Competency based Undergraduate Curriculum in PHYSIOLOGY (CODE: PY)

Programme Outcome – Course Outcome (POCO) Mapping

Programme Outcomes of Indian Medical Graduate-MBBS programme

PO1- Clinician: Provides preventive, promotive, curative, palliative and holistic care with compassion.

PO2- Leader and member of the health care team and system: Act as leader and member of the health care team and system with capabilities to collect, analyze and synthesize health data.

PO3- Communicator: Communicates effectively with patients, families, colleagues and community.

PO4- Lifelong learner: Recognizes the need and has the ability to engage in life-long learning to update knowledge and professional skills.

PO5- Professional: Illustrate professional skills by being ethical, responsive and accountable to patients, community and profession.

PO6- Critical Thinker: Develop problem solving skills in professional practice.

PO7- Researcher: Generates and interprets evidence.

How relevant is each competency of CBME Curriculum to each of the above mentioned Programme Outcomes of Indian Medical Graduate-MBBS programme?

To be rated on a scale of zero (0) to three (3):

0- No correlation

1- Low correlation

2- Moderate correlation

3- High correlation

General Physiology Number of competencies: 09								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY1.1	Describe the structure and functions of a mammalian cell	3	0	1	3	2	3	3
PY1.2	Describe and discuss the principles of homeostasis	3	0	1	3	2	3	3
PY1.3	Describe intercellular communication	3	0	1	3	2	3	3
PY1.4	Describe apoptosis – programmed cell death	3	0	1	3	2	3	3
PY1.5	Describe and discuss transport mechanisms across cell membranes	3	0	1	3	2	3	3
PY1.6	Describe the fluid compartments of the body, its ionic composition	3	0	1	3	2	3	3
PY1.7	Describe the concept of pH & Buffer systems in the body	3	0	1	3	2	3	3
PY1.8	Describe and	3	0	1	3	2	3	3

	discuss the molecular basis of resting membrane potential and action potential in excitable tissue							
PY1.9	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.	3	2	3	3	3	3	3

Haematology Number of competencies: 13								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY2.1	Describe the composition and functions of blood components	3	0	1	3	2	3	3
PY2.2	Discuss the origin, forms, variations and functions of plasma proteins	3	0	1	3	2	3	3
PY2.3	Describe and discuss the synthesis and functions of Haemoglobin and explain its breakdown. Describe variants of haemoglobin	3	0	1	3	2	3	3
PY2.4	Describe RBC	3	0	1	3	2	3	3

	formation (erythropoiesis & its regulation) and its functions							
PY2.5	Describe different types of anaemias & Jaundice	3	0	1	3	2	3	3
PY2.6	Describe WBC formation (granulopoiesis) and its regulation	3	0	1	3	2	3	3
PY2.7	Describe the formation of platelets, functions and variations.	3	0	1	3	2	3	3
PY2.8	Describe the physiological basis of hemostasis and, anticoagulants. Describe bleeding & clotting disorders (Hemophilia, purpura)	3	0	1	3	2	3	3

PY2.9	Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion	3	0	1	3	2	3	3
PY2.10	Define and classify different types of immunity. Describe the development of immunity and its regulation	3	0	1	3	2	3	3
PY2.11	Estimate Hb, RBC, TLC, RBC indices, DLC, Blood groups, BT/CT	3	2	3	3	3	3	3
PY2.12	Describe test for ESR, Osmotic fragility, Hematocrit. Note the findings and interpret the test	3	2	3	3	3	3	3

	results etc							
PY2.13	Describe steps for reticulocyte and platelet count	3	2	3	3	3	3	3

Nerve and Muscle Physiology Number of competencies: 18								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY3.1	Describe the structure and functions of a neuron and neuroglia; Discuss Nerve Growth Factor & other growth factors/cytokines	3	0	1	3	2	3	3
PY3.2	Describe the types, functions & properties of nerve fibers	3	0	1	3	2	3	3
PY3.3	Describe the degeneration and regeneration in peripheral nerves	3	0	1	3	2	3	3
PY3.4	Describe the structure of neuro-muscular junction and transmission of impulses	3	0	1	3	2	3	3
PY3.5	Discuss the action of neuro-muscular blocking agents	3	0	1	3	2	3	3
PY3.6	Describe the pathophysiology of	3	0	1	3	2	3	3

