

SYLLABUS

**for Courses affiliated to the
Kerala University of Health Sciences
Thrissur 680596**



**Master of Science in
Medical Physiology
Course Code: 286**

(2016-17 Academic year onwards)

2. COURSE CONTENT

2.1 Title of course:

Name of the course shall be the “Master of Science - Medical Physiology (MSc. Medical Physiology)”

2.2 Objectives of course

At the end of the course the candidates **qualifying for the award of M.Sc. Medical Physiology should be able to**

- a) Demonstrate comprehensive understanding of human body as related to physiology.
- b) Plan & conduct research.
- c) Organize & equip physiology laboratories
- d) Organize the laboratories for various practical exercises, substitute & fabricate some of the simpler equipment for teaching purposes and Handle & order for stores, draw up lists of equipment's required for physiology laboratories.

2.3 Medium of instruction:

Medium of instruction shall be English

2.4 Course outline

First year will be foundation course. i.e. Anatomy, Physiology and Biochemistry. Second and Third year - Medical Physiology. Course content should include basics of Research methodology & Biostatistics. Candidates have to work on a particular allotted topic for dissertation, submission of which shall be as per University regulations. Candidates will also maintain a journal by the teacher in

which all the practical done by him/her is recorded. They will also be given training in teaching methodology

Subjects	Total (40 weeks)	
	Theory Hrs.	Practical Hrs.
Physiology	160	320
Biochemistry	160	80
Anatomy	140	420
Total	460	820

Second & Third Year – Medical Physiology

Years	Theory including Seminar, Symposium Hrs.	Practical's including Lab Postings Seminars, Journal clubs tutorials	Total Hrs.
Second Year	240	1200	1440
Third Year	240	1200	1440

2.5 Duration

Three academic years. 2 parts- Preliminary part of one year & Final part of 2 years. The maximum duration of the MASTER OF SCIENCE IN MEDICAL PHYSIOLOGY shall be for a period of six years.

No candidate shall join any other course of study or appear for any other examination in this university or any other university during the period of study.



2.6 Syllabus

As given under 2.10

The concept of health care counseling shall be incorporated in all relevant areas

2.7 Total number of hours

As given under 2.10

2.8 Branches if any with definition :

As given under 2.10

2.9 Teaching-Learning method:

As given under 2.10

2.10 Content of each subject in each year

a. FOUNDATION COURSE IN ANATOMY - PAPER I

Time allotted Theory	140 hrs.
Practical	420 hrs.

General anatomy (8 hrs.)

- Includes introduction to anatomy (1 hr.), Skeleton system with classification, types of bone, features of long bone, ossification, blood supply (2 hrs.), Joints – classification with examples, structure of typical synovial joints (1 hr.), Myology – classification with examples, types of skeletal muscles, tendon, aponeurosis (2 hrs.), Nervous system – subdivisions, types of cells in CNS, neuron - structure, types, ganglia and nuclei, plexuses. (2 hr.)

Regional anatomy.

- Upper Limb (20 hrs.)**–All parts and regions of upper limb –General lay out of; bones with regard to their structure and parts and muscular attachments (6 hrs.) --- All joints and details of capsules, ligaments, movements (6 hrs.) –Brachial Plexus of upper limb and its branches with details of root value, origin, formation, course, relations and distribution (4 hrs.) –Arteries and their branches (3hrs.) -- Necessary and applicable applied anatomy (1 hr.)

- b. **Lower Limb (20 hrs.)**- All parts and regions of lower limb – general lay out of ; thigh, leg, ankle and foot with details of muscles, arteries veins and other vasculature, lymphatic's and nerves – All Bones in detail with regard to their structure and parts and muscular attachments (6hrs)– All joints and details of capsules, ligaments, movements(6hrs)–Lumbar plexus and its branches with details of root value, origin, formation, course, relations and distribution (4hrs)– arteries and their branches(3hrs)– Necessary and applicable applied anatomy(1hr).
- c. **Abdomen (20 hrs.)** -Abdominal quadrants -- abdominal viscera with details of peritoneal coverings, relations, blood supply, lymphatics, innervation (5 hrs.)– Abdominal blood vessels and lymphatics – sympathetic and parasympathetic pathways of concerned areas (4 hrs.)– Retroperitoneal area(1hr) – nerve plexuses of the region(1hr) – Thoraco-abdominal diaphragm(2hrs) -- Lumbar vertebrae (2hrs)-- all pelvic viscera with details of position, relations, blood supply, lymphatics, innervation and functions(3hrs) – termination of abdominal aorta and its subsequent branches(1hr)-- Necessary and applicable applied anatomy. (1hr).
- d. **Thorax (18 hrs.)** - Thorax, its extent and dimensions– thoracic wall (1 hr.)– thoracic inlet and outlet (1hr.)– thoracic viscera with details of relations, blood supply, innervation and functions (2 hrs.)–oesophagus, (1 hr.) trachea (1hr.), pleura and pericardium(2 hrs.) – mediastinum, its divisions and structures (2hrs.)– heart and great vessels(3 hrs.), thoracic vertebrae, sternum and ribs (2hrs.)-- relations and systemic outlay of various parts and structure (2 hrs.)-- necessary and applicable applied anatomy(1 hr.).
- e. **Head & Neck (17hrs.)**- General lay out of triangles of neck (2 hrs.), pharynx and larynx (2 hrs.), oral cavity and tongue (1 hr.), tonsils(1 hr.), all blood vessels of head and neck (1hr.), details of nerves of the region, sympathetic and para sympathetic components(1hr.), cranial nerves(3 hrs.), skull, cranial cavities and cervical vertebrae (4hrs.) – relations and systemic outlay of various parts and structure(1 hr.) -- necessary and applicable applied anatomy(1 hr.).
- f. **Brain & Spinal cord Meninges (17 hrs.)**-- Parts of brain -- external features -- internal features (3 hrs.)--various ascending and descending tracts (3 hrs.) -- neuralconnexions – specialized areas of brain and their functions(2 hrs.) – ventricles

of brain (2 hrs.)– cranial nerves and their connexions (2 hrs.)– blood supply(2 hrs.) – relations and systemic outlay of various parts and structure necessary and applicable applied anatomy(1hr.)

g. General embryology (10hrs)

Includes introduction & mitosis and meiosis(1hr.), gametogenesis(1hr.),fertilization(1hr.), implantation(1hr.), bilaminar germ disc(1hr.), notochord formation(1hr.), trilaminar germ disc(1hr.), embryonic folds(1hr.),fetal membranes(1hr.), placenta(1hr.).

h. Histology (10hrs)

Microscopy, basic tissues, blood vessels, tongue, esophagus, stomach, small intestine, large intestine, pancreas, liver, trachea, lung, kidney, ureter, urinary bladder, testis, ovary, uterus, fallopian tube, thyroid gland, and skin.

i. Genetics (8 hrs.)

Introduction, chromosomes, inheritance, karyotyping, chromosomal abnormalities, inborn errors of metabolism and genetic counselling.

b. FOUNDATION COURSE IN BIOCHEMISTRY

(INCLUDING MEDICAL PHYSICS AND MOLECULAR BIOLOGY) PAPER II

DETAILED SYLLABUS

Details of the course

Total number of hours: 240

Lectures : 160

Practical's : 80

DETAILS OF LECTURES

1. Introduction: structure and functions of cell, cellular organelle and bio membranes 1hr

2. Biomolecular: 14HRS

- **Proteins:** Amino acids – classification based on structure 1hr



Ionic properties of amino acids, isoelectric pH, buffering action of Amino acids and proteins. Structural organization of proteins – primary, secondary, tertiary and quaternary, forces involved in maintaining-Examples-Insulin, Collagen, proteins. Denaturation, coagulation, isoelectric precipitation of proteins using salt solutions, classification of proteins (color reactions to be covered with practicals). Electrophoresis and chromatography-brief mention on separation techniques (details of techniques and application in practical demonstration)

- **Carbohydrates:** Classification-monosaccharide's: glucose, fructose, galactose and mannose. Reactions: reducing property, oxidation, reduction, isomers, anomers and epimers. Derivatives like amino sugars and deoxy sugars, Glycosidic bond Disaccharides, lactose, sucrose, maltose, polysaccharides: Starch 2hrs
- **Lipids:** definitions, classification with examples, saturated and unsaturated fatty acids, triacylglycerol. Phospholipids 2hrs
- Structure and function of biomembrane 2hrs

