Government of West Bengal
Government General Degree College at Kharagpur-II
Department of Physiology
Madpur, Paschim Medinipur – 721149, West Bengal

Government General Degree College at Kharagpur II

Department of Physiology
B.Sc. General in Physiology[3 tier system]
Programme Outcome (PO)
&
Course Outcome (CO)

Syed Benazir Hidaus
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Department of Physiology
B.Sc. General in Physiology(3 Tier Examination Pattern)
w.e.f. 2014-2015

Programme Outcome (PO)

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B.Sc. General in Physiology
(3 Tier Examination Pattern)

w.e.f. 2014-2015 Programme outcome

At the end of the course B.Sc. General in Physiology, students are expected to:

- Gain the basic and compact knowledge about Human Physiology.
- Understand the mechanisms of the functioning of the different organs and organ systems of the human body.
- Understand about Cellular Physiology, Biophysical Principles, Biochemistry, Digestive system & Metabolism.
- Develop knowledge about the various physiological systems including Blood, body fluid and immune System, Cardiovascular System, Respiratory System, Nervous System,Sensory Physiology, Endocrinology, Reproductive System, Renal Physiology etc.,
- To develop knowledge about Nerve –Muscle Physiology, Skin and Body temperature regulation.
- To develop a compact understanding of the different public health issues and to gain an insight to design solution to those.
- To lean to recognize any particular epidemiological condition in the society through survey method, to analyze the epidemiological data and to suggest the ways out of any adverse pathogenic condition.
- To gain knowledge about the mechanisms and working of various modern medical technologies and analytical instruments in order to understand their application.
- To learn about clinical Biochemistry and clinical Hematology and their applications,
- To gain insights about Microbiology and Biotechnology in context to human Physiology.
- To perform various experiments in biochemistry, human experimental, animal experimental, histology, hematology, biophysics etc.
- To learn different basic skills in the field of classical and clinical Physiology so that they may applythose for further learning in allied fields.
- To learn the basic digital skills necessary for employment and higher studies.
- To gain an overall knowledge in the subject of Human Physiology so that they may be confident enough to seek jobs for which they may be eligible completing the undergraduate certificate course.
- To be competent enough to pursue their future career in paramedical, pharmacology, teaching, industry and other professions in Physiology and allied science, following completion of the course.

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Course Outcome (CO)

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Course Outcomes

Course	Paper code	Unit & Unit name	Outcomes
PART-I	**Paper- I (Theory)**	**Unit-01** i) Physiology as a science of excellence ii) Units of human system iii) Biophysical & Biochemical principles involved in human system iv) Conservation of matter and energy in human system a) Alimentation b) Biochemistry & Metabolism c) Nutrition & Dietetics.	This course helps the students to gain knowledge about role of Physiology as a basic science and the scopes from studying Physiology. They also learn about the structure, function of the cell and the structure andfunction s of various sub cellular components.They also learn about the various biochemical and biophysical principles, processes, their applications and significance in Physiology. Students learn about enzymology and the mechanism of enzyme substrate reactions, concept of co-enzyme, iso-enzyme, anti-enzyme, Catalyst etc. They learn about alimentation, biochemistry and metabolism processes including Glycolysis, Hexose monophosphate shunt, glycogenesis, glycogenolysis, TCA cycle, gluconeogenesis etc. They learn about nutrition and dietetics including BMR, various food components, proteins, vitamins etc.
		Unit-02 i) Blood & Body Fluids ii) Cardiovascular System iii) Respiratory System iv) Renal Physiology	Students learn about the blood and body fluids, bone marrow, plasma proteins, coagulation process, hematocrit value, blood group, blood transfusions, lymph body fluids etc., They learn about the structural and functional details of the heart. They get to know about circulation and get basic concepts of blood pressure, ECG, regional circulation etc.Students also learn about the respiratory physiology, transport of respiratory gasses, mechanism of respiration, breathing, volumes and capacities of the lung. They also learn

