Written/ Viva voce |
| PY9.12 Discuss the common causes of infertility in a couple and role of IVF in managing a case of infertility. | K | KH | At the end of the session phase 1 student must be able to- 1. Define infertility. 2. Enumerate causes of infertility. 3. Enumerate the investigations of infertility. 4. Define Invitro Fertilization. 5. Enumerate indications of IVF | Lecture, small grpou discussion | Written/ Viva voce |
| Topic : NEUROPHYSIOLOGY | | | | | |
| PY10.1 Describe & discuss the oranisation of nervous system | K | KH | At the end of session phase I MBBS student must be able to - 1.Eneumerate different parts of CNS. 2.describe the function of different part of nervous system. | Lecture, Small group discussion | written/ vivavoce |

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| <p>PY10.2 Describe 7 discuss the functions & properties of synapse, reflex, receptors.</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define synapse. 2. Draw a labelled diagram of synapse. 3. Describe the mechanism of synaptic transmission. 4. Classify the synapse. 5. Enlist the properties of synapse. 6. Explain the properties of synapse. 7. Describe the mechanism of various types of synaptic inhibitions. 8. Define reflex. 9. Classify the reflex. 10. Draw the diagram of stretch reflex 11. Explain the pathway of stretch reflex. 12. Enumerate the function of stretch reflex. 13. Draw the diagram of inverse stretch reflex. 14. Explain the pathway of inverse stretch reflex 15. Describe the importance of inverse stretch reflex. 16. Draw the diagram of withdrawal reflex. 17. Describe the importance of withdrawal reflex. 18. Explain the properties of spinal reflex. 19. Define the receptor. 20. Classify the receptor. 21. Describe the mechanism of generation of receptor potential. 22. Describe the structure of function receptor. 23. Explain the properties of receptor. | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |
| <p>PY.10.3 Describe and discuss somatic sensation & sensory tract.</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Define Sensation 2. Classify the different types of sensation 3. Explain the arrangement of neuron in ascending pathway 4. List the sensation carried in dorsal column pathway & anterolateral system. 5. Draw a well labelled diagram to trace the pathway . | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |

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| <p>PY.10.4 Describe the discuss motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium & vestibular apparatus.</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Classify the descending pathway. 2. Draw a well labelled diagram of corticospinal tract (CST) 3. Describe the origin, course, functions of CST 4. Explain the effect of lesion of CST at internal capsule. 5. List the difference between UMN & LMN paralysis. 6. Explain the Physiological basis of these differences. 7. Describe the origin, course & functions of other descending pathway. 8. Describe the mechanism of maintenance of tone muscle. 9. Describe the mechanism of maintenance of tone, control of body movements posture & equilibrium. 10. Enlist the components of vestibular apparatus. 11. Describe the functions of each components. 12. Describe the mechanism of action potential generation in hair cells. 13. Explain the physiological significance of hair cells arrangement & their responses in otolith organ & semicircular canal. 14. Draw a well labelled diagram of vestibular pathway. 15. Enlist vestibular reflexes. 16. Explain vestibular dysfunctions. 17. Enlist the vestibular function tests. | <p>Lecture, Small group discussion</p> | <p>written/ viva voce</p> |
| <p>PY.10.5 Describe and discuss structure and functions of reticular activating system, autonomic nervous system (ANS)</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Describe the functional organization of brainstem reticular formation. 2. Enlist the components of brainstem reticular activating system (RAS) 3. Explain the functions of brainstem RAS. 4. Explain the importance of RAS in body Physiology. 5. Differentiate functional specialization of sympathetic & parasympathetic divisions ANS. 6. Differentiate in central connection & reflex arc of somatic nervous system & ANS. 7. Differentiate in pre & post ganglionic fibres of sympathetic & parasympathetic division of ANS. 8. Enlist the common neurotransmitters in ANS & their receptor 9. Enlist the control mechanism of autonomic functions. 10. Understand the importance of regulation of autonomic functions. 11. Describe the features of common autonomic disorders. 12. List the AFT5 for assessment of sympathetic & parasympathetic functions. 13. Explain the importance of AFT5 in clinical physiology. | <p>Lecture, Small group discussion</p> | <p>written/ viva voce</p> |
| <p>PY.10.6 Describe and discuss Spinal cord, its functions, lesion & sensory disturbances</p> | <p>K</p> | <p>KH</p> | <p>At the end of session phase I MBBS student must be able to -</p> <ol style="list-style-type: none"> 1. Discuss the physiological anatomy of spinal cord. 2. Discuss the function of spinal cord. 3. Discuss complete transection of spinal cord. 4. Discuss incomplete transection of spinal cord. 5. Discuss Brown sequard syndrome 6. Discuss lesion of sensory system in spinal cord (Deafferentation syringomyelia, Tabes dorsalis multiple sclerosis subacute degeneration of spinal cord). | <p>Lecture, Small group discussion</p> | <p>written/ viva voce</p> |