3. Enzymes: 10HRS

- Nature of enzymes, coenzymes and cofactors, classification 1hr
- Mechanism of action, specificity of enzymes, active site 1hr
- Enzyme kinetics, factors affecting enzyme activity, K_m value and significance (derivation not required) 2hrs
- Enzyme inhibition – competitive, allosteric, feed back Therapeutic agents like antimetabolites as example 2hrs

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- Enzymes regulation in biological systems-allosteric regulation
 - Covalent modification, zymogen activation induction and Repression (mention only) 1hr
 - Isoenzymes and their significance with suitable examples 1hr
 - Clinical enzymology-diagnostic importance of enzymes (LDH, CPK, AST, ALT, ACP, GGT, GPD, 5'Ntase, cholinesterase, Amylase, Lipase) 2hrs

4. Digestion and absorption of nutrients – carbohydrates:

6HRS

- Lipids and proteins 3hrs
- Disorders of digestion and absorption 1hr

- Glucose transporters 1hr
- Malnutrition's –PEM 1hr

5. A. Metabolism of Carbohydrates : 14 HRS

- EMP pathway: Reactions, regulation in brief, energetics, RapaportLeubering cycle, fate of pyruvate in aerobic and anaerobic conditions, PDH reaction 3hrs
- Gluconeogenesis, key enzymes, regulation and significance
Cori's cycle 1hr
- Glycogen synthesis and degradation, regulation (brief), inborn Errors associated 2hrs
- HMP shunt pathway, NADPH generation, Transketolase
Reaction, Tissues where operating, G6PD deficiency m, Metabolic importance (Non oxidative phase need not be Elaborated) 2hrs
- Metabolism of galactose, fructose, polyol and uronic acid
Pathways-inborn errors associated hrs
- Blood glucose regulation-action of insulin, glucagons cortisol
Growth hormone 1hr
- Diabetes mellitus-Aetiology, biochemical abnormalities,
Symptoms and complications 1hr
- Glycosurias -differential diagnosis of reducing sugars 1hr
- GTT-procedure, criteria of normal & diabetic status,
Interpretation of Graphs, glycated HB 1hr

5.B. Metabolism of lipids: 13HRS

- Beta oxidation of fatty acids, transport of fatty acids across mitochondrial
Membrane regulation and energetics 1hr



- Synthesis of fatty acids, fatty acid synthase complex, regulation, elongation and desaturation 2hrs
- Formation and utilization of ketone bodies, ketoacidosis in diabetes and starvation 2hrs
- Metabolism of adipose tissue, hormone sensitive lipase, action of hormones (insulin, glucagons, epinephrine and cortisol), liver adipose tissue axis, fatty liver, lipotropic factors 2hrs
- Cholesterol-structure synthesis (crucial intermediates only), regulation, metabolic fate, bileacids and steroids hormones-formation from cholesterol 2hrs
- Transport plasma lipids, lipoproteins, metabolism, apoproteins , functions, lipids profile and Dyslipidemias-diet PUFA and dietary fibre Drugs 2hrs
- Eicosanoids-prostaglandins, thromboxanes and leukotrienes, structure and formation (major Steps only), actions 1hr
- Phospheolipids and sphingolipids – inborn errors 1hr

5.C. Metabolism of Amino acids:

13HRS

- Body amino acid pool, dynamic state of body proteins interorgan transport of amino acids, Nitrogen balance, glucogenic and ketogenic amino acids 1hr
- Transamination (reaction only) decarboxylation, oxidative deamination, transdeamination, Formation of ammonia 1hr
- Metabolism of glycine, compounds synthesized, creatine and creatinine, hyperglycinemias, Glutathione 2hrs

- Metabolism of sulphur containing amino acids, methionine and cysteine, transsulphuration, transmethylation reactions, formation of taurine, PAPS, excretion of sulphur, homocystinuria, cystinuria and cystinosis 2hrs
 - Phenyl alanine and tyrosine-metabolism, PKU and alkaptonuria synthesis of thyroid Hormones, synthesis and catabolism of catecholamines, albinism, tyrosinemia 2hrs
 - Tryptophan-formation of NAD (important steps only), serotonin and 5-HIAA, xanthurenic Acid, melatonin, formation of indican, Hartnup's disease, branched chain amino acids – MSUD (Pathway not required) 2hrs
 - Glutamic acid, glutamine, GABA, aspartic acid, asparagine, serine, (metabolic role and compounds synthesized using these amino acids only) 2hrs
- 5.D. TCA Cycle : 6HRS**
- Reaction, regulation and energetics 1hr
 - Interrelation of CHO, lipid and amino acid metabolism 1hr
 - Anaplerotic reactions, role of TCA cycle and metabolic adaptations during fed state and Starvation 2hrs
 - Electron transport chain- components and sites of ATP synthase, inhibitors and uncouplers, ATP phosphorylation (briefly) 2hrs
- 6. Haemoglobin: 5HRS**
- Synthesis and degradation 2hrs
 - Haemoglobinopathies and thalassemias, porphyrias 3hrs
(Brief mention only as examples in each case)

7. Vitamins:

8HRS

- Classification, chemical nature (detailed structure not required), conenzyme Forms, biochemical role, sources, requirements, deficiency and toxicity of the following vitamins

- i. Vitamins A, D, K and E-free radicals 4hrs
- ii. Thiamine, riboflavin, niacin, biotin, pyridoxine, panthothenic acid 1hr
- iii. Folic acid and one carbon groups and B12 2hrs
- iv. Ascorbic acid 1hr

8. Minerals :

6HRS

- Sources, requirements, absorption, biochemical role, deficiency, and Toxicity of the following minerals.

- i. Calcium and phosphorus-role of PTH, 1, 25 DHCC and CT 2hrs
- ii. Iron, copper magnesium and anemia's 2hrs
- iii. Sodium potassium and chloride 1hr
- iv. Trace elements- Zn, Fl, Se, Mn 1hr

9. Maintenance of homeostasis :6HRS

- i. Acid base regulation-acid and bases, pH, buffers Henderson-Hasselbach's equation (derivation not required), buffer capacity 1hr
- ii. Acids bases in the body, plasma buffers, respiratory and renal Regulation of pH 2hrs
- iii. Acidosis and alkalosis, major causes and compensatory mechanism Anion gap, assessment of acid base status 2hrs



- iv. Fluid and electrolyte balance –distribution of body water and disorders
(Hormonal regulation covered in physiology) 1hr

10. Nucleic acid: 23HRS

- A. i. Structure of purines, pyrimidines, nucleosides, nucleotides 2hrs
- ii. Purine: nucleotide synthesis and catabolism (synthetic pathway need not be considered in detail with names of intermediates. Only the sources of different atoms and sequence of addition) Salvage pathway and regulation, hyperuricemia and gout, LeschNyhan Syndrome 2hrs
- iii. Pyrimidine: nucleotide synthesis, regulation, orotic aciduria, formation of deoxynucleotides thymidylate synthesis reaction, folic antagonist and nucleotide analogues as chemotherapeutic agents 1hr
- iv. Nucleic acids: structure of DNA, different types of DNA, mitochondrial DNA, base pairing rule, differences between types of RNA 2hrs
- B. DNA replication, DNA polymerase, DNA repair 1hr
- C. Transcription, RNA polymerase, post-transcriptional modifications, splicing Inhibitors, reverse transcriptase ribozyme 2hrs
- D. Genetic code, RNA, ribosomes 1hr
- E. Translation, steps, post – translational modification, inhibitors 2hrs
- F. Regulation of gene expression, induction, repression and derepression 2hrs
- G. Recombinant DNA technology, restriction endonucleases, southern, northern and western blotting RFLP, DNA, finger printing, polymerase chain reaction, anti-sense therapy, application of molecular biology in clinical situations, gene therapy 5hrs
- H. Biochemical basis of inherited disorders: Mutations, Pathogenesis of inborn general types of mutations with examples in each, mode of inheritance 3hrs

11. Immunoglobulins: 2HRS

- Structure and functions, hyper and hypogammaglobulinemias, immunoassays. AIDS monoclonal antibodies. 2hrs

12. Biochemistry of Cancer-cell cycle 5HRS

- Mutagens, carcinogens, role in carcinogenesis, virus in carcinogenesis, tumor Markers and oncogenes 2hrs



