

Physiological Basis of CNS disorders like Alzheimer's disease, Parkinsonism, Syringomyelia, Tabes dorsalis

XII. SPECIAL SENSES

(10 Hours)

Eye : Functional anatomy of eye. Image formation on retina. Structure of photoreceptors electrical activity of photoreceptors. Errors of refraction, functions of aqueous humour, intraocular tension. Mechanisms of accommodation, dark adaptation, pupillary reflexes, functions of retina. Optic pathway and lesions. Role of visual cortex in perception. Field of vision. Colour vision, Acuity of vision, photochemistry of vision. Nutritional deficiency - blindness.

Auditory Apparatus :

1. Functional anatomy of the ear, physics of sound (basic)
2. Role of tympanic membrane, middle ear, cochlea in hearing.
3. Auditory receptors and pathway
4. Deafness and its causes, principles of audiometry, tuning fork tests and its interpretation.

Vestibular Apparatus :

Structure and functions, connections and lesions of Vestibular apparatus.

Taste and Smell :

Modalities, receptors, pathway, cortical and limbic areas associated with taste and smell.

XII. BIO-MEDICAL WASTE : Types, potential risks and their safe management.

Practical

The following list of practical is minimum and essential. Additional exercises can be included as and when feasible and required. All the practicals have been categorized as 'Procedures' and 'Demonstrations'. The procedures are to be performed by the students during practical classes to acquire skills. Some of these would be included in the practical during University examination. Those categorized as "Demonstrations" are to be shown to students during practical classes. However, these Demonstrations would not be included in the university examinations, but questions based on these would be given in the form of data, charts, problems and case - histories, for interpretation by students.

Procedures to be performed by the students:

1. Haematology:

- 1) RBC count, 2) WBC Count, 3) Differential Leucocyte Count 4) Estimation of haemoglobin
- 5) Blood grouping 6) Bleeding time 7) Clotting time 8) Absolute Eosinophil Count

2. Female Reproduction : Menstrual cycle : Changes in ovary, uterus, cervix, vagina and hormonal regulation. Ovulation and its detection, fertilization, implantation, physiological changes during pregnancy, Placental development; nutritional needs of mother during pregnancy, Parturition, lactation, Composition of breast milk, placenta, menopause. Physiology of newborn. (3 Hours)

3. Family Planning and Welfare : Physiological basis of contraception in males and females. Principles of use of oral contraceptives, safe period, rhythm and other methods of contraception. (4 Hours)

IX. CARDIOVASCULAR SYSTEM (25 Hours)

Functional anatomy of heart, properties of cardiac muscle, principles of alicardigraphy, electrical and mechanical changes in cardiac cycle, conducting system of heart, normal ECG. Cardiac output measurement in man, physiological variations. Regulatory mechanisms of heart rate and blood pressure. Regional circulations: normal values, physical principles governing flow of blood in heart and blood vessels, measurement and regulation of coronary, cerebral, skin. Foetal circulation, changes in CVS during muscular exercise, postural changes, hypovolemia, hypoxia, and cardiopulmonary resuscitation. Microcirculation, Haemodynamics, pathophysiology of hypertension, shock, cardiac failure and coronary artery disease.

X. RESPIRATORY SYSTEM (12 Hours)

Functional anatomy of respiratory system. Mechanics of normal respiration. Physical principles governing flow of air in respiratory passages. Lung compliance, alveolar ventilation, ventilation perfusion ratio, oxygen and carbon dioxide transport, diffusing capacity, pulmonary function tests. Regulation of respiration, respiratory acidosis and alkalosis, pulmonary blood flow. Hypoxia, cyanosis, asphyxia. Respiratory adjustments during muscular exercise, hyperbaric conditions, principles of oxygen therapy, artificial respiration. Hyaline membrane disease. Pathophysiology of obstructive and restrictive disorders. Pulmonary oedema, decompression sickness, hyperbaric oxygen therapy, dyspnoea.

