

KRISHNA INSTITUTE OF MEDICAL SCIENCES,  
“DEEMED TO BE UNIVERSITY”, KARAD.  
**KRISHNA INSTITUTE OF MEDICAL SCIENCES**

**PROGRAMME NAME: M. Sc. Medical Physiology. CHOICE BASED CREDIT SYSTEM (CBCS).**

**PROGRAMME CODE: 1503**

**COURSE NAME: Paper I, II, III, and IV.**

**COURSE CODE: 1503-11, 12, 13, 14.**

**PREAMBLE:**

The aim of the course is to prepare PG students who shall

- 1) Teach and train future under-graduate & post-graduate medical students Human Physiology in Medical Colleges and Research Institutions.
- 2) Carry out & guide research & in academics, can go for higher qualifications like Ph.D. in Physiology & contribute to advancement of the subject.
- 3) Earn to placements in Medical teaching institute, research laboratories run by the government and the corporate sector & organize & manage administrative responsibilities for routine day to day departmental work.

**Objectives:** At the end of course student should be able to achieve:

**A-Domain:**

- 1) Cognitive domain: All the systems of the body should be studied with respect to:
  - a) Historical aspect
  - b) Evolution and development
  - c) Comparative physiology
  - d) Structure-gross and electron microscopic and functions at cellular level
  - e) Qualitative and quantitative aspects.
  - f) Regulating mechanisms
  - g) Variations in physiological and pathological conditions
  - h) Applied physiology
  - i) Recent advances
- 2) Psychomotor domain: P.G. students should be able-
  - a) To perform human and animal (mammalian, amphibian) experiments: Hematology, Experiments based on biophysical principles.
  - b) To acquire history taking and clinical examination skills.

**3) Affective domain**

- a) The P.G. students should develop communication skills to interact with students, colleagues, superiors and other staff members.
- b) They should be able to work as a member of a team to carry out teaching as well as research activities
- c) They should have right attitude toward teaching profession

**B) Global Competencies & Employability:** The student should get employment in the following branches related to the course and should acquire the competency for the same.

- Teaching medical Physiology
- Research
- Physiological laboratories (PFT, EEG, NCV/EMG)
- Yoga
- Exercise Physiology
- Food & Nutrition

**C) Methodology**

- Element of Critical thinking: In addition to didactic lectures students are exposed to the following teaching-learning practices/programs
- Journal Clubs
- Seminars
- Participate in workshop, conferences / CME

**D) Duration of Study:** The duration of the study for M.Sc. Medical Physiology will be of six semesters spread over three years.

**Duration - Three years**

Program Pattern - Commencement of Semester

- First Semester: August
- Second Semester: February
- Third Semester: August
- Fourth Semester: February
- Fifth Semester: August
- Sixth Semester: February

**E) Eligibility -** Any of the following bachelor degree passing with not less than II class

- B.Sc. graduates of biological Sciences.
- B.Sc. Zoology/Microbiology/Botany/Physiology

- Other health sciences
- BHMS
- BAMS
- B.V.Sc

**F) Fee:** Fee as per University policy.

**G) Selection Method:** Entrance Examination conducted by the University

**H) Faculty:**

- 1) Dr. Mrs. K. C. Wingkar (Professor & Head of Physiology)
- 2) Dr. A. G. Joshi (Professor of Physiology)
- 3) Dr P. M. Somade (Professor of Physiology)
- 4) Dr. S. N. Patil (Professor of Physiology)
- 5) Dr Mrs. S. S. Jagtap (Associate Professor of Physiology)

**Medium of instruction:** English

**Attendance:** Compulsory

**Teaching-learning methods:**

- Lectures
- Demonstrations
- Seminars and Practical's

**COURSE STUDENTS INSTRUCTIONS:**

- Student should attend all UG lectures in Physiology
- Student should perform all UG Practical's.
- Attend all demonstrations
- Attend seminar and present seminar as per the schedule.
- Visit to library & get acquainted with scientific journals
- Review of literature to choose topic for the dissertation & its submission in consultation of respective PG guide.
- Carryout research work.