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			about the regulation of respiration, Hypoxia, apnea, hypercapnia, cyanosis. Mountain sickness, acclimatization etc. Students also learn about renal physiology including mechanism of formation of urine, structural functional details of the nephrons, mechanisms of micturition, non excretory function of the kidneys etc.
PART-II	**Paper-II (Theory)**	**Unit-03** i) Nerve-Muscle Physiology ii) Nervous System iii) Skin and Regulation of Body Temperature	This section helps the students to know about different types of muscles & their structures,sarcotubular system and mechanism of muscle contraction. They learn about the properties of muscle and develop concept about muscle spindle. The students learn about the structure & classification of nerves, origin & propagation of nerve impulse andproperties of nerve fibres. They know about synapses, neuromuscular junction, neurotransmitters,degeneration & regeneration of nerve fibres andmyelination. They gain knowledge about the organization and functions of nervous system (sensory, motor, association), CNS and PNS (emphasis on the structure of spinal cord and brain stem), neural tracts and reflex action.They study the formation, circulation and functions of cerebrospinal fluid or CSF. The students develop concepts about the structure and function of the integumentary system of the human body and understand the physiological mechanisms involved in body temperature regulation.

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			and nicotine. They learn about abuse of medicines: sulfa drugs, antibiotics, androgenic steroids, doping. In the Environmental Physiology section,the students gain idea about the physiological aspects ofenvironment. They study about some common pollutants like Carbon monoxide, lead & arsenic and their deleterious health effects. They learn about the health effects of noise, pesticides andradio-active wastes. They study learn about the role of kidney as a scavenger, food pollution and adulteration. The students know about DNA virus & RNA virus, phages, bacteria - structure and morphological classification. They gain knowledge about sterilization, pasteurization, antibiotics, immunity, immunization and immunological detection of pregnancy. They learn about AIDS- causative virus, mode of transmission, effects on human body, preventive measures, diagnostic test for AIDS (ELISA). The part of the course onWork & Sports Physiology helps them learn about thedefinition of work, cardiac index, work index or pulse, O2 debt, classification of physical work, cardiovascular and respiratory changes during physical exercise. They develop idea about VO2 max. In the Biostatistics and Modern Instrumentation (Biomedical) & Basic Concepts of Computer, the students know aboutsampling and its methods, frequency distribution, properties & computation of standard deviation. They are able to discern the sampling errors, standard error or difference between means. They gather knowledge about the principle & application of artificial pacemaker, MRI, hemodialysis, USG, CT scan, X-ray and endoscopy. They develop basic concept of computer, uses of computer, elementary ideas about hardware, software and software packages. The part of the course in

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			The students acquire skills to perform Human Experiments.They learn about determination of PFI of an individual by Harvard Step Test and graphical plotting of changes in pulse & breathing rate during recovery period,measurement of systolic and diastolic arterial blood pressure by sphygmomanometer and determination of pulse pressure and mean pressure during quiet rest and exercise. The students gather adequate expertise to conduct diet surveys to determine nutritional and health status of communities. They learn to prepare reports of those surveys with recommendations to mitigate the health and dietary issues found. They are usually encouraged to conduct the survey on his/her own family.
PART-III	Paper-IV A (Theory)	1. Application of Physiology 2. Clinical Biochemistry and Molecular Biology 3. Environmental Physiology 4. Microbiology and Immunology 5. Work and Sports Physiology 6. Biostatistics and Modern Instrumentation (Biomedical) & Basic Concepts of Computer 7. Community Health Management	This part of the course helps the students to gain knowledge about the application of Physiology in different fields – Hematology, Biochemistry, Molecular Biology, Immunology, Microbiology, Social Physiology, Work and Sports Physiology, Environmental Physiology, Space Physiology and Pharmacology. The Clinical Biochemistry section helps the students to learn about DNA and RNA- types and functions, gene, genome, genetic code, transcription, translation and genetic engineering. They also study about thepathological significance of the following blood constituents like glucose, urea, creatinine, uric acid, cholesterol, lipoproteins, bilirubin, SGPT and SGOT, alkaline and acid phosphatases and ketone bodies. They learn about dose response relationship and develop concepts in ED 50, LD 50, CO, TLV, therapeutic index of drugs, safety factor for drugs and pollutants.They know about narcotic drug abuse and addiction, addiction of alcohol