XI. CENTRAL NERVOUS SYSTEM (30 Hours)

1. Organisation of the central nervous system. Functions and neuronal organisation of spinal cord level. Synaptic transmission. Motor and sensory systems and their lesions. Reticular system in brain stem, sleep, wakefulness, EEG waves and physiological changes in EEG. Clinical lesions and experimental sections at spinal cord, brain stem and sub-cortical levels. Physiology of basal ganglia, cerebellum, thalamus, hypothalamus, limbic system, prefrontal lobe and cerebral cortex. Speech and its disorders. Autonomic nervous system. Formation, circulation and functions of CSF. Blood brain barrier, central Neurotransmitters. Neuroglia.

9) Erythrocyte Sedimentation Rate. 10) Determination of blood indices - MCV, MCH, MCHC and Colour Index.

II. Procedures to be performed on human subjects

1. Mosso's ergometry - at normal condition, after venous occlusion and arterial occlusion.
2. Recording of Blood Pressure, effect of posture and exercise on it.
3. Stethography - at rest, effect of deglutition, exercise, voluntary hyperventilation and break point after breath holding, breathing through long tube, rebreathing through bag.
4. Spirometry - lung volumes and capacities, MVV and Dyspnoeic Index, FEV1
5. Peak Expiratory Flow Rate (PEFR) by Wright's mini peak flow meter
6. Cardiovascular fitness test - by Harvard's step test or bicycle ergometer or 2 km walk.
7. Visual field by Perimetry
8. Body composition - BMI (by Quetelet's Index) and Body Fat % by Durenberg's equation.
9. Recording of ECG in lead II.
10. Tests of autonomic functions.

III. Clinical Examination

1. Examination of radial pulse.
2. Clinical Examination of Cardiovascular system
3. Clinical Examination of Respiratory system
4. Examination of Cranial Nerves
5. Examination of Sensory system
6. Examination of Motor system
7. Examination of Reflexes.

IV. Interpretation of - Charts, Problems and Case histories

Recommended Demonstrations :

1. Haematology: Haematocrit, Reticulocyte count, Platelet count, Osmotic fragility.
2. Nerve - Muscle Physiology: Electro myography (E.M.G.).
3. Cardiovascular system : Electrocardiography (ECG), Demonstration of sinus arrhythmias, Recording of Arterial pulse tracing.

PAPER I

General Physiology (4), Blood (20), Cardiovascular system (24), Respiratory system (20), Gastrointestinal system (20), Renal system (12). (Note: Marks for Renal and Gastrointestinal system can be interchanged. (Figures shown in parentheses are weightage of marks recommended for the different topics.)

PAPER II

Endocrine (20), special senses (20), Reproduction (12), Central Nervous System (28), Muscle-Nerve (16), Skin and Body Temperature (4). (Note: Marks for Endocrines and Reproduction can be interchanged. (Figures shown in parentheses are weightage of marks recommended for the different topics.)

*The topics assigned to the different papers are generally evaluated under those sections. However a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.

B. Practical : 80 Marks

There shall be two practical sessions, Practical I and II, each carrying 40 marks, each practical will be of 2 hrs., duration. The distribution of content and marks for the practical would be:

Practical I : 40 Marks

1. Clinical Examination - 20 marks
2. Procedures on Human Subjects - 20 marks

Practical II : 40 Marks

3. Haematology
(Major) - 20 marks
(Minor) - 10 marks
4. Interpretation of case histories / problems / charts - 10 marks

C. Viva-Voce Examination : 40 Marks

The viva-voce examination shall carry 40 marks and all examiners will conduct the examination.

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| Table 1 - Portions of Paper I | - | 20 Marks |
| Table 2 - Portions of Paper II | - | 20 Marks |

SCHEME OF EXAMINATION

Internal Assessment

Total Marks: 80 (Theory 60 and Practical 20)

Theory: 60 Marks

Minimum of three examiners are recommended. The sessional examination preceding the University examination may be similar to the pattern of University examination. Average of any two best marks obtained in the notified internal examinations be taken in to consideration for calculating internal assessment. The total marks be reduced to 60 and sent to the University.

Practical: 20 Marks

There will be two terminal practical examinations. Five Marks will be for records and 15 marks for terminal tests. Average marks of the two terminal examinations shall be reduced to 15 marks and added to the marks obtained for records and the sum of this two shall be sent to the University.

The internal assessment marks both theory and practical obtained by the candidates should be sent to the University at least fifteen days prior to the commencement of theory examination.