<b>(M.SC. MEDICAL PHYSIOLOGY) SEMESTER I</b>			
<b>Sr. Number</b>	<b>Content</b>	<b>No. Hours</b>	<b>Credits.</b>
<b>A. CORE SUBJECT</b>			
<b>a - Theory</b>			
1) Paper I	( Lectures ,Tutorials ) General Physiology (i)	45	3
2)Paper II	( Lectures ,Tutorials) Respiratory System (i)	45	3
3)Paper III	( Lectures ,Tutorials ) Excretory system (i)	45	3
4)Paper IV	( Lectures ,Tutorials ) Endocrine (i)	45	3
<b>b – Practical</b>			
1)Paper I	<b>Haematology (i)</b>	60	2
2)Paper II	<b>Clinical examination (i)</b>	60	2
3)Paper III	<b>Clinical examination CNS (i)</b>	60	2
4)Paper IV	<b>Endocrine photographs i ( Charts )</b>	60	2
<b>B. Discipline specific elective ( ANY ONE )</b>			
<b>a - Theory</b>			
1.	,	----	-----
2.			
<b>b - Practical</b>			
1.		-----	-----
2.			
<b>C. Generic Elective.( Any One ) Stress Management, Health Economics , Biosafety</b>			
<b>a.- Theory</b>			
1.		30	2
<b>b - Practical</b>			
1.		90	3
<b>D Dissertation</b>	<b>Selection of research topic.</b>	30	1
	<b>Total</b>	570	26

<b>(M.SC. MEDICAL PHYSIOLOGY) SEMESTER II</b>			
<b>Sr. Number</b>	<b>Content</b>	<b>No. Hours</b>	<b>Credits.</b>
<b>A. CORE SUBJECT</b>			
<b>a. THEORY</b>			
1) Paper I	( Lectures ,Tutorials ) <b>General Physiology (ii)</b>	45	3
2)Paper II	( Lectures ,Tutorials ) <b>Respiratory System (ii)</b>	45	3
3)Paper III	( Lectures ,Tutorials ) <b>Excretory system (ii)</b>	45	3
4)Paper IV	( Lectures ,Tutorials ) <b>Endocrine (ii)</b>	45	3
<b>b. Practical</b>			
1)Paper I	<b>Hematology (ii)</b>	60	2
2)Paper II	<b>Clinical examination(ii)</b>	60	2
3)Paper III	<b>Clinical examination CNS (ii)</b>	60	2
4)Paper IV	<b>i) Endocrine photographs ii ( Charts )</b>	60	2
<b>B. Discipline specific elective ( Any One) Select any one EEG or EMG and NCV</b>			
<b>a - Theory</b>			
1.	Electroencephalogram or EMG, NCV. Basic principle	60	4
2.	Interpretation of EEG or EMG, NCV.		
<b>b - Practical</b>			
1.	Basics of EEG or EMG, NCV. Recording procedure	90	3
2.	EEG. Or EMG, NCV Record analysis		
<b>C. GENERIC ELECTIVE.( ANY ONE )</b>			
<b>A - Theory</b>			
1.		-----	-----
<b>b - Practice</b>			
1.		-----	-----
<b>D.</b>			
<b>Dissertation</b>		-----	---
	<b>Total</b>	570	27