	Myasthenia gravis							
PY3.7	Describe the different types of muscle fibres and their structure	3	0	1	3	2	3	3
PY3.8	Describe action potential and its properties in different muscle types (skeletal & smooth)	3	0	1	3	2	3	3
PY3.9	Describe the molecular basis of muscle contraction in skeletal and in smooth muscles	3	0	1	3	2	3	3
PY3.10	Describe the mode of muscle contraction (isometric and isotonic)	3	0	1	3	2	3	3
PY3.11	Explain energy source and muscle metabolism	3	0	3	3	3	3	3
PY3.12	Explain the gradation of muscular activity	3	0	1	3	2	3	3
PY3.13	Describe muscular dystrophy: myopathies	3	1	2	3	2	3	3
PY3.14	Perform Ergography	3	1	3	3	2	3	3
PY3.15	Demonstrate effect of mild, moderate	3	2	3	3	2	3	3

	and severe exercise and record changes in cardiorespiratory parameters							
PY3.16	Demonstrate Harvard Step test and describe the impact on induced physiologic parameters in a simulated environment	3	2	3	3	2	3	3
PY3.17	Describe Strength-duration curve	3	0	1	3	2	3	3
PY3.18	Observe with Computer assisted learning (i) amphibian nerve - muscle experiments (ii) amphibian cardiac experiments	3	2	3	3	2	3	3

Gastro-intestinal Physiology, Number of competencies: (10)								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY4.1	Describe the structure and functions of digestive system	3	0	1	3	2	3	3
PY4.2	Describe the composition, mechanism of secretion, functions, and regulation of saliva, gastric, pancreatic, intestinal juices and bile	3	0	1	3	2	3	3
PY4.3	Describe GIT movements, regulation and functions. Describe defecation reflex. Explain role of dietary fiber.	3	0	1	3	2	3	3
PY4.4	Describe the physiology of digestion and absorption of nutrients	3	0	1	3	2	3	3
PY4.5	Describe the source of GIT hormones, their regulation and functions	3	0	1	3	2	3	3

PY4.6	Describe the Gut Brain Axis	3	0	1	3	2	3	3
PY4.7	Describe & discuss the structure and functions of liver and gall bladder	3	0	1	3	2	3	3
PY4.8	Describe & discuss gastric function tests, pancreatic exocrine function tests & liver function tests	3	0	1	3	2	3	3
PY4.9	Discuss the physiology aspects of: peptic ulcer, gastroesophageal reflux disease, vomiting, diarrhea, constipation, Adynamic ileus, Hirschsprung's disease.	3	0	1	3	2	3	3
PY4.10	Demonstrate the correct clinical examination of the abdomen in a normal volunteer or simulated environment	3	0	1	3	3	3	3

Cardiovascular Physiology (CVS) Number of competencies: (16)								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY 5.1	Describe the functional anatomy of heart including chambers, sounds; and Pacemaker tissue and conducting system.	3	1	1	3	3	3	3
PY 5.2	Describe the properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions	3	0	2	3	3	3	3
PY 5.3	Discuss the events occurring during the cardiac cycle	3	0	1	3	3	3	3
PY 5.4	Describe generation, conduction of cardiac impulse	3	0	1	3	3	3	3
PY 5.5	Describe the physiology of electrocardiogram(E.C.G),its applications and the cardiac axis	3	0	1	3	3	3	3
PY 5.6	Describe abnormal ECG, arrhythmias, heart block and myocardial Infarction.	3	0	2	3	3	3	3
PY 5.7	Describe and discuss hemodynamics of circulatory system	3	0	1	3	3	3	3
PY 5.8	Describe and discuss local and systemic cardiovascular regulatory mechanisms	3	2	1	3	3	3	3

PY 5.9	Describe the factors affecting heart rate, regulation of cardiac output & blood pressure	3	0	1	3	3	3	3
PY 5.10	Describe & discuss regional circulation including microcirculation, lymphatic circulation, coronary, cerebral, capillary, skin, fetal, pulmonary and splanchnic circulation	3	0	1	3	3	3	3
PY 5.11	Describe the patho-physiology of shock, syncope and heart failure	3	1	3	3	3	3	3
PY 5.12	Record blood pressure & pulse at rest and in different grades of exercise and postures in a volunteer or simulated environment.	3	0	1	3	3	3	3
PY 5.13	Record and interpret normal ECG in a volunteer or simulated environment	3	2	1	3	3	3	3
PY 5.14	Observe cardiovascular autonomic function tests in a volunteer or simulated environment	3	0	1	3	3	3	3
PY 5.15	Demonstrate the correct clinical examination of the cardiovascular system in a normal volunteer or simulated environment	3	0	1	3	3	3	3
PY 5.16	Record Arterial pulse tracing using finger plethysmography in a volunteer or simulated environment	3	0	1	3	3	3	3