University Examination

A. Theory : 200 Marks

There shall be two theory papers of 100 marks each and duration of each paper will be of 3 hours. The pattern of questions would be of three types.

Type of Questions	Number of questions	Marks for each question	Total
Long Essay	2	10	20
Short Essay	10	5	50
Short Answer	10	3	30
Total Marks			100

Distribution of chapters and suggested marks in parenthesis for Paper I and Paper II in Physiology for University examination are as follows*:

Univ Pract (80)
 20 clinical 2 Q
 40 hemat (60) Hemat major
 10 Hemat minor
 5 case history
 5 Rob chart photo
 20 Plasma. 1 Q.

- HC
4. Respiratory system: Determination of lung volumes and capacity, and other lung function tests by computerized spirometry.
 5. Reproductive system: Sperm motility and Sperm count
 6. Special senses: Audiometry, Parkirje - Samson's images, Ophthalmoscopy, Retinoscopy, Examination of fundus.
 7. Nervous system: Autonomic function tests
 8. Amphibian Practical: Muscle - nerve and heart experiments may be demonstrated if feasible for academic interest only and not for university practical examination as graphs on amphibian experiments are deleted.
 9. Electro encephalogram (E.E.G)

TEACHING HOURS AND METHODS

1. Total Number of Hrs. - 480

Theory Didactic Lectures	- 160 Hrs.
Non Lecture teaching	- 80 Hrs.
Practical/Demonstrations	- 240 Hrs.

2. System wise Distribution of Teaching Hours

Sl. No.	System	No. of Hrs.
1.	General Physiology, body fluids	8
2.	Blood and lymph	16
3.	Nerve-Muscle	8
4.	Gastro-Intestinal	12
5.	Kidney	10
6.	Skin, Body temperature	2
7.	Endocrine	16
8.	Reproduction	10
9.	Cardio Vascular	25
10.	Respiration 12	
11.	Central Nervous System	30
12.	Special Senses	10

Table 1 - Portions of Paper I - 20 Marks

Table 2 - Portions of Paper II - 20 Marks

Recommended Text Books and Reference Books

Deciding which textbook to buy is not an easy task. Choice of a textbook depends on the individual and his or her aptitude. It is desirable, and would certainly be helpful if each student has one textbook out of the recommended list of textbooks. We suggest that you browse through, try each one out and take your time before you decide which one you would like to invest one suits your particular temperament and of course for you to fall back on if you really cannot afford to invest in a textbook of your own. Remember there is no ideal textbook; all share their imperfections and yet each one of them has much to offer. Obviously cost is a so an important criterion.

The list of books under the section Reference books are categorized under three levels of difficulty- level one being the easiest. The books under level one are meant to provide an overall, simple but comprehensive account of physiology. Books at level two can be considered as alternative textbooks and some of them are excellent books for further reading. Level three books are really meant for purposes of reference during advanced study in any special area of Physiology.

TEXT BOOKS

1. GUYTON (Arthur C), text of Medical Physiology, Recent edn., Prism Publishers, Bangalore.
2. GANONG (William F), Review of Medical Physiology, Recent edn., Appleton and Lange.
3. VANDER et al. Human Physiology, recent edn.
4. SHUKHART (Evald E.), Basic Physiology for the health sciences, Little Brown, Boston
5. CHAUDHURI (Sujith K), Concise Medical Physiology, New Central Books, Calcutta.
6. TORTORA (Gerald J), Principles of anatomy and physiology Harper Collins Ref. College Publication.
7. GARRIAL ENGEILA - Textbook of Physiology
8. A.K. JAIN, Textbook of Medical Physiology.
9. BILANI (RL), Understanding medical physiology; text book for medical students, Jaypee brothers, New Delhi

REFERENCE BOOKS

Level 1

1. MORAN Campoal E. J, Clinical Physiology, ELBS UK.

Level 2

1. BERNE (Robert M) and Levy (Mathew), Physiology, Mosby Publication.
2. SCHMIDT (RF) and THEWS (G), Human Physiology, Springer Verlag, London.