- Biochemical basis of environmental health and environmental toxicology, Biotransformation of exnobotics in general and absorption, transport, effects and biotransformation. 3hrs

13. Conventional Laboratory Investigations

- Liver function Tests including formation of billirubin, hyperbilirubinemias an differential diagnosis of jaundice ()S.bilirubin, serum enzymes, A/G ration, BSP test, urine tests 2hrs
- Gastric function tests (pentagastrin test, total and free acidity of a gastric juice, AHT and Hollander's test) and pancreatic function tests including tests for malabsorption. 2hrs
- Renal function tests –clearance tests of tubular function, NPN urine analysis 2hrs
- Specialized Laboratory investigations – RIA, EIA, principles of colorimetry, Blot techniques, RELP, PCR-Details 1hr
- Radioactivity – diagnostic, research and therapeutic applications and radiation hazards. 1hr

c. FOUNDATION COURSE IN PAPER III-PHYSIOLOGY

DETAILED SYLLABUS SCHEDULE OF LECTURES

Theory –For First year- 160 hrs

I. HAEMATOLOGY : 18 Hrs.

Fluid compartments, Composition & functions of blood, Plasma proteins

Erythrocyte - Morphology, Count, Function, Erythrocyte Sedimentation rate, Osmotic fragility. Hemoglobin, Erythropoiesis, Anemia, Polycythemia, Fate of RBC, Jaundice.

Leucocytes - Morphology, Types, normal count and variations. Properties & Functions, Leucopoiesis.

Thrombocytes- Morphology, Count, Function, Variations. Thrombopoiesis Hemostasis. Coagulation and its disorders.

Blood groups and its importance, Blood transfusion.

Blood volume, Tissue fluid and Lymph.

II. CARDIOVASCULAR SYSTEM:

20 Hrs

Organization of CVS, Properties of Cardiac Muscle, Origin and spread of cardiac impulse

Cardiac Cycle – Electrical and mechanical events, ECG.

Cardiac output, Measurement, regulation

Blood pressure, measurement & variation, determinants, regulation, shock.

Regional circulation- coronary, Pulmonary, Cerebral, Cutaneous.

III. RESPIRATORY SYSTEM :

18 Hrs

Introduction. Functional anatomy, Mechanics of ventilation, Pressure changes, volume changes,

Surfactant, Compliance, Airway resistance.

Alveolar ventilation, Dead space, Ventilation perfusion ratio

Diffusion of gases, O₂ transport, CO₂ transport.

Regulation of respiration – Voluntary, Neural, Chemical. Abnormalities of respiration

Hypoxia,

Cyanosis, Dyspnea, Asphyxia. High altitude, Dysbarism.

IV. DIGESTIVE SYSTEM :

13 hrs

Functional anatomy of GI tract, salivary secretion & its regulation.

Gastric secretion and its regulation, Peptic ulcer, pancreatic secretion, Bile & its regulation, Intestinal juice.

Mastication, Deglutition, Movements of stomach, vomiting, Movements of intestine,

Defecation. GI Hormones, Digestion & Absorption of carbohydrates, Proteins, Fat & vitamins.

V. KIDNEY, and SKIN :

11 Hrs

Functional anatomy of kidney, functions of kidney, renal blood flow and its peculiarities.

Glomerular filtration rate, Definition, Measurement and factors affecting Tubular functions – Reabsorption, Secretion, Acidification, concentration and abnormalities.



Micturition – Bladder innervation, Micturition reflex and its abnormalities.

Skin - Structure, Functions, regulation of body temperature.

VI. MUSCLE and NERVE : 12 Hrs

Neurons and glial cells - Structure, Types, electrical property, function, degeneration and regeneration.

Muscle- Structure & Functions of skeletal muscle & smooth muscle

Neuromuscular transmission – Functional anatomy, Transmission & Clinical importance.

VII. CENTRAL NERVOUS SYSTEM : 32 Hrs

Organization of Nervous system. Synapse, Properties & Functions

Reflexes, Reflex action, Property, Function.

Sensory system – Receptor, Ascending sensory pathways, Thalamus, sensory cortex

Motor System – Spinal control of Motor activity, Motor areas in Cerebral Cortex, Pyramidal &

extrapyramidal tracts, Basal ganglia & Cerebellum.

Reticular formation, Higher functions of Cortex.

Autonomous nervous system

Cerebro spinal fluid

VIII. SPECIAL SENSES : 10 Hrs

Olfaction and gustation

Audition

Vision

IX .ENDOCRINOLOGY : 18 Hrs

General endocrinology

Pituitary hormones & disorders.

Thyroid hormones & its disorders

Parathyroid hormone and calcium metabolism

Adrenal cortical hormones and clinical significance Adrenal medullary hormones.

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Endocrine Pancreas

Local Hormones.

X. REPRODUCTIVE SYSTEM:

8 Hrs

Male Reproductive System

Female reproductive system, Lactation, Pregnancy & Contraception

HUMAN PHYSIOLOGY – SYLLABUS

I. GENERAL PHYSIOLOGY –

- Introduction to Physiology, morphology of cells-Structure of cell membrane with reference to ion channels, transport across cell membranes, Intercellular communication, Cell death and regeneration, Ageing and theories, Protein synthesis and its regulation, Homeostasis, Body fluid compartments: principles of measurement and normal values.

II. HAEMATOLOGY-

Composition, properties and functions and values and variations of blood.

- **Plasma proteins:** Types, normal values, origin, functions, abnormal proteins & applied aspects.
- **Red blood cells:** Morphology, functions. RBC Count - Normal value, variations, determination.
Hemoglobin: Structure, types, derivatives, normal value, functions & variations.

Life span of RBCs, destruction of RBCs, Jaundice, tissue macrophage system.

Erythropoiesis: Definition, sites, stages and regulation.

- **Anaemias:** types and features.
- **Leucocytes:** Morphology of different types of leucocytes, normal values, variations,

Properties and functions.

Leucopoiesis: sites, stages, regulation & leukemia

- **Platelets:** Morphology, normal values, variations, properties and functions, Thrombopoiesis.



Haemostasis: Definition, mechanism. Blood coagulation: Definition, mechanisms, clot Retraction, fibrinolysis, bleeding disorders, tests for coagulation, Anticoagulants: mechanism of action and uses. Thrombosis and embolism.

- **Blood groups:** ABO and Rh systems & Bombay blood group, blood typing, Blood transfusion: indications, precautions to be taken and complications of mismatched transfusion & recent advances.

Erythroblastosis foetalis – management, prevention, Medicolegal and clinical importance.

Lymph, tissue fluid, oedema.

III. NERVE & MUSCLE PHYSIOLOGY-

- Types of neurons, Neuroglia.
- Morphology of neurons, classification of nerve fibers, properties, bioelectric potentials- RMP & Action potential. Mechanisms of conduction in nerve fibers, factors affecting conduction.
- Types of nerve injuries, Wallerian degeneration, regeneration of nerve fibers, factors affecting regeneration.
- Classification of muscles & Morphology & properties of each type.
- Mechanism of neuro-muscular transmission. Molecular mechanism of muscle contraction

Excitation contraction coupling. Electrical, chemical, mechanical & thermal changes during muscle contraction. Types of contraction. Length tension relationships.

IV. DIGESTIVE SYSTEM-

- **Introduction** – Functional Anatomy of G.I. Tract. Basic electric rhythm, enteric nervous system. Salivary secretion. Types of salivary glands. Innervation, composition & functions of saliva, regulation & applied aspects.
- **Gastric secretion** – Structure of gastric mucosa. Innervation. Origin, composition and functions of gastric juice. Mechanism of secretion of HCl. Functions.

Regulation of gastric secretion. Methods of study. Phases of gastric secretion,



factors influencing gastric secretion, Peptic ulcer & gastrectomy & gastric function tests.

- **Pancreatic secretion** – Structure of pancreas. Innervation, composition and functions of Pancreatic juice. Mechanisms of secretion, Regulation, Tests for Pancreatic exocrine function & pancreatitis.
- **Liver and gall bladder** – Structure and functions of liver. Composition and functions of Bile. Regulation of bile secretion. Functions of gall bladder. Regulation of filling and emptying, Cholecystectomy, Gall stones. steatorrhea & liver function tests.
- **Small intestine** – Structure, Composition and functions of succus entericus & short bowel syndrome, sprue.
- **Large intestine** - Structure, functions, constipation and diarrhoea.
- **Gastro-intestinal movements** – Stages of deglutition, Mechanism, Disturbances, Gastric Motility. Types of movement, Regulation of gastric emptying. Movements of small intestine – Types, Regulation, Function. Movements of colon, Defecation and vomiting.
- **Gastro-intestinal hormones and their actions.** Digestion of carbohydrates, proteins and fats. Absorption of carbohydrates, Proteins, fats, vitamins, water and electrolytes.

