DEPARTMENT OF PHYSIOLOGY
CURRICULUM OF STUDIES IN PHYSIOLOGY

(i) GOAL:

The broad goal of the teaching of undergraduate students in Physiology aims at providing them comprehensive knowledge of the normal function of the organ systems of the body to facilitate an understanding of the Physiological of health and disease.

(ii) OBJECTIVES:

(A) KNOWLEDGE:

1. Explain the normal functioning of all the organ systems and their interactions for well co-ordinated total body function.

2. Assess the relative contribution of each organ system to the maintenance of the milieu interior.

3. Elucidate the Physiological aspects of normal growth and development.

4. Describe the Physiological response and adaptations to environmental stresses.

5. List the Physiological principles underlying pathogenesis and treatment of disease.

(B) SKILLS: At the end of the course the student shall be able to:-

1. Conduct experiments designed for study of physiological phenomenon.

2. Interpret experimental/investigative data.

3. Distinguish between normal and abnormal data derived as a result of tests, which he/she has performed and observed in the laboratory.

(C) INTEGRATION: At the end of the integrated teaching, the student shall acquire on integrated knowledge of organ structure and function and its regularly mechanisms.

(D) CURRICULUM:
(a) General aspects including genesis of life, cell-development, structure and functions of different components, genetic control. Transport through cell member. Basic evolutionary processes leading to cell differentiation and organisation into tissues. Basic functional organisation of human body. Homeostasis as the basic aim of physiological organisation.

(b) Systemic physiology

(1) **GASTRO INTESTINAL SYSTEM**

Principles of balanced diet. Gastrointestinal tract movements, secretions: composition, function, mechanism of regulation of secretion of Saliva, gastric juice, pancreatic juice, bile, sulcus entericus etc. faeces.

(2) **BLOOD AND CIRCULATION**

Blood volume, its measurement and regulation. Blood depots; Blood reaction & its maintenance. Composition of blood & functions of its constituents. Bone marrow, Origin & fate of formal elements; Hemoglobin; its chemistry, compounds & system, spleen, lymphoreticular system etc. immunity, transplantation of organs, tissue rejection.

(3) **CARDIOVASCULAR SYSTEM**

Characteristics of cardiac muscle; valves – structure & its action, Origin & transmission of cardiac impulse, Heart block, Sounds, Electrocardiogram; Cardiac output, its measurement & physiological variation. Regularly of Heat activity, Structure of blood vessels, course & circulation of blood, nutrition of heart & coronary circulation, Rate of blood flow-velocity, circulation time, Regulation of peripheral circulation-arterial, capillary & venous. Echocardiography, Dynamics of cardiovascular system, Histamine & its role pulmonary, Hepatic, Renal circulation, Tissue fluid (extracellular and intracellular).

(4) **RESPIRATION:**

Respiratory organs. Lung compliance; Mechanics of respiratory movements, Lung volumes & capacities; Spirometry. Compositions of inspired & expired and alveolar air; Gases in the blood and air & their
tensions. Mechanisms of external & internal respiration, Transport of oxygen & carbon di oxide in blood. Control of respiration; Apnea, Dyspnoea, Anoxia, Cyanosis, asphyxia & periodic breathing; Effects of high & low atmospheric pressures of respiration on other systems.

(5) **EXCRETORY SYSTEM:**
Structure of kindly & mechanism of urine formation, Urinary output its physiological variation & composition. Functions of kindly, role in regulation of water balance and reaction of blood. Mechanism of micturition, hormone excreted in urine & their significance, Dialysis, hormones.

(6) **ENVIRONMENTAL PHYSIOLOGY:**
Integument-skin; Body surface temperature, core temperature; regulation, hypothermia, hibernation; environmental pollution, Ionising radiation-effects etc. aviation physiology-High altitude & under water physiology, Hyperbaric environment, space physiology.

(7) **SKELETO-MUSCULAR SYSTEM:**
Various types of muscles in the body & their special features, Changes of excitation, nature of contractile process & factors influencing muscular contractions, Neuromuscular functions.