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| <p>PY.10.7 Describe and discuss function of cerebral cortex basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities</p> | K | KH | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. List the Areas of cerebral cortex. 2. Draw diagram depicting the different Broadmann's areas. 3. Describe the functions of different areas of cerebral cortex. 4. Describe the importance of cerebral assymetry. 5. Define cortical plasticity. 6. Describe the major nucleus of Thalamus. 7. Describe the functional organization of Thalamus. 8. Define Thalamic dysfunctions. 9. Enumerate the major nucleus of Hypothalamus. 10. Describe the functions of Hypothalamus. 11. List the abnormalities of hypothalamic functions. 12. Draw a diagram to depict divisions of cerebellum. 13. Describe the functions of cerebellum. 14. List the afferents inputs to cerebellum. 15. Describe the internal neuronal arrangement of cerebellum. 16. List the features of cerebellar disorders. 17. List the components of Limbic system. 18. Draw a diagram of Papez circuit. 19. Describe the connections of Limbic system. 20. Describe the functions of Limbic system. 21. Enumerate the abnormalities of limbic functions. 23. Enumerate parts of Basal ganglia. 24. List inputs, outputs, internal connections of basal ganglia. 25. Describe the role of basal ganglia in motor functios. 26. Describe the physiological basis of dysfunctions of basal ganglia. | Lecture, Small group discussion | written/ viva voce |
| <p>PY.10.8 Describe and discuss behavioural and EEG characteristics during sleep and mechanism responsible for its production.</p> | K | KH | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. Understand the functional organization of cortical, subcortical neurons in the genesis of EEG. 2. List the EEG waves. 3. Enumerate stages of sleep. 3. Draw the characteristic EEG waves during different stages of sleep. 4. Describe the mechanisms of NREM, REM sleep. 5. Explain the theories of sleep. 6. Describe the physiological basis of sleep disorders. | Lecture, Small group discussion | written/ viva voce |
| <p>PY.10.9 Describe and discuss the physiological basis of memory, learning and speech.</p> | K | KH | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. Define learning. 2. Define memory. 3. Enumerate types of Memory. 4. List the types of conditioned reflexes. 5. Describe the mechanism of learning and memory. 6. List the brain areas involved n different types of learning and memory. 7. Describe the physiological basis of abnormalities of learning and memory. 8. Enumerate speech areas in the brain. 9. Draw pathways for speech. 10. Understand theory of speech production. 11. Enumerate the disorders of speech. | Lecture, Small group discussion | written/ viva voce |
| <p>PY.10.10 Describe and discuss chemical transmission in the nervous system.</p> | K | KH | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. List the Neurotransmitters. 2. Describe the functions of common Neurotransmitters. 3. Describe the dysfunctions of Neurotransmitters. 4. Enumerate the clinical conditions associated with alteration of levels of neurotransmitters. | Lecture, Small group discussion | written/ viva voce |
| <p>PY.10.11 Demonstrate the correct clinical examination of the nervous system : Higher functions, sensory system, motor system, reflexes, cranial nerves in a normal volunteer or simulated environment.</p> | S | P | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. Perform the clinical examination of higher functions correctly. 2. Perform the clinical examination of sensory system correctly. 3. Perform the clinical examination of motor system correctly. 4. Perform the clinical examination of reflexes correctly. 5. Perform the clinical examination of cranial nerves correctly. | DOAP session | Skill assessment/ Viva voce/OSCE |
| <p>PY.10.12 Identify normal EEG forms</p> | S | S | <p>At the end of the session phase 1 student must be able to</p> <ol style="list-style-type: none"> 1. Interpret normal EEG forms. 2. Explain the clinical importance of EEG forms. | Small group teaching | OSPE/Viva voce |