V. **CARDIOVASCULAR SYSTEM**

- **Introduction**, Systemic and pulmonary circulation. Functional anatomy of heart and blood vessels. Properties of cardiac muscle.
- **Conducting system of the heart**, Origin and spread of cardiac impulses & abnormal pacemakers & conduction defects.
- **Cardiac cycle**: phases, Electrical events- Electrocardiogram, mechanical events, heart sounds. Innervation of the heart & Echo cardiography. Heart rate variations and its regulation & heart failure.
- **Cardiac output**: Definition, variations, distribution, methods of determination (using Fick's Principle in detail), Regulation.
- **Arterial pulse & variations.**
- **Haemodynamics.**
- **Blood pressure** and its regulation. Applied aspects- Hypertension, Hypotension.

- **Shock.**
Cardiovascular changes during exercise, Compensation for gravitational effects.
- **Regional circulation:** Cerebral, Coronary, splanchnic, cutaneous. Foetal circulation.

VI. RESPIRATORY SYSTEM

- **Introduction**, functional anatomy of respiratory tract & non respiratory functions,
- **Ventilation** - mechanics-mechanism of breathing. Pressure changes, volume changes (lung volumes and capacities), pressure-volume interrelationship-compliance, work of breathing – Airway resistance & determination, importance.

Pulmonary & Alveolar ventilation – dead space, significance.

Pulmonary circulation & pulmonary edema, ventilation –perfusion ratio and its significance. Diffusion of gases through respiratory membrane and factors affecting it.

- **Oxygen transport** – Oxygen Dissociation Curve and factors affecting it-myoglobin.
- **Carbon dioxide transport:** Carbon dioxide dissociation curve.
- **Regulation of respiration** –organisation of respiratory centers, neural regulation, Herring Breur

reflexes, chemical regulation. Periodic breathing. Voluntary hyperventilation, breath holding.

- **Hypoxia:** types and effects & treatment, high altitude changes, acclimatization, decompression sickness,

respiratory adjustments during muscular exercise.

- **Other disorders** - Dyspnoea, cyanosis, asphyxia. **COPD, Sudden infant death syndrome.**
- **Principles of Artificial respiration**
- **Pulmonary function tests.**

VII. RENAL PHYSIOLOGY, SKIN AND TEMPERATURE REGULATION



- **Introduction** - Functional anatomy of the kidney. Function in homeostasis
- **Renal circulation** - peculiarities, renal blood flow and its determination.
- **GFR:** definition, factors influencing, measurement, normal value & variations.
- **Tubular functions.** Reabsorption, secretion and concentration mechanisms.
Acidification of

urine, Diuretics.

- **Micturition-** Nerve supply to urinary bladder: Micturition reflex, its higher control

Non-excretory function of kidney.

- **Principles of Dialysis.**

VIII. SKIN AND ITS FUNCTIONS.

- Temperature regulation.

IX. ENDOCRINE SYSTEM

- **General endocrinology,**
- **Pituitary gland-** (Anterior and posterior)- hormones, actions, regulation of secretion and abnormalities.
- **Thyroid gland:** Hormones, synthesis, transport, actions, regulation of secretion and abnormalities.
- **Hormones regulating Calcium metabolism** and bone physiology, Parathormone, actions and regulation of secretion. Calcitriol- Synthesis, actions and regulation.

Calcitonin: source, actions and regulation.

Hypoparathyroidism – tetany, Hyperparathyroidism.

Rickets, osteomalacia, osteoporosis.

- **Adrenal cortex:** Structure, classification of adrenal cortical hormones, biosynthesis. Actions, regulation of secretion and abnormalities of each.
- **Adrenal medulla:** Hormones, actions, and pheochromocytoma.



- **Endocrine pancreas:** hormones, actions and regulation of secretion. Diabetes mellitus.

Thymus gland, pineal.

- **Local hormones.**
- **Physiology of Growth & development**

IX. REPRODUCTIVE SYSTEM

- **Introduction**
- **Sex determination & differentiation**
- **Male reproductive system.** - Physiological Anatomy, Spermatogenesis & factors influencing it, Functions of accessory sex organs & **male fertility tests & Castration & prostate cancer.**
- **Female reproductive system-** Menstrual cycle- Phases of ovarian and uterine cycle, Tests for ovulation, cervical cycle, hormonal control Pregnancy, tests for pregnancy and its medico level importance parturition and lactation, menopause – changes. First breath and its importance.
- **Contraceptive measures** in male and female.

X. CENTRAL NERVOUS SYSTEM

- **Synapse,** Types, synaptic transmission, properties.
- **Reflexes:** classification and properties & abnormal reflexes.
- **Organisation of CNS:** Cross section of spinal cord.
- **Sensory system:** receptors, classification and properties. Sensory pathways: Dorsal column tract, spinothalamic tracts – lateral and ventral. Trigeminal pathway from face. Origin, course and termination and the sensations carried through each tract. Pain sensation: Referred pain, mechanisms and examples. Intrinsic analgesic system. Thalamus: classifications of nuclei, connections and functions, thalamic syndrome.
- **Motor system:** Pyramidal tract – (Corticospinal and corticobulbar tract). Origin, course and termination.
Extrapyramidal tract and function.



Upper motor neuron and lower motor neuron lesion.

Spinal cord lesions: complete section, hemisection-Effects

Tabisdorsalis, syringomyelia, subacute combined degeneration of spinal cord.

Cerebellum: functional classification, major connections, functions and effects of lesions.

Basal ganglia: components, major connections, functions and abnormalities

Reticular formation: functions.

Sleep & EEG & evoked potentials.

Vestibular apparatus: functions & disorders.

Posture and equilibrium maintenance- basic principles

Hypothalamus: major nuclei connections and functions.

Limbic system: major connections, functions & disorders.

Cerebral cortex, areas, functions.

Higher functions of the nervous system.

- **CSF:** formation, composition, circulation, functions and applied aspects.
- **Autonomic nervous system.**

XI. SPECIAL SENSES

- **Vision:** Structure of the eye. Physiology of vision. Visual pathway, Field of vision, effects of lesion at different sites. Light reflexes and accommodation reflex-pathway. Common errors of refraction. Dark and light adaptation. Photochemical changes. Colour vision, colour blindness.
- **Hearing:** Structure of the ear, Components and functions of the middle ear Structure of organ of Corti. Physiology of hearing. Auditory pathway. Theories of hearing. Deafness. Tests of hearing.
- **Smell:** Structure of olfactory mucous membrane and olfactory pathway
- **Taste:** Structure of taste bud, Basic taste modalities, Taste pathway.

XII. BIOPHYSICS (To be taken along with the relevant systems)

- Physical principles of transport across cell membranes and across capillary walls.



- Biopotentials, Physical principles governing flow of blood in heart & blood vessels.
- Physical principles governing flow of air in air passages.

2.11 No: of hours per subject

First year subjects with theory hours

Physiology -160hrs

Biochemistry-160hrs

Anatomy -140hrs

Final part-Medical Physiology with theory hours

Second year -240hrs

Third year -240hrs

2.12 Practical training

Practical	
Subject	Hrs.
Physiology	320
Biochemistry	80
Anatomy	420
total	820

A. Physiology: DETAILS OF PRACTICALS

Haematology

1. RBC count, WBC count, Differential count
2. Hemoglobin estimation, ESR determination
3. Blood group determination, PCV, Bleeding time, clotting time.
4. Platelet count, Eosinophil count, Reticulocyte count.