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			sections of bone, cartilage, lung, trachea, spleen, lymph gland, liver, salivary glands, pancreas, esophagus, stomach, small intestine, large intestine, ovary, adrenal, testis, thyroid, spinal cord, cerebellum, cerebral cortex, kidney, skin and tongue. They are demonstrated how to carry out eosin - haematoxylin staining of blood film andreticulocyte staining. In the Biochemistry section, the students are trained to performqualitative tests for identification of starch, dextrin, lactose, sucrose, maltose, glucose, galactose, fructose, albumin, gelatin, peptone, lactic acid, HCl, uric acid, acetone, glycerol, bile salts and urea in blood. They acquire skills forqualitative analysis of pulse, rice, milk to test the presence of carbohydrate, protein, fat. They are demonstrated how to perform qualitative identification of lipid & cholesterol. They learn to carry outquantitative estimation of glucose, sucrose by Benedict's method, estimation of lactose from milk by Benedict's method,estimation of blood sugar by Folin-Wu method,estimation of chloride by Mohr's method and estimation amino-nitrogen through formol-tritration method. Students will be trained to interpret the prepared supplied curve. They will learn the use of Kymograph, induction coil and keys, recording of simple muscle curve with sciatic nerve-gastrocnemius muscle preparation of a toad, determination of latent period, contraction period, relaxation period & maximum height of contraction. They also learn normal tracing of unperfused toad's heartbeat, studying theeffects of warm saline on unperfused toad's heartbeat,effect of ion (K+ & Ca2+) on unperfused toad's heart beat andeffect of adrenaline and acetylcholine on unperfused toad's heartbeat.

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		Unit-04: i) Sensory Physiology ii) Endocrine System iii) Reproductive Physiology	The Sensory Physiology part of the course help the students to learn about theclassification of general and special senses, and their receptors. They know about Muller's law of specific nerve energies and Weber-Fechner law. They gather the concept of receptor adaptation, after taste, etc. They learn in details about the neurophysiology of audition and vision. The students know about the anatomy of the endocrine system,classification of hormones, regulation of hormone actions, mechanism of hormone action and endocrine disorders. They also know about prostaglandins, erythropoietin and melatonin. In the Reproductive Physiology part of the course the students learn about primary and accessory sex organs, secondary sex characters,puberty, estrous and menstrual cycle, and their hormonal control. They gather knowledge about spermatogenesis, ovulation, fertilization, implantation, placenta formation and its function. They also learn about placental hormones, maintenance of pregnancy, hormonal factors, parturition, pregnancy tests, development of mammary gland and lactation.
	Paper- III (Practical)	A. Histology B. Biochemistry C. Experimental Physiology D. Human Experiments E. Diet Survey Report F. Excursion	This part of the course helps the students to develop skills on Histological techniques. They learn Leishman's staining of human blood film & identification of different blood corpuscles and preparation of haemin crystals. In haematology, they learn how to estimate hemoglobin of blood. The part of the course on Fresh tissue experiments involves acquiring skills on examination & staining of fresh tissue- squamous, ciliated & columnar epithelium, skeletal muscle fibre (Rat/Goat) by Methylene blue stain, transitional epithelium, mesentery (Rat/Goat) (counter stain by Methylene blue) andstaining of adipose tissue by Sudan III or IV. After the completion of this course, the students become adept in identification of permanent slides of the

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			Community Health Management, helps the students to develop basic concept of population, society, community and community Health. They also learn aboutpopulation control & family planning, causes and management of different types of diabetes, thalassemia, nutritional anemia, atherosclerotic disorders, gout, obesity, filaria, endemic goiter and dental carries.
	Paper-IVB (Practical)	A. Hematological Tests B. Clinical Pathology C. Human Experiments	The students learn to perform Hematological Tests and they can determine differential count (DC) of WBC, PCV, MCV, clotting time, bleeding time, ABO grouping. They are demonstrated how to carry out total count (TC) of RBC & WBC, determine haematocrit value and erythrocyte sedimentation rate(ESR). The experiments on Clinical Pathology, help the students to develop skills inidentification of abnormal constituents of urine - glucose, proteins, acetone, blood, bile salts. They learn about Pregnancy Test (strip method). After the completion of the course in Human Experiments, the students can carry outpneumographic recording of normal respiratory movements, recording during drinking water, talking, forced hyperventilation & breath holding;Spirometric measurement of vital capacity; and Determination of VO2 max by Queen's College method. They learn measurements of common anthropometric parameters like stature, eye height, shoulder height, elbow height, knee height (sitting); circumference of head, chest, wrist and hip; Body Mass Index measurement (BMI) and Calculation of body surface area (BSA).

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