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| <p>PY.10.13 Describe and discuss perception of smell and taste sensation.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to 1.Describe the physiology of Olfactory mucus membrane of the nasal epithelium. 2.Draw olfactory pathway. 3.Understand mechanism of olfaction. 4.List factors affecting olfaction. 5.Enumerate abnormalities of smell. 6.Describe the structure ,location of taste buds. 7.List functions of taste buds. 8.Draw the taste pathways. 9.Understand the mechanism of gustatory transduction for various testants. 10.List the factors influencing taste sensations. 11.Enumerate the abnormalities of taste sensation.</p> | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |
| <p>PY.10.14 Describe and discuss patho-physiology of altered smell and taste sensation.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to 1.Describe the patho-physiology of altered smell sensation. 2.Describe the patho-physiology of altered taste sensation.</p> | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |
| <p>PY.10.15 Describe and discuss the functional anatomy of ear and auditory pathways and physiology of hearing.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to 1.Describe the functional anatomy of external, middle and internal ear. 2.List the functions of external ear. 3.List the functions of middle ear. 4.Understand the significance of Tympanic reflex. 5.Explain the physiology of cochlea and organ of corti. 6. Draw a diagram of organ of corti. 7.Describe the mechanism of activation of cochlear hair cells. 8.Explain the Auditory pathways. 9.List the auditory cortical areas. 10.List the functions of auditory cortex. 11.Understand the process of transmission of sound waves in the middle and inner ear. 12.Explain the transduction mechanism of sound waves. 13.Describe the mechanism of hearing.</p> | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |
| <p>PY.10.16 Describe and discuss the pathophysiology of deafness.Describe hearing tests.</p> | <p>K</p> | <p>H</p> | <p>At the end of the session phase 1 student must be able to 1.List the hearing defects. 2.Explain the causes of deafness. 3.Describe the pathophysiology of deafness. 4.List the hearing tests. 5.Describe the procedure of each test. 6.Understand the principles of Audiometry.</p> | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |
| <p>PY.10.17 Describe and discuss functional anatomy of eye, physiology of image formation, physiology of vision including colour vision, refractive errors,colour blindness, physiology of pupil and light reflex.</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to 1.Describe the functional anatomy of eye. 2.Draw the layers of sclera,cornea and retina. 3.Understand the functions of choroid,ciliary body and iris in vision. 4.Define fovea centralis, fundus and optic disk. 5.Define intraocular pressure. 6.Describe the physical principle of refraction of light rays by the cornea and iris. 7.Enumerate the principles of optics. 8.Understand the physiological basis of defects of image forming mechanism. 9.Draw a diagram depicting structure of Photoreceptors. 10.Describe the mechanism of phototransduction. 11.Explain the importance of photoreceptor potential. 12.Describe the mechanism of visual adaptations. 13.Draw the pathway of Light reflex. 14.Draw the pathway of Accomodation reflex. 15.Explain the theories of color vision. 16.Understand the physiological basis of color blindness.</p> | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |

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| PY.10.18 Describe and discuss the physiological basis of lesion in visual pathway. | K | KH | At the end of the session phase 1 student must be able to 1.Draw a labelled diagram of visual pathway. 2.Understand the topographical organization in lateral geniculate body. 3.List the functions of the visual cortical areas. 4.Draw a diagram to Depict the visual defects produced by lesions at different levels of visual pathway. | Lecture, Small group discussion | written/ vivoce |
| PY.10.19 Describe and discuss auditory and visual evoked potentials. | K | KH | At the end of the session phase 1 student must be able to 1.Define Brainstem Auditory Evoked Response (BAER) 2.List the waveforms of BAER. 3.Define the visual evoked potentials. 4.Understand the waveforms of the visual evoked potentials. | Lecture, Small group discussion | written/ vivoce |
| PY.10.20 Demonstrate (i) Testing of visual acuity, colour and field of vision and (ii) Hearing (iii) Testing for smell and (iv) taste sensation in volunteer/simulated environment. | S | P | At the end of the session phase 1 student must be able to (i)1. Understand the physiological basis of tests for visual acuity. 2.Perform the visual acuity tests independently. 3.Define visual field. 4.Demonstrate the test of field of vision using confrontation method correctly. 5.Describe the perimeter chart. 6.Perform the charting of visual field(perimetry) using Perimeter correctly. 7.Describe the Ishihra charts for testing color vision correctly. (ii) 1.Explain the importance of doing hearing tests. 2.List the Tuning-fork tests. 3.Describe the principles of tuning-fork tests. 4.Perform the hearing tests correctly. (iii) 1.Understand the olfactory pathway. 2.Perform the tests for smell sensation correctly. (iv) 1.Understand the area of tongue supplied by 7th and 9th cranial nerves. 2.List the different types of tastes. 3.Perform the tests for different types of taste independently. | DOAP/ sessement | Skill assessment/ Viva voce/OSCE |

Topic : Integrated Physiology

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| PY11.1 Describe and discuss mechanism of temperature regulation | K | KH | At the end of the session phase 1 student must be able to- 1. Discuss the normal body temperature. 2. List all the mechanisms involved in heat production. 3. List all the mechanisms involved in heat loss. 4. Describe the mechanism of regulation of body temperature. | Lecture, Small group discussion | written/ vivoce |
| PY11.2 Describe and discuss adaptation to altered temperature (heat and cold) | K | KH | At the end of the session phase 1 student must be able to- 1. Enumerate different mechanisms of adaptations of cold. 2. Discuss neonatal adaptations of hypothermia. 3. Enumerate different body adaptations for high ambient temprature. | Lecture, Small group discussion | written/ vivoce |
| PY11.3 Describe and discuss mechanism of fever, cold injuries and heat stroke | K | KH | At the end of the session phase 1 student must be able to- 1. Discuss the pathophysiology of fever. 2. Describe the pathophysiology of cold injuries including frost bite. 3. List different types of cold injuries. 4. Discuss pathophysiology of heatstroke and other body injuries due to High ambient temperature. 5. Describe the role of cutaneous circulation in body temprature regulation, | Lecture, Small group discussion | written/ vivoce |

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| <p>PY11.4 Describe and discuss cardio-respiratory and metabolic adjustments during exercise; physical training effects</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. List different grades and types of exercises. 2. Discuss different cardiovascular mechanisms involved during adaptation for different grades of physical exercises. 3. Discuss different respiratory adjustments during adaptation for different grades of physical exercises. 4. Discuss different metabolic and other physiological adjustments during exercises. 5. Describe different physiological effects of physical training. | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |
| <p>PY11.5 Describe and discuss physiological consequences of sedentary lifestyle</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Discuss different physiological changes which develop due to prolong sedentary life style. 2. List different life style diseases which develop due to sedentary life style. 3. Enumerate different physiological benefits of regular physical exercise. 4. Differentiate between physiological parameters between persons living sedentary life style and persons doing regular exercises. | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |
| <p>PY11.6 Describe physiology of Infancy</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Discuss different physiological adjustments occurring in new born after birth. 2. Discuss special features of cardiovascular , respiratory, renal, digestive and metabolic physiology of new born. 3. Differentiate between adult body physiological mechanism and infant body physiology. 4. Discuss pathophysiology of different diseases specific for infants. | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |
| <p>PY.11.7 Describe and discuss physiology of aging; free radicals and antioxidants</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe different physiological changes occurring with aging. 2. Discuss reduction in physiological reserve with aging. 3. Differentiate between physiological parameter of young and old person. 4. Discuss pathophysiology of different geriatric diseases. 5. Discuss contribution of free radicals in normal process of aging. 6. Discuss the physiological role of anti-oxidants in prevention of ageing related problems. | <p>Lecture, Small group discussion</p> | <p>written/ vivoce</p> |