<b>(M.SC. MEDICAL PHYSIOLOGY) SEMESTER III</b>			
<b>Sr. Number</b>	<b>Content</b>	<b>No. Hours</b>	<b>Credits.</b>
<b>A. CORE SUBJECT</b>			
<b>a. Theory</b>			
1) Paper I	( Lectures ,Tutorials ) Hematology (i)	30	2
2) Paper II	( Lectures ,Tutorials ) Respiratory System (iii)	30	2
3) Paper III	( Lectures ,Tutorials ) CNS. (i)	30	2
4) Paper IV	( Lectures ,Tutorials ) Autonomic nervous System.	30	2
<b>b. Practical</b>			
1) Paper I	Hematology.( i)	60	2
2) Paper II	Human Experiments (i)	60	2
3) Paper III	Clinical examination CNS (iii)	60	2
4) Paper IV	Renal ( Problems and calculations )	60	2
<b>B. Discipline specific elective ( ANY ONE )</b>			
<b>a - Theory</b>			
1.		--	--
2.			
<b>b - Practical</b>			
1.		--	--
2.			
<b>C. GENERIC ELECTIVE ( ANY ONE )</b>			
<b>a - Theory</b>			
1.		-----	-----
<b>b - Practice</b>			
1.		-----	-----
<b>D. Dissertation</b>	Data collection, Lab. Work.	180	6
	<b>Total</b>	540	22

<b>(M.SC. MEDICAL PHYSIOLOGY) SEMESTER IV</b>			
<b>Sr. Number</b>	<b>Content</b>	<b>No. Hours</b>	<b>Credits.</b>
<b>A. CORE SUBJECT</b>			
<b>a. Theory</b>			
1) Paper I	( Lectures ,Tutorials ) Hematology (ii)	30	2
2)Paper II	( Lectures ,Tutorials ) Cardiovascular system (i)	30	2
3)Paper III	( Lectures ,Tutorials ) CNS. (ii)	30	2
4)Paper IV	( Lectures ,Tutorials ) Sports Physiology	30	2
<b>b. Practical</b>			
1)Paper I	Nerve Muscle(i)	60	2
2)Paper II	-----	60	2
3)Paper III	Clinical examination CNS (iv)	60	2
4)Paper IV	Autonomic function tests.	60	2
<b>B. Discipline specific elective ( ANY ONE ) Physical Fitness or PFT.</b>			
<b>a.- Theory</b>			
1.	Physiological aspects of physical fitness.	60	4
	Pulmonary function tests.		
<b>b.- Practical</b>			
1.	Methodology of Physical fitness tests.	90	3
2.	Methodology of recording of PFT.		
<b>C. GENERIC ELECTIVE ( ANY ONE )</b>			
<b>a - Theory</b>			
1.		----	----
<b>b - Practice</b>			
1.		----	----
<b>D. Dissertation</b>	Lab. Work.	60	2
	<b>Total</b>	570	25

<b>(M.SC. MEDICAL PHYSIOLOGY) SEMESTER V</b>			
<b>Sr. Number</b>	<b>Content</b>	<b>No. Hours</b>	<b>Credits.</b>
<b>A. CORE SUBJECT</b>			
<b>a. Theory</b>			
1) Paper I	( Lectures ,Tutorials ) Nerve Muscle Physiology (i).	30	2
2) Paper II	( Lectures ,Tutorials ) Cardiovascular system (ii)	30	2
3) Paper III	( Lectures ,Tutorials ) CNS. (iii)	30	2
4) Paper IV	( Lectures ,Tutorials ) Space physiology (i)	30	2
<b>b. Practical</b>			
1) Paper I	Muscle Physiology.	60	2
2) Paper II	Clinical examination CNS (iv)	60	2
3) Paper III	Autonomic function tests.	60	2
4) Paper IV	Physical fitness Tests.	60	2
<b>B. Discipline specific elective ( ANY ONE )</b>			
<b>a - Theory</b>			
1.			
2.			
<b>b - Practical</b>			
1.			
2.			
<b>C. GENERIC ELECTIVE ( ANY ONE )</b>			
<b>a - Theory</b>			
1.		----	----
<b>b - Practice</b>			
1.		----	----
<b>D Dissertation</b>	Analysis of data. and Lab. Work.	150	5
	<b>Total</b>	510	21