Demonstrations only

1. Measurement of blood pressure



2. Examination of sensory systems
3. Examination of motor system, reflexes
4. Examination of CVS & Respiratory system
5. Examination of cranial nerves
6. ECG
7. Frog muscle-nerve preparation; Muscle experiments, Heart experiments

Innovative Sessions

- **Tutorials, seminars, structured discussion, integrated teaching,**

B.Biochemistry:DETAILS OF PRACTICALS

Practicals 1 to 15 (48hrs)

Practicals 16 to 21 (32hrs)

1. Reactions of carbohydrates: Glucose, Fructose, lactose, sucrose
2. Reactions of proteins (colour reactions and precipitation)
3. Reactions of urea and uric acid
(hypobromite and specific urease test for urea and Benedict's test and Schiff's test for uric acid).
4. Identification of biochemically important compounds in given solution
5. Normal urine-organic and inorganic constituents
6. Abnormal Urine: report on abnormal urine
7. Demonstration of chromatography and diagnostic importance
8. Introduction to clinical chemistry, collection of samples, anticoagulants and preservatives, principles of colorimetry.
9. Estimation of glucose
10. Estimation of urea in serum calculation of clearance from given values of UV
11. Estimation of creatinine serum
12. Estimation of serum cholesterol – estimation of LDL cholesterol from given values of HDL and TAG, lipid profile, data interpretation.
13. Estimation of total protein and albumin-A/G ration
14. Estimation of serum alkaline phosphatase
15. Spotters – demonstration-simple instruments, graphs,tests, etc.

16. Laboratory data interpretation-liver disease, renal diseases, acid base disturbances, diabetes mellitus, lipid disorders.
17. Problem solving exercises – short history of different conditions may be given and students will be asked to suggest investigations to arrive at a diagnosis and student will be
18. Demonstration to techniques in molecular biology
19. Clinical lab posting
20. Revision.

C. Anatomy: PRACTICAL SYLLABUS

I. Dissection& Demonstration of dissected specimens –

Region wise Thorax, Abdomen and pelvis, Head and Neck and Brain including osteology and radiology.

II. Histology – Study of histology slides - system wise.

III. Distribution of theory and practical hours:

6 hours theory/week.

4 hours practicals/week for gross anatomy.

4 hours practicals for histology.

D.Details of FINAL PART –PRACTICAL

Practical	
Final part	
Subject	Hrs.
Second year	1200
Third year	1200
total	2400

Weekly Schedule



1. Daily lecture class attended: _____ hours per week
2. PG training programme: Discussions, Viva and Seminars
3. Practical demonstration and supervision: _____ hours per week
4. Practicals done: Hematology, Biophysics and Amphibian experiments.

Besides specially designed PG practicals, MSc students have to perform all undergraduate practicals and also teach these practicals to the undergraduates.

a. HAEMATOLOGY EXPERIMENTS

- Use and care of microscope
- Microscopic examination of blood
- ESR, PCV and Haemoglobin estimation
- RBC count
- Calculation of blood indices
- WBC count
- Differential leukocyte count
- Determination of blood group
- Absolute eosinophil count
- Reticulocyte count
- Platelet count
- Bleeding time, clotting time

Biophysics

- Perimetry
- ECG
- Physiograph
- Spirometry

b. HUMAN EXPERIMENTS

- Recording of arterial pulse.
- Recording of blood pressure
- Effects of posture and exercise on blood pressure
- Perimetry



- Spirometry
- Electrocardiography (ECG)
- Clinical examination of respiratory system
- Examination of cardiovascular system
- Examination of sensory system
- Examination of motor system
- Examination of cranial nerves
- Examination of reflexes.

c. AMPHIBIAN EXPERIMENTS

- Use and care of common appliances used in experimental physiology
- Muscle-nerve preparation
- Simple muscle curve
- Effect of two successive stimuli
- Effect of variation of temperature on muscle contraction
- Fatigue
- Velocity of nerve impulse
- Effect of load and after load 9. Genesis of tetanus and clonus
- Recording of normal cardiogram of frog's heart
- Effect of cold and warm saline on sinus venosus and ventricle of frog's heart.
- Effect of Stannius ligatures.
- Properties of cardiac muscle
- Effect of refractory period on frog's heart
- Effects of vagal stimulation on frog's heart
- Perfusion of isolated frog's heart, study of the effects of ions and drugs.
- Isolated mammalian heart perfusion – effects of drugs.
- Intestinal movements.

d. Mammalian Experiments

1. Isolated Organ Bath/Perfusion studies.



To study ionotropic&chronotropic functions in isolated rabbit heart.

2. Dog experiments (charts)

e. PRACTICAL DEMONSTRATION

1. Audiometry

2. Pulse recording using Physiograph

3. EMG

4. Pregnancy diagnosis test. (Immunological test)

5. Genesis of tetanus using Mosses Ergograph.

6. Blood Banking.

7. Bicycle Ergography.

8. Case history (for interpretation)/Spotters/Calculations/charts.

9. Clinicalcharts: Clinical conditions for Discussion.

Eg:Cushing'sSyndrome,Cretinism, Myxoedema, Grave's disease,

Adrenogenital Syndrome, Tetany, Gigantism etc.

f. Seminars – 'Twice a Week'

The seminars are on a topic belonging to a system scheduled by the faculties. The topic is presented in depth appropriate for postgraduates by one of the M.Sc. or PhD students and moderated by a faculty member.

The seminars represent only a small and somewhat arbitrary selection of topics. They are not intended to cover an entire system. Their aims are to:

- Topics belonging to a system scheduled for the semester.
- Topic presented in depth by appropriate for PGs & modulated by a faculty member.
- Cover recent advances.
- To give practice in oral presentation

g. Journal Clubs every month first week



The journal clubs are on an article belonging to a system scheduled by the faculties. The article is presented by an M.Sc./PhD student or senior demonstrator and moderated by a faculty member. The aims of journal clubs are to:

- Highlight recent advances
- Discuss classical papers
- Inculcate the faculty of critical appreciation of a research article
- Give students and senior demonstrators practice in the art of oral presentation
- Faculty presentation
- Medical education
- Research methodology
- An area of research in which the faculty member is involved

In the second year students should attend daily lecture classes in Physiology with MBBS 20... batch & also presented seminars, journal clubs, and group discussions & had individual topic discussions & evaluation sessions under the guidance of senior Faculty in Physiology.

1. Attended classes in Biostatistics & Research Methodology in the month of February 20....
2. Search for & Selection of topic for dissertation
3. Practicals done: All Hematology, Biophysics and Amphibian experiments (as per curriculum)
4. Attended Departmental Teacher's training program in the form of
 - Helping in conducting Practical demonstrations for MBBS and BDS students.
 - Practical supervision & conducting group discussions – all hematology and Amphibian experiments for MBBS, BDS and Para medical students.
 - Helping in conducting research and practical's for PG students. (MD)

2.13 Records

To be maintained for all Practical Work



2.14 Dissertation:

As per Dissertation Regulations of KUHS

Eligibility for project guide

- M. Sc Medical Physiology with five years of experience/ Ph.D with 3 year's experience/ M.D with three year's experience ,from core faculty only can become guide for the project work and shall be the examiner for Dissertation & viva voce.
- Faculty of the concerned other departments with can co guide in the case of interdisciplinary research.
- Change of guide as per university regulations

2.15 Speciality training if any

As per [09 and 10] above.

2.16 Project work to be done if any

Dissertation work: Study designing, Ethical clearance, Data collection, Sampling, Statistical analysis and Writing up of thesis.

After approval of the Plan, the student will begin work on the thesis. The progress of work will be monitored regularly by the Guide. The thesis not exceeding 100 pages typed on A4 paper on one side only in double spacing is to be submitted to the university through the Guide. The candidates shall submit four copies of dissertation in the prescribed format given by the college before the commencement of the theory examination of that year. Candidates who fail to submit their dissertation on or before the stipulated date shall not be permitted to appear for the final year examination. This shall be assessed as accepted or as rejected with no marks carried there of as per the panel of examiners (1 external & 2 internal at least). In the event of discrepancy between internal & external examiners the dissertation will be referred to a third examiner and his/her verdict on same will be taken as final.

Maximum time limit for dissertation should be 3 months and each candidate should publish/ present at least one paper as a part of dissertation work in peer reviewed journal or a conference.

Preparation of Panel of Examiners: From the Medical faculty panel of KUHS

Research work should be added to the log book.

2.17 Any other requirements [CME, Paper Publishing etc.]

A certified practical Record is compulsory for each subject and that will be evaluated at the time of concerned Practical Examination. A maximum of 10 marks shall be given for the record.

2.18 Prescribed/recommended textbooks for each subject

As per [9 and 10] above.