Topic: Respiratory Physiology Number of competencies: (10)								
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY 6.1	Describe the functional anatomy of respiratory tract	3	0	3	3	3	3	3
PY 6.2	Describe the mechanics of normal respiration, pressure changes during ventilation, lung volume and capacities, alveolar surface tension, compliance, airway resistance, ventilation, V/P ratio, diffusion capacity of lungs.	3	2	1	3	3	3	3
PY 6.3	Describe and discuss the transport of respiratory gases: Oxygen and Carbon dioxide	3	0	1	3	3	3	3
PY 6.4	Describe and discuss the physiology of high altitude and deep sea diving	3	0	1	3	2	3	3
PY 6.5	Describe and discuss the principles of artificial respiration, oxygen therapy, acclimatization and decompression sickness	3	1	2	3	2	3	3
PY 6.6	Describe and discuss the	3	1	1	3	2	3	3

	pathophysiology of dyspnea ,hypoxia, cyanosis asphyxia; drowning, periodic breathing							
PY 6.7	Describe and discuss lung function tests & their clinical significance	3	1	2	3	2	3	3
PY 6.8	Demonstrate the correct technique to perform & interpret Spirometry	3	1	2	3	2	3	3
PY 6.9	Demonstrate the correct clinical examination of the respiratory system in a normal volunteer or simulated environment	3	1	2	3	2	3	3
PY 6.10	Demonstrate the correct technique to perform measurement of peak expiratory flow rate in a normal volunteer or simulated environment	3	1	2	3	2	3	3

Topic: Renal Physiology Number of competencies: (09)								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY7.1	Describe structure and function of kidney	3	0	1	3	2	3	3
PY7.2	Describe the structure and functions of juxta glomerular apparatus and role of renin-angiotensin system	3	0	1	3	2	3	3
PY7.3	Describe the mechanism of urine formation involving processes of filtration, tubular reabsorption & secretion; concentration and diluting	3	0	1	3	2	3	3
PY7.4	Describe & discuss the significance & implication of Renal clearance	3	0	1	3	2	3	3
PY7.5	Describe the renal regulation of fluid and electrolytes & acid-base balance	3	0	1	3	2	3	3
PY7.6	Describe the innervations of	3	0	1	3	2	3	3

	urinary bladder, physiology of micturition and its abnormalities							
PY7.7	Describe artificial kidney, dialysis and renal transplantation	3	0	1	3	2	3	3
PY7.8	Describe & discuss Renal Function Tests	3	0	1	3	2	3	3
PY7.9	Describe cystometry and discuss the normal cystometrogram	3	0	1	3	2	3	3

Topic: Endocrine Physiology Number of competencies: (06)								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY8.1	Describe the physiology of bone and calcium metabolism	3	0	1	3	2	3	3
PY8.2	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	3	0	1	3	2	3	3
PY8.3	Describe the physiology of Thymus & Pineal Gland	3	0	1	3	2	3	3
PY8.4	Describe function tests: Thyroid gland; Adrenal cortex, Adrenal	3	0	1	3	2	3	3

	medulla and pancreas							
PY8.5	Describe the metabolic and endocrine consequences of obesity & metabolic syndrome, Stress response. Outline the psychiatry component pertaining to metabolic syndrome	3	0	1	3	2	3	3
PY8.6	Describe & differentiate the mechanism of action of steroid, protein and amine hormones	3	0	1	3	2	3	3

Topic: Reproductive Physiology Number of competencies: (12)								
PY 9.1	Describe and discuss sex determination; sex differentiation and their abnormities and outline psychiatry and practical implication of sex determination.	3	0	1	3	1	3	3
PY 9.2	Describe and discuss puberty: onset, progression, stages; early and delayed puberty and outline adolescent clinical and psychological association.	3	0	1	3	1	3	3
PY 9.3	Describe male reproductive system: functions of testis and control of spermatogenesis & factors modifying it and outline its association with psychiatric illness	3	0	1	3	1	3	3
PY 9.4	Describe female reproductive system: (a) functions of ovary and its control; (b) menstrual cycle - hormonal, uterine and ovarian changes	3	0	1	3	1	3	3
PY 9.5	Describe and discuss the physiological effects of sex hormones	3	0	1	3	1	3	3
PY 9.6	Enumerate the contraceptive methods for male and female. Discuss their	3	0	1	3	1	3	3

	advantages & disadvantages							
PY 9.7	Describe and discuss the effects of removal of gonads on physiological functions	3	0	1	3	2	3	3
PY 9.8	Describe and discuss the physiology of pregnancy, parturition & lactation and outline the psychology and psychiatry-disorders associated with it.	3	0	1	3	2	3	3
PY 9.9	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	3	0	1	3	2	3	3
PY 9.10	Discuss the physiological basis of various pregnancy tests	3	1	2	3	2	3	3
PY 9.11	Discuss the hormonal changes and their effects during perimenopause and menopause	3	0	1	3	1	3	3
PY 9.12	Discuss the common causes of infertility in a couple and role of IVF in managing a case of infertility.	3	0	1	3	1	3	3