<b>(M.SC. MEDICAL PHYSIOLOGY) SEMESTER VI</b>			
<b>Sr. Number</b>	<b>Content</b>	<b>No. Hours</b>	<b>Credits.</b>
<b>A. CORE SUBJECT</b>			
<b>a. Theory</b>			
1) Paper I	( Lectures ,Tutorials ) Nerve Muscle Physiology (ii)	45	3
2)Paper II	( Lectures ,Tutorials ) Cardiovascular system (iii)	45	3
3)Paper III	( Lectures ,Tutorials ) CNS. (iv)	45	3
4)Paper IV	( Lectures ,Tutorials ) Space physiology(ii)	45	3
<b>b. Practical</b>			
1)Paper I	Nerve Muscle (ii)	30	1
2)Paper II	Human Experiments. (ii)	30	1
3)Paper III	Perimetry	30	1
4)Paper IV	Cranial nerves.	30	1
<b>B. Discipline specific elective ( ANY ONE ) Nutrition or Autonomic Function tests.</b>			
<b>a - Theory</b>			
1.	Nutrition in health and disease OR	60	4
2.	Basic principles and interpretation of AFT		
<b>b.- Practical</b>			
1.	Diet prescribing in heath and diseases. OR	120	4
2.	Methodology of AFT.		
<b>C. GENERIC ELECTIVE ( ANY ONE )</b>			
<b>a - Theory</b>			
1.		----	----
<b>b - Practice</b>			
1.		----	----
<b>D. Dissertation</b>	Stastical Analysis .Submission.	60	2
	<b>Total</b>	540	26

**CORE SUBJECT SYLLABUS THEORY AND PRACTICES (MUST KNOW)**  
**THEORY (PAPER - I)**

**A) PAPER - I**

**a) THEORY**

Unit no.	Theory Topics
1.	<p><b>General Physiology</b></p> <p>i) Homeostasis, feedback mechanisms Structure &amp; function of cell &amp; organelles</p> <p>ii) Transport across Cell Membrane Cell adhesions, junctions, apoptosis Physiology of growth &amp; senescence</p>
2.	<p><b>Hematology</b></p> <p>i) Composition &amp; functions of blood, plasma protein RBC, Erythropoiesis Hemoglobin, Anemia Blood Groups WBC</p> <p>ii) Immunity Hemostasis Platelets Coagulation of blood Lymph, reticulo-endothelial / Tissue Macrophage System Blood bank – Blood components etc. Plasmin system &amp; tissue typing</p>
3.	<p><b>Nerve Muscle Physiology</b></p> <p>i) Structure, function &amp; classification of Nerve Fibers Properties of Nerve Fibers</p> <p>Resting membrane Potential, Action Potential, experimental techniques to study bioelectrical phenomenon (voltage clamp technique, CRO, SD curve, NCV studies)</p> <p>ii) Neuromuscular Junction Structure of skeletal muscle Mechanism of muscle contraction, Excitation Contraction coupling Properties of skeletal muscle EMG details Smooth muscle Pathophysiology of muscle disorders</p>

## TUTORIAL TOPICS

Unit no.	Tutorial Topics
1.	Transport of cell
2.	Erythropoiesis & its regulation
3.	Blood Groups
4.	Resting membrane potential & Action Potential
5.	Coagulation of blood & disorders
6.	Immunity
7.	Molecular basis of muscle contraction
8.	Neuromuscular Transmission

## b) PRACTICAL TOPICS

Unit no.	Practical Topics
1.	<b>Haematology</b> i) Microscope, collection of blood Hemoglobin Total Leukocyte count RBC count DLC BT &CT ii) Blood Group Total platelet count Total reticulocyte count Absolute eosinophil count
2.	<b>Nerve Muscle</b> i) Amphibian graphs Human charts ii) NCV & EMG studies

**B) PAPER II**

**a) THEORY TOPICS**

<b>Unit no.</b>	<b>Theory Topics</b>
1.	<b>Respiratory System</b> i) Introduction, physiological anatomy & Functions of RS Lung volume & capacities Pulmonary function Tests Mechanism of breathing Diffusion ii) Transport of O <sub>2</sub> Transport of CO <sub>2</sub> Neural Regulation iii) Chemical regulation Hypoxia, hyperbaric oxygen Blood gas analysis
2.	<b>Cardiovascular system</b> i) Introduction – functional anatomy, structure of cardiac muscle Properties of cardiac muscle Cardiac impulse ii) ECG, Echocardiography & Vector Cardiography Cardiac cycle Cardiac output CVS regulation Heart Rate iii) Blood Pressure Hemodynamics Coronary circulation flow meters & color Doppler studies Stress test, cardiac catheterization & other invasive procedures