2.19 Reference books

BIOCHEMISTRY

1. Text of Biochemistry for Medical students by Vasudevan & Sreekumari - latest edition
2. Harper's review of Biochemistry- latest edition
3. Medical Biochemistry by Dinesh Puri -latest edition
4. Lippincott's Illustrated Review of Biochemistry -latest edition

ANATOMY

1. Cunningham's Manual of Practical Anatomy-3 Volumes, 15th Edition
2. Essentials of Human Anatomy-A.K.Datta, 3 Volumes
3. Text Book of Anatomy by I.B.Singh, 3 volumes
4. Human Embryology-Inder Bir Singh
5. Human Neuro Anatomy-Inder Bir Singh
6. Text Book of Human Histology-Inder Bir Singh
7. Surface and Radiological Anatomy-A. Halim & A.C.Das
8. Text Book of Osteology by I.B.Singh
9. Text Book of General Anatomy-G.P.Pal
10. Clinically Oriented Problem Based Anatomy-Dr.Neeta Kulkarni.

PHYSIOLOGY

1. GUYTON (Arthur C), Text of Medical Physiology 11th Edition, 2008, Prism Publishers, Bangalore.
2. GANONG (William F), Review of Medical Physiology, 23 rd Edition, and Lange.

3. CHAUDHURI (Sujith K), 5th Edition Concise Medical Physiology New Central Books, Calcutta.
4. TORTORA (Gerald J), Principles of anatomy and physiology 11th Edition John Waley& Sons, Ref. college publication.
5. A.K. Jain – Textbook of Medical Physiology, 4th Edition 2008. 6. BIJLANI (RL), Understanding medical physiology; text book for medical students, Jaypee Brothers, New Delhi
6. VANDER ct al. Human Physiology, 8th Edition, Mechanism of body function, McGraw Hill Publishers.

Reference books

BIOCHEMISTRY

1. LIPPINCOTT'S ILLUSTRATED REVIEWS: BIOCHEMISTRY
Pamela C. Champe; Richard A. Harvey 3rd ed,
2. BIOCHEMISTRY: A CONCISE TEXT FOR MEDICAL STUDENTS
D.K. Apps; B.B. Cohen; C.M. Steel
3. BIOCHEMISTRY: A CASE ORIENTED APPROACH
R. Montgomery; T. Conway; A. Spector; D. Chappel

ANATOMY

1. Clinical Anatomy for Medical Student By R.S. Snell 7th Edition 2003
2. Lippincott Williams & Wilkins
3. Grants Atlas of Anatomy By A. Agur, M. Lec 11th Edition 2007
4. Histology: A text & atlas By M.H. Ross 4th Edition 2002 G.I. Kaye, W. Pawlina
Lippincott Williams & Wilkins
5. DiFiore's- Atlas of Histology with By V. Eroschenko Functional correlations
International Edition 10th Edition 2004
6. Langman's- Medical Embryology T. Sadler with Simbryo Version 1CD-ROM
Lippincott, Williams and Wilkins 9th Edition 2003
7. Clinical Neuroanatomy by Richard S. Snell for Medical Students Lippincott, William
and Wilkins 5th Edition 2001

PHYSIOLOGY

1. MORAN Campbell E. J Clinical Physiology, ELBS UK Churchill 14th Edition
2. BERNE (Robert M) and LEVY (Mathew 6th Edition, Physiology Elsevier Publication 2008
3. VERNON B. MOUNT CASTLE, Vol. 1 & 2, Medical Physiology, 14th Edition, Mossby Publication.
4. PATERSON SMITH, Textbook of Physiology, 10th Edition, Smith Churchill Livingstone Publication
5. Textbook of Medical Physiology, Guyton and Hall.
6. Review of Medical Physiology, William. F. Ganong.
7. Human Physiology, Vander, Sherman, Luciano
8. Physiology, Robert. M. Berne, Mathew. N. Levy
9. Textbook of Human Physiology, SaradaSubramaniam.
10. Text book of Human Physiology Dr.InduKhurana.
11. Understanding Medical Physiology, R.L. Bijilani
12. Text book of Physiology, Vol.1 and 2, Prof. A.K. Jain
13. Physiological Basis of Medical Practice, John. B. West
14. Text book of practical physiology G K Pal

- **Experimental Physiology**

1. Ghai, A textbook of Practical Physiology, 5th Edition, Jaypee Brothers.
2. Hutchinson & Hunter, Clinical Methods 22nd Edition, Elsevier Publishers.
3. A.K. Jain – Manual of practical Physiology, 2nd Edition, Arya Publications- 2007.

2.20 Journals

1. Indianjournal of physiology and pharmacology
2. National journal of physiology, pharmacy and pharmacology

2.21 Logbook

To be maintained for all academic work

Logbook TEMPLATE

EMBLEM

LOG BOOK

Submitted in partial fulfillment of the requirements for the award of the Master of
Science in
Medical Physiology.

By

Name

Roll no:

Certificate

This is to certify that the content of the log book is a bonafide work of
..... Reg. No: M.Sc.Medical Physiology student in
the Department of Physiology, for the academic period 20.... - 20....

Head of the Department

Candidate's Statement

I hereby declare that the work incorporated in the present log book is original and has
not been submitted to any other University or Institutions for the award of any degree.

Signature

Name



Biodata of the Candidate

1. Name of the candidate:
 2. Register number:
 3. Name of Institution/Hospital:
 4. Name of University
 5. Name of the course: M Sc Medical Physiology
 6. Duration of the course: 3yrs
 - Address
 7. Department: Physiology
- Signature of HOD**



3. EXAMINATION

3.1 Eligibility to appear for exams

The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examination.

- A candidate is required to put in at least 80% attendance in theory and practical subjects separately in a recognized institution approved by and affiliated to Kerala University of health sciences.
- Candidate shall have minimum of 50% marks in theory and practical separately for each subject for the internal assessment examination
- If candidate fails in any subject in first year he/she shall have to appear only for that subject (both theory and practical) in the supplementary examination.
- Candidates who fail in the Foundation course are allowed to continue to second year; but will have to pass the Foundation course before appearing for the final University examination in the third year.
- If the candidate fails in any of the subject in third year, he/she shall have to appear for all the papers (both theory & practical) of that year.
- Candidate shall submit dissertation before registering for the final year examination.

3.2 Schedule of Regular/Supplementary exams

FIRST YEAR

REGULAR: 3rd week of September

SUPPLEMENTARY: 1st week of April

FINAL YEAR

REGULAR: 2nd week of September

SUPPLEMENTARY: 1st week of February

3.3 Scheme of examination showing maximum marks and minimum marks

Year	Subject	Theory		Theory Internal		Theory Viva		Practical		Practical Internal	
		Max. Marks	Min Mark	Max. Marks	Min Mark	Max. Marks	Min Mark	Max Marks	Pass Mark	Max. Marks	Pass Mark
	Foundation Course										



First Year	Anatomy	70	35	20	10	10	**	40	20	10	05
	Physiology	70	35	20	10	10	**	40	20	10	05
	Biochemistry	70	35	20	10	10	**	40	20	10	05

FINALYEAR Mark distribution- University Exam and Internal Assessment

University Marks			Max. / Min.
Theory	Paper1	General Physiology, Haematology, Cardiovascular system	100/50
	Paper2	Physiology of Respiration, Renal Physiology, Skin & temperature regulation, Principles of Biophysics as applied to Physiology	100/50
	Paper3	Nervous system, Special senses, Muscle & nerve Physiology	100/50
	Paper4	Gastro intestinal Physiology, Endocrine system, Reproductive system, Recent Advances in Physiology	100/50
Internal Assessment	Paper1	General Physiology, Haematology, Cardiovascular system	25/12.5
	Paper 2	Physiology of Respiration, Renal Physiology, Skin & temperature regulation, Principles of Biophysics as applied to Physiology	25/12.5

	Paper 3	Nervous system, Special senses, Muscle & nerve Physiology	25/12.5
	Paper 4	Gastro intestinal Physiology, Endocrine system, Reproductive system, Recent Advances in Physiology	25/12.5
	Practical		50/25
	Log book		50/25
	Seminars, Journal club & Integrated teaching		80/40
Total			680/340
Paper V-	Practical 1	Long Haematology- 25	70/35
		Short Haematology-10	
Practical	Practical 2	OSPE-10	
		Clinical Physiology (System Examination, ECG, Spirometry, Physiograph, Perimetry) - 25	
Record			50/25
Viva			100/50
Paper VI -Dissertation			50/25

Paper VII- Microteaching			50/25
Grand Total			1000/500

3.4 Papers in each year:

PRELIMINARY PART(FIRST YEAR)

PAPER I ANATOMY

PAPER II PHYSIOLOGY

PAPER III BIOCHEMISTRY

FINAL PART (SECOND & THIRD YEAR)

PAPER I

General Physiology, Haematology, Cardiovascular system

PAPER II

Physiology of Respiration, Renal Physiology, Skin & temperature regulation, Principles of Biophysics as applied to Physiology

PAPER III

Nervous system, Special senses, Muscle & nerve Physiology

PAPER IV

Gastro intestinal Physiology, Endocrine system, Reproductive system, Recent Advances in Physiology

3.5 Details of theory exams

PRELIMINARY PART(FIRST YEAR)

PAPER I ANATOMY

PAPER II PHYSIOLOGY

PAPER III BIOCHEMISTRY

Model Question paper- for Foundation Courses

Q I. Essay -10 Marks.