Neurophysiology including special senses Number of competencies: 20								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY10.1	Describe and discuss the organization of nervous system	3	0	1	3	2	3	3
PY10.2	Describe and discuss the functions and properties of synapse, reflex, receptors	3	0	1	3	2	3	3
PY10.3	Describe and discuss somatic sensations & sensory tracts	3	0	1	3	2	3	3
PY10.4	Describe and discuss motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium & vestibular apparatus	3	0	1	3	2	3	3
PY10.5	Describe and discuss structure and functions of reticular activating	3	0	1	3	2	3	3

	system, autonomic nervous system (ANS).							
PY10.6	Describe and discuss Spinal cord, its functions, lesion & sensory disturbances.	3	0	1	3	2	3	3
PY10.7	Describe and discuss functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities	3	0	1	3	2	3	3
PY10.8	Describe and discuss behavioral and EEG characteristics during sleep and mechanism responsible for its production.	3	0	1	3	2	3	3
PY10.9	Describe and discuss the physiological basis of memory, learning and speech.	3	0	1	3	2	3	3
PY10.10	Describe and discuss chemical	3	0	1	3	2	3	3

	transmission in the nervous system. (Outline the psychiatry element).							
PY10.11	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.	3	0	3	3	3	3	3
PY10.12	Identify normal EEG forms.	3	0	1	3	2	3	3
PY10.13	Describe and discuss perception of smell and taste sensation.	3	0	1	3	2	3	3
PY10.14	Describe and discuss patho-physiology of altered smell and taste sensation.	3	0	1	3	2	3	3
PY10.15	Describe and discuss functional anatomy of ear and auditory pathways & physiology of hearing.	3	0	1	3	2	3	3

PY10.16	Describe and discuss pathophysiology of deafness. Describe hearing tests.	3	0	1	3	2	3	3
PY10.17	Describe and discuss functional anatomy of eye, physiology of image formation, physiology of vision including color vision, refractive errors, color blindness, physiology of pupil and light reflex.	3	0	1	3	2	3	3
PY10.18	Describe and discuss the physiological basis of lesion in visual pathway.	3	0	1	3	2	3	3
PY10.19	Describe and discuss auditory & visual evoke potentials.	3	0	1	3	2	3	3
PY10.20	Demonstrate (i) Testing of visual acuity, color and field of vision and (ii) hearing (iii) Testing for smell and (iv) taste	3	0	3	3	3	3	3

	sensation in volunteer/ simulated environment.							

Integrated Physiology Number of competencies: (14)								
Course Outcome (CO)		**Programme Outcome (PO)**						
Competency No.	**Competency**	**PO1 Clinician**	**PO2 Leader and member**	**PO3 Communicator**	**PO4 Lifelong learner**	**PO5 Professional**	**PO6 Critical Thinker**	**PO7 Researcher**
PY11.1	Describe and discuss mechanism of temperature regulation	3	0	1	3	2	3	3
PY11.2	Describe and discuss adaptation to altered temperature (heat and cold)	3	0	1	3	2	3	3
PY11.3	Describe and discuss mechanism of fever, cold injuries and heat stroke	3	0	1	3	2	3	3
PY11.4	Describe and discuss cardio-respiratory and metabolic adjustments during exercise; physical training effects	3	0	1	3	2	3	3
PY11.5	Describe and discuss physiological consequences of sedentary lifestyle	3	0	1	3	2	3	3
PY11.6	Describe physiology of Infancy	3	0	1	3	2	3	3
PY11.7	Describe and discuss physiology of aging; free radicals and antioxidants	3	0	1	3	2	3	3
PY11.8	Discuss & compare	3	0	1	3	2	3	3

	cardio-respiratory changes in exercise (isometric and isotonic) with that in the resting state and under different environmental conditions (heat and cold)							
PY11.9	Interpret growth charts	3	0	1	3	2	3	3
PY11.10	Interpret anthropometric assessment of infants	3	0	1	3	2	3	3
PY11.11	Discuss the concept, criteria for diagnosis of Brain death and its implications	3	0	1	3	2	3	3
PY11.12	Discuss the physiological effects of meditation	3	0	1	3	2	3	3
PY11.13	Obtain history and perform general examination in the volunteer / simulated environment	3	0	1	3	2	3	3
PY11.14	Demonstrate Basic Life Support in a simulated environment3	3	0	1	3	2	3	3