Level 3

1. MCJINCASTLE (Vernow B), Medical Physiology.
2. PATTON (Harry d), Textbook of Physiology
3. RAINER AND NINDHAERST- Text of Physiology- Springer, Verlag, London

Experimental Physiology

There is no one textbook on experimental physiology and that may be recommended with impunity. However, there is certainly no need for an undergraduate medical student to invest in one. Some useful books to refer to are.

1. Ghai., A textbook of Practical Physiology.
2. McLeod, Clinical Examination
3. Hutchingson & Hunter, Clinical Methods.
4. A. K. Jain - Manual of practical physiology.

Annexure - I RCOHS Syllabus

Physiology

OBJECTIVES

At the end of the course, the student should be able to:

1. Describe the normal functions of all organ systems, regulatory mechanisms and interactions of the various organs for well co-ordinated total body function.
2. Understand the basic principles, mechanism and homeostatic control of all the functions of human body as a whole.
3. Elucidate the physiological aspect of normal growth and development.
4. Analyse the physiological responses and adaptation to different stresses during life Processes.
5. Lay emphasis on applied aspect of physiological functions underlying disease state.
6. Correlate knowledge of physiology in areas indicated by National Health Programmes
7. Acquire the skills to do the experiments for study of physiological function.
8. Interpret experimental and investigative data.
9. Distinguish between normal and abnormal data derived as a result of tests which he / she performed and observed in the laboratory.
10. Understand different types of Bio-medical waste, their potential risks and their management.

COURSE CONTENTS

Theory

i. GENERAL PHYSIOLOGY

(8 Hrs.)

1. Homeostasis, concepts of physiological norms, range and variations, active and passive Transport, relationship between stimulus and response.
2. Structure of cell membrane, resting membrane potentials, cellular receptors, intercellular Communications.
3. Body fluids - Compartments, changes in body fluid compartments, hypoproteinaemia, Replacement of body fluid loss.

ii. BLOOD AND LYMPH.

(16 Hours)

Blood composition, cellular elements of blood their formation and regulation, Haemoglobin - Synthesis and functions, jaundice, anaemias and their classification, haemostatic mechanisms, anticoagulants, blood groups, Rh incompatibility, blood transfusion; ESR, Basic mechanisms of immunity and functions of WBCs, Lymph- composition, circulation and functions.

III. NERVE AND MUSCLE

(8 Hours)

Classification of nerves, muscle. Structure of skeletal muscle. Types of muscle fibres, mechanism of contraction and its Molecular basis. Thermal and chemical changes during muscle contraction; oxygen debt. Neuromuscular transmission. Neuromuscular blocking drugs. Neuromuscular disorders, Pathophysiology of Myasthenia gravis.

IV. GASTROINTESTINAL TRACT

(12 Hours)

Functional morphology. Smooth muscle - structure, mechanism of contraction and nerve supply and neurotransmitters, composition, function and regulation of secretion of salivary glands, stomach, small intestine and large intestine; regulation of gastrointestinal movements; functions of gall bladder, liver, site of production and actions of GI hormones. Mechanism of intestinal absorption of food. Physiological basis of peptic ulcer, diarrhea and constipation, motility disorders - Achalasia, Hirschsprung's disease.

V. KIDNEY

(10 Hours)

Functions of different parts of nephron in urine formation. Role of kidney in water and electrolyte balance. Acidification of urine, diuresis, kidney function tests. Juxtaglomerular apparatus. Renin - Angiotensin system, Renal blood flow, structure and innervations of bladder, micturition, Cystometrogram, disorders of micturition, principles of artificial kidney.

VI. SKIN AND BODY TEMPERATURE (ENVIRONMENT)

(2 Hours)

Structure and functions of skin, Regulation of Body temperature.

VII. ENDOCRINE GLANDS

(16 Hours)

(To be integrated with Biochemistry)

General principles of regulation of endocrine glands. Hormones, functions cellular mechanism of hormone action, regulation of secretion. Experimental and clinical disorders of anterior and posterior pituitary, thyroid, parathyroid, adrenal cortex and medullar and endocrine pancreas. Stress and hormones, physiology of growth. Minor endocrine glands - Pineal body, heart, and kidney.

VIII. REPRODUCTION

Sex determination and differentiation.

1. Male Reproduction: functions of testis, constituents of semen, testicular hormones, spermatogenesis and regulation. (3 Hours)