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| <p>PY11.8 Discuss & compare cardio-respiratory changes in exercise (isometric and isotonic) with that in the resting state and under different environmental conditions (heat and cold)</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Discuss comparison of cardiovascular changes in exercise and resting stage. 2. Discuss comparison of respiratory changes in exercise with resting state. 3. Discuss comparison of cardio-vascular and respiratory changes in resting stage and different environmental conditions like heat and cold. | <p>Lecture, Small group discussion</p> | <p>written/ vivavoce</p> |
| <p>PY11.9 nterpret growth charts</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe growth charts . 2. Discuss the normal variations in growth in height and weight according to growth charts. 3. Discuss the abnormal deviations in weight and height in growth chart. 4. Discuss the use of growth charts in finding different grades and types of malnutrition. 5. Define percentile curve 6. Describe the statistics used in defining growth charts. | <p>Small group yeaching</p> | <p>Practical/ OSPE/ viva voce</p> |
| <p>PY11.10 nterpret anthropometric assessment of infants</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Describe different parameters of anthropometric assessment like height, weight, BMI, head circumference, chest circumference etc. 2. Discuss utilization of different parameters of anthropometric assessment in diagnosing different nutritional or congenital growth retardation. 3. List common common causes of growth retardation in infants. 4. Discuss preventive measures for growth retardation. | <p>Small group yeaching</p> | <p>Practical/ OSPE/ viva voce</p> |
| <p>PY11.11 Discuss the concept, criteria for diagnosis of Brain death and its implications</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Define brain death. 2. Discuss criterion for diagnosis of brain death. 3. Describe different methods to confirm brain death. 4. Report brain death. 5. Discuss comparative validity of different methods to confirm brain death . | <p>Lecture, Small group discussion</p> | <p>written/ vivavoce</p> |

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| <p>PY11.12 Discuss the physiological effects of meditation</p> | <p>K</p> | <p>KH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Discuss different types of meditation. 2. Discuss about physiological changes of meditation on cardiovascular system. 3. Discuss physiological changes of meditation on brain . 4. Discuss about physiological changes of meditation on autonomic nervous system. 5. Discuss about physiological effects of meditation on different hormone levels. 6. Discuss role of meditational practices in management of different life style and other non-communicable diseases. | <p>Lecture, Small group discussion</p> | <p>written/ vivavoce</p> |
| <p>PY11.13 Obtain history and perform general examination in the volunteer / simulated environment</p> | <p>S</p> | <p>SH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Record proper history of volunteer including, past history, present history , diet history, drug history, family history etc. 2. Perform general examination of volunteer following authentic protocol . 3. Discuss the interpretation of abnormalities of history and general examination in diagnosing different diseases. 4. Discuss about the physiological aspects of different points in general examination. | <p>DOAP sessions</p> | <p>Skill assessment/ Viva voce</p> |
| <p>PY11.14 Demonstrate Basic Life Support in a simulated environment</p> | <p>S</p> | <p>SH</p> | <p>At the end of the session phase 1 student must be able to-</p> <ol style="list-style-type: none"> 1. Document different components of basic life support like airway, breathing, circulation. 2. Demonstrate procedures of resuscitation of an emergency patient on a volunteer. 3. Identify different danger signs in an emergency patient. 4. Identify different equipments used in basic life support. | <p>DOAP sessions</p> | <p>OSCE</p> |