Q II. Essay -10 marks



Q III.Short Notes-5marks x 6 = 30(For Anatomy & Biochemistry) and6marks x 5 = 30
(For Physiology)

Q IV. Answer Briefly -2 Marks x 10 = 20(For Anatomy & Biochemistry)and Answer
Briefly -4 Marks x 5 = 20 (For Physiology)

FINAL PART(SECOND &THIRD YEAR)

PAPER I

General Physiology, Haematology, Cardiovascular system

PAPER II

Physiology of Respiration, Renal Physiology, Skin & temperature regulation, Principles
of Biophysics as applied to Physiology

PAPER III

Nervous system, Special senses, Muscle & nerve Physiology

PAPER IV

Gastro intestinal Physiology, Endocrine system, Reproductive system, Recent
Advances in Physiology

3.5 Details of theory exams

As per clause 3.3

Model Question paper- for Final year

Q I. Essay -20 Marks x 1=20marks.

Q II.Short Essay-10 marks x 8=80marks

3.6 Model question paper for each subject with question paper pattern

Q.P.Code:.....

REG. No:.....

First Year M.Sc Medical Physiology Supplementary Degree Examinations,



...../20....

(FOUNDATION COURSE)

Time: 3 hrs

Max. Marks:- 70

PAPER I – ANATOMY

Answer all the questions

Draw diagrams wherever necessary

Essay: (2x10=20)

1. Explain the gross anatomy of the uterus in detail and add a note on supports of the uterus.

2. Describe the pituitary gland under following headings:

- Parts
- relations
- microscopic anatomy
- blood supply

Short Notes: (6x5=30)

3. Medulla oblongata
4. Coronary arteries
5. Classify synovial joints
6. Parotid gland
7. External features and muscles of the tongue
8. Oesophagus

Answer briefly: (10x2=20)

9. Male urethra
10. Pneumatic bone
11. Down's syndrome
12. Microscopic anatomy of thin skin
13. Contents of middle ear
14. Microscopic anatomy of lung

☆

15. Tonsil
16. Anal sphincters
17. Extra ocular muscles
18. Hyaline cartilage

Q.P.Code:.....

REG. No:.....

First Year M.Sc Medical Physiology Degree Examinations,/20.....

(FOUNDATION COURSE)

Time: 3 hrs

Max. Marks:- 70

PAPER II – BIOCHEMISTRY

Answer all the questions

Draw diagrams wherever necessary

Essay: (2x10=20)

1. Explain the steps of TCA cycle indicating the enzymes involved in each step. List the four functions of TCA cycle. (6+4 = 10)
2. What is the normal pH of blood. What are the renal mechanisms of acid base regulation. Add a note on metabolic acidosis. (1+6+3=10)

Short Notes: (6x5=30)

3. Deficiency manifestations of vitamin A
4. Functions of calcium
5. DNA replication
6. Tumor markers
7. Enzymes in the diagnosis of myocardial infarction
8. Functions of HMP shunt pathway

Answer briefly: (10x2=20)

9. Essential amino acids

☆

10. Glucose transporters
11. Cori's cycle
12. Glycated hemoglobin
13. Alkaptonuria
14. Hormone sensitive lipase
15. Dietary fiber
16. Acute intermittent porphyria
17. A/G ratio
18. Radioimmunoassay

Q.P.Code:.....

REG. No:.....

First Year M.Sc Medical Physiology Degree Examinations,/20.....
(FOUNDATION COURSE)

Time: 3 hrs

Max. Marks:- 70

PAPER III – PHYSIOLOGY

Answer all the questions

Draw diagrams wherever necessary

Essay: (2x10=20)

1. Describe the pressure and volume changes in the left ventricle and aorta during cardiac cycle phases (10)
2. Describe the origin, course and termination of pyramidal tracts.
Explain the symptoms of lesion at the level of left internal capsule. (1+3+1+5=10)

Short Notes: (5x6=30)

3. CO₂ dissociation curve and Haldane's effect.
4. Ovulation time, its significance and hormonal basis.
5. ABO and Rh system of blood groups.
6. Micturition reflex and cystometrogram.
7. Changes taking place during accommodation to near vision.

☆

Answer briefly: (5x4=20)

8. Properties of synapse.
9. Actions of parathyroid hormone on target tissues.
10. Deglutition mechanism.
11. Compare diabetes mellitus and diabetes insipidus
12. Residual volume and timed vital capacity.

Q.P.Code:.....

REG. No:.....

Final Year M.Sc Medical Physiology Degree Examinations,/20....

Time: 3 hrs

Max. Marks:- 100

General Physiology, Haematology and Cardiovascular System

Answer all the questions

Draw diagrams wherever necessary

Essay: (20)

1. Define cardiac output. Which methods are commonly used to measure cardiac output. What are the advantages and disadvantages of each method.

Short Essays: (8x10=80)

2. Neuromuscular junction
3. Hazards of mismatched blood transfusion.
4. What are Korotkoff's sounds. How are they produced.
5. Describe the proteins that help in transport across the cell membrane.

☆

6. What is rigor mortis and mention its medico-legal importance.
7. Conducting system of the heart.
8. Coronary circulation.
9. Sino-aortic mechanism

3.7 Internal assessment component

Internal assessment marks is calculated on the basis of assessment of the candidate's performance in the Session examinations, laboratory works, Practical records, Projects, Seminars and structured discussions. In the case of failed candidates, the internal assessment marks have to be freshly calculated before each attempt of the University examination.

3.8 Details of practical/clinical practicum exams

NOTE: There is no practical examination for Second year M.Sc. (Medical) Physiology Students.

Foundation Course

Subject	Practical		Practical Internal		Total Max/Min
	Max. Marks	Pass Mark	Max. Marks	Pass Mark	
Anatomy	40	20	10	05	25/50
Physiology	40	20	10	05	25/50
Biochemistry	40	20	10	05	25/50

Duration: One day for each exam

Final year



Paper V-	Practical 1	Long Haematology- 25	70/35
		Short Haematology-10	
Practical	Practical 2	OSPE-10	
	Practical 3	Clinical Physiology (System Examination, ECG, Spirometry, Physiograph, Perimetry) - 25	
Record			50/25
Paper VI -Dissertation			50/25
Paper VII- Microteaching			50/25
Total			220/110

Duration: Two days

3.9 Number of examiners needed (Internal & External) and their qualifications

Foundation course(First year)

Eligibility for Internal Examiner

Paper I Anatomy

M. Sc Medical Anatomy with five years of teaching experience

One internal examiner and one External examiner



Paper II Biochemistry

M. Sc Medical Biochemistry with five years of teaching experience.

One internal examiner and one External examiner .

Paper III Physiology

M. Sc Medical Physiology with five years of teaching experience .

One internal examiner and one External examiner

Eligibility for External Examiner

M. Sc Medical Anatomy/M. Sc Medical Biochemistry/M. Sc Medical Physiology with five years of experience/ Ph.D with 3 years' experience/ M.D with three years' experience.