(8) **NERVOUS SYSTEM AND NEURO-MUSCULAR SYSTEM:**
Neuron & Neuroglia nerve fibres; its excitation & propagation of nerve impulse, changes undergone in a nerve during stimulation. Electrotonus & floggers law of contraction, Wallerian degeneration, Reaction of degeneration & their features, General features of nervous system, Neuronal transmission, Synapses & its special features, Reflex action & its characteristics, Classification of sensations, receptor organs & pathways of cutaneous & deep sensations, Structure & functions of spinal cord, its roots & brainstem. Reticular formation; Functions of Cerebellum, Corpus striatum, Thalamus, hypothalamus, Cerebral cortex-its structure, connections & localisation of functions, Higher functions, Electro-encephalogram, Muscle tone, regulation of postural tonus & mechanism of co-ordinate movements, Non-auditory labyrinth; physiology of speech.
Conditioned reflexes; sleep, Autonomic nervous system & functions, Physiology of chemical transmission, Cerebrospinal fluid-composition, formation, circulation & functions.

(9) **ENDOCRINES & REPRODUCTION:**

Structure & functions of various endocrine organs, Primary & secondary sex characters, Andrology-physiology of tests, Menstruation, ovulation, fertilisation & formation of the germinal layers, Formation & role of placenta, Fetal respiration & circulation. Mammary glands and lactation, Physiological changes during pregnancy; Principles of contraception, Fertility controls.

(10) **SPECIAL SENSES:**

EYE: Structure of Eye and Functions of various parts, Nutrition of eye and intraocular fluid, Field of vision and mechanism of accommodation. Errors of refraction, Visual Path and ocular reflexes, Color vision, Binocular visions, after images ocular fields, refractive media.

EAR: Auditory apparatus, Labyrinthine conduction of sound waves and Mechanism of hearing, Auditory pathway, tests for hearing, audiometer.

TEST AND SMELL: Structure, distribution and functions of receptors, Mechanism of stimulation and their pathways.

(11) **INTEGRGATIVE LECTURES:**

Growth and development, Hemorrhage and shock, Muscular exercise and its effects. Aging – Gerontology, maintenance of PH, water and electrolytes balance.
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List of Practical’s and Demonstrations  

A. **HAEMATOLOGY**  
   1. Total WBC Count  
   2. Total RBC Count  
   3. Differential WBC Count  
   4. Hemoglobin estimation  
   5. Packed cell volume, blood indices  
   6. Erythrocyte Sedimentation rate  
   7. Bleeding and clotting time  
   8. Blood group determination  
   9. Haemin crystals  

B. **HUMAN PHYSIOLOGY**  
   ☄ Applied and clinical  
   1. History taking and general examination  
   2. Examination of alimentary system  
   3. Examination of cardiovascular system  
   5. Examination of pulses  
   6. Cardiac efficiency test, electrocardiology  
   7. Examination respiratory system  
   8. Spirometry  
   9. Resuscitation – artificial respiration  
   10. Closed theoretic cardiac massage  
   11. Respiratory efficacy tests  
   12. Examination of sensory system  
   13. Examination of motor system  
   14. Examination of reflexes – superficial, deep and other  
   15. Examination cranial nerves  
   16. Examination of higher functions  
   17. Primary visual acuity  
   18. Auditory test  
   19. Tests of sensation of smell and taste  
   20. Recording of body temperature  
   21. Stethography
22. Ophthalmoscopy
23. Ergography
24. Phonocardiography and Plethysmography
25. Reflex time and reaction time
26. Bone marrow smear
27. Price Jones curve – diameter of RBCS
28. Specific gravity, Osmotic fragility of blood
29. Platelets and reticulocyte count
30. Circulation time
31. Pregnancy test

C. EXPERIMENTAL PHYSIOLOGY

⭐ Amphibian Experiments:
1. Introduction to various instruments used in laboratory, circuits
2. Muscles nerve preparation, Simple muscle twitch
3. Effect of temperature and load
4. Factors affecting muscle contraction – two successive stimuli, multiple stimuli fatigue.
5. Velocity of nerve impulse
6. Normal Cardiogram and effects of temperature
7. Heart Block (Stannius ligatures)
8. Effects of stimulation of vagus and crescent on cardiac contraction
9. Perfusion of amphibian heart
10. Effect of ions and drugs on heart – Pilocarpine, Acetylcholine, Adrenaline, nicotine and atropine.
11. Properties of cardiac muscles
12. Decerebrate and spinal preparation

⭐ Mammalian Experiments:
1. Determination of blood volume in experimental animals
2. Recording of movements of isolated loop of mammalian intestine and effects of drugs of physiological importance.

1. Recording of Blood Pressure and respiration in mammals and factors influencing them.