Final Year (Paper I,II,III,IV)

Two internal examiners and one external examiner

Eligibility for Internal Examiner

M. Sc Medical Physiology with Five years of experience.

Eligibility for External Examiner

M. Sc Medical Physiology with five years of experience/ Ph.D with 3 years' experience/ M.D with three years' experience.

3.10 Details of Viva:

Foundation Course	Max	Min
Theory VIVA VOCE		
Anatomy	10	**
Physiology	10	**
Biochemistry	10	**

FINALYEAR	Max	Min



Theory VIVA	50	25
Dissertation Viva	50	25

4 Internship

Not applicable

5. ANNEXURES

5.1 Check Lists for Monitoring: Log Book, Seminar Assessment etc. to be formulated by the curriculum committee of the concerned Institution

Template for Dissertation

TITLE OF THE DISSERTATION (IN ALL CAPS)

By

YOUR NAME HERE IN ALL CAPS

Degree of Master of Science in Medical Physiology

Month, YEAR

Submitted to the Faculty of the NAME OF THE INSTITUTION

Affiliated to KeralaUniversity of Health sciences ,Thrissur

in partial fulfillment of

the requirements for

the Degree of Master of science in Medical Physiology

Month, YEAR

TITLE OF THE DISSERTATION (IN ALL CAPS)

NAME:.....

REGISTER NUMBER:.....

HEAD OF THE DEPARTMENT

PRINCIPAL

TITLE OF THE DISSERTATION (IN ALL CAPS)

NAME:.....

REGISTER NUMBER:.....

INTERNAL EXAMINER

EXTRNAL EXAMINER

INTERNAL EXAMINER



Name: TYPE NAME

NAME of the Exam: Month & Year

Title of Study: TYPE FULL TITLE IN ALL CAPS

Major Field: TYPE MAJOR

Abstract: Type the abstract here. Limit 350 words, single spaced.

TABLE OF CONTENTS

Chapter Page

I. INTRODUCTION

II. REVIEW OF LITERATURE.....

III. METHODOLOGY

IV. FINDINGS.....

V. CONCLUSION

☆

VI.REFERENCES

33. Template for Mark List showing Maximum & Minimum

To be prepared by the IT Section as per Regulations

KERALA UNIVERSITY OF HEALTH SCIENCES, THRISSUR – 680 596

Format for College Inspection/ Minimum standard for M.Sc. Medical Physiology

Course 20..... - 20.....

1	Name of the Educational Agency	
2	Name of the college	
3	Whether the college has got approval for conducting M.Sc. Medical Physiology course by Kerala Government.	
4	No of seats approved by Kerala Government	

5	No of seats applied to university			
6	Other courses conducting at college with the approval of the university	Name of the course	Year of starting	
7	Reference number of the appointment order of the university for inspection			
8	Date of inspection			
9.	Infrastructure facilities required to start M.Sc.Medical Physiology course for 10 students	Area in sqft.	Available/ Not available	Remarks
a.	Building area for running the course-	4000sqft		
b.	Administrative area:-			



c.	1.	Faculty Room	300sqft.		
	2.	Office Room	400sqft.		
	Class Rooms and Lab Facilities:-				
	1.	Class Rooms	200sqft. X 3class rooms = 600 sqft		
	2.	Seminar Hall	300sqft.		
	3.	Histology	400sqft.		
	4.	Hematology lab	400sqft.		
	5.	Clinical lab	200sqft.		
	6.	Electrophysiology lab	200sqft.		
	7.	Biochemistry Lab	400sqft.		
8.	Anatomy Lab	200sqft.			

	9.	Animal House*	400sqft.		
* Mandatory only if animal experiments are conducting in the department					
Requirement of Equipment for M.Sc. Medical Physiology Course for 10 students					
Sl.No	Equipment		Required No	Available / Not Available	Remarks
I	Haematology Experiments				
1	Microscopes		5		
2	Hemoglobinometers		5		
3	Hemocytometer		5		
4	Blood grouping kits		5		
5	Diluting fluids for RBC, UBC, Platelet, Eosinophil count		2		
6	Capillary tubes(glass)		2		
7	Filter paper		2sheets		
8	Glass Slides		2box		

II	Human Experiments			
1.	Pulse oximeter	1		
2	Sphygmomanometers	5		
3	Spirometer	1		
4	ECG Machine	1		
5	Clinical Thermometer	2		
6	Tuning forks	5		
7	Knee hammers	5		
8	Thermasthesio meter	2		
9	Measuring tape	5		
10	Polygraph	1		
III	Amphibian Practical's			
1	Kymograph	1		
2	Sherrington starling drum	5		
3	Electronic stimulation	1		
4	Induction Coil	5		
5	Symes perfusion apparatus	4		

IV	Biochemistry Lab			
1	Laboratory Incubator with Temperature Control	2		
2	Water bath	2		
3	Centrifuge	3		
4	Hot air oven	1		
5	Refrigerator	1(big) (300 liters)		
6	Photoelectric colorimeter	2		
7	Spectrophotometer	2		
8	Chemical balance with weight box	2		
9	Electronic balance	2		
10	Distillation apparatus	2		
V	Anatomy Lab			
1	Mannequins	1		
2	Articulated Skeleton	1		
3	Soft parts	All		
4	Histology slides	50		
5	Model of Musculature			
		Available / Not Available	Remarks	
e.	Hospital:-			

	<ol style="list-style-type: none"> 1. The hospital should have 200 bed capacity 2. All main medical & surgical specialties should be present 		
f.	Teaching & training requirements:- <ol style="list-style-type: none"> 1. Class room boards 2. Class room chairs with writing boards 3. LCD(one) 		
g.	Library <ol style="list-style-type: none"> 1. Library with space of 20 Sq.ft. 2. Minimum of 250 Books 3. Minimum 3 specific topic related magazines/journals/periodicals 		
h.	Research Laboratory-200 sq.ft.with 5 computers /Wi-Fi facility on class hours		

10. Faculty/Personnel

Full Time	First Year	Second year	Third year
Professor	1		
Associate Professor/Reader	3	1*	



Lecturer/Assistant Professor	1	2	2			
Foundation Course – First Year						
Department of Anatomy						
Full Time	No	Qualification		Experience	Publications	Available /Not Available
		Essential	Desirable			
Associate Professor/Reader	1	M.Sc. Medical Anatomy	Ph.D	5-7 years teaching experience in the field In case of Ph.D,3 years teaching experience	Essential	
Lecturer/Assistant Professor	1	M.Sc. Medical Anatomy	Ph.D	0-5 years teaching experience in the field		
Department of Biochemistry						
Associate Professor/Reader	1	M.Sc.Medical Biochemistry	Ph.D	5-7 years teaching experience in the field In case of Ph.D,3 years	Essential	

				teaching experience		
Non-Teaching Staff						
Lab Assistant-Biochemistry		1				
Lab Assistant-Anatomy		1				
Lab Assistant-Physiology		1				
Librarian/staff		1+1				
Core Faculty						
Designation	Qualification		Experience		Publications	
	Essential	Desirable	Essential	Desirable		
Professor	M.D. Physiology/ M.Sc.Medical Physiology	Ph.D.	10 years and above teaching experience in the field/ In case of M.D.& Ph.D,5 years teaching experience.		Essential	

Associate Professor/Reader	M.Sc.Medical Physiology	Ph.D.	5-7 years of teaching/ research/with graduate/post graduate courses In case of Ph.D,3 years teaching experience	Essential
Lecturer/ Assistant Professor	M.Sc.Medical Physiology	Ph.D.	0-5 years of teaching/ research/with graduate/post graduate courses .	

Note:

1. Minimum of one faculty each in core areas will be required for giving recognition for the first year.
2. In case of Professor not being available, *2 Readers/Associate Professor are appointed

to accommodate research guidance and administrative work.

11. EXAMINATION HALL (600sqf)

SI NO	PARTICULARS	DETAIL
1	Seating arrangement and spacing	Satisfactory/Not satisfactory
2	Extension of landline	Yes/No



3	CCTV	Available/Not available
4	Mobile Jammer	Available/Not available
5	Other	

12.CONFIDENTIAL ROOM(300sqf)

1	Two Computer	Available/Not available
2	Two internet connections	Available/Not available
3	Printer	Available/Not available
4	Fax Machine	Available/Not available
5	CCTV	Available/Not available
6	Mobile Jammer	Available/Not available
7	NKN connection	Available/Not available
8	Generator	Available/Not available
9	UPS	Available/Not available
10	Other	

13. Whether provided required number of eligible examiners for evaluation as per Kerala University of Health Sciences Norms (List should be submitted with inspection report)

14. CARDINAL DEFICIENCIES

1. Infrastructure
2. Equipment's



3. Clinical material

4. Faculty

5. Academic training

15. Report of interaction with students

1. Name &Signature of the Inspector:-

2. Name &Signature of the Inspector:-