## TUTORIAL TOPICS

Unit no.	Tutorial Topics
1.	Mechanics of breathing
2.	Transport of O <sub>2</sub> & CO <sub>2</sub>
3.	Regulation of respiration
4.	Origin & spread of cardiac impulse
5.	ECG & applied
6.	Cardiac output & regulation
7.	Circulatory shock

### C) PRACTICAL TOPICS:

Practical Topics
<b>Clinical examination</b> i) General Physical Examination Pulse ii) Blood pressure
<b>Human Experiments</b> i) Spirometry, computerized PFT ii) ECG

## D) PAPER - III

### a) THEORY

Unit no.	Theory Topics
1.	<b>Excretory system</b> I) Functional anatomy, Nephron, Functions of kidney Glomerular filtration Tubular Reabsorption and secretion ii) Concentration & dilution of urine Physiology of Micturition, cystometry Regulation of body temperature Artificial kidney, Acid base balance
2.	<b>CNS</b> i) Organization of nervous system Synapse Receptors Reflex ii) Sensory system Motor system Autonomic nervous system Cerebellum iii) Basal ganglia, Thalamus Hypothalamus, limbic system iv) Cerebral cortex, Higher functions Muscle tone, Posture, Equilibrium, vestibular apparatus Methods to study various brain functions (EEG

### TUTORIAL .

Unit no.	Tutorial Topics
1.	Ovarian cycle & applied
2.	Synapse
3.	Reflex action

4.	Descending Tracts & applied	
5.	Ascending Tracts& applied	
6.	Cerebellum	b)
7.	Basal ganglia & applied	c) d)
8.	Transaction & hemisection of spinal cord	e) f)
9.	Mechanism of hearing & functions of middle ear	g) h)

**c) PRACTICAL TOPICS:**

<b>Unit No.</b>	<b>Practical Topics</b>
1	<b>Clinical examination CNS (Practical)</b> i) Sensory system ii) Motor system I &II iii) Higher functions & cranial nerves Visual acuity & color vision iv)Tests for hearing &deafness EEG study
2	<b>vi) Perimetry (Demonstration)</b>

## D) PAPER IV

### a) THEORY TOPICS:

Unit no.	Theory Topics
1.	<b>Endocrine</b> i) Introduction – mechanism of hormone action Pituitary – anterior, posterior, Growth Hormone, ADH, Oxytocin Thyroid Hormones ii) Adrenocortical hormones Adrenal medulla Parathormone, calcitonin, vitamin D Endocrine Pancreas-Insulin Various hormone function tests. <b>Autonomic nervous System.</b> <b>Sports Physiology.</b> <b>Space physiology</b>

### b) PRACTICAL TOPICS:

Unit No.	Practical Topics
1	<b>Charts</b> <b>i) Endocrine photographs</b> Gigantism, Dwarfism, Acromegaly, Grave's disease ii) Myxedema, Cretinism, Cushing syndrome Carpopedal spasm
2	<b>Renal ( Problems and calculations )</b> 1. Calculation:-Clearance creatinine, inulin, PAH 2. Cystometrogram
3	<b>Autonomic function tests.</b>
4	<b>Physical fitness Tests.</b>



a) **THEORY .**

<b>Unit no.</b>	<b>Theory Topics</b>
1.	<p><b>Special Senses</b>            Eye structure, optics            Accommodation, Errors of refraction            Photochemistry of vision, color vision            Visual pathway, retinoscopy, funduscopy, electrophysiology of retina            Functional anatomy of Ear            Mechanism of hearing, audiometry, electrophysiology of cochlea, BAEP studies            Taste, olfaction</p>
2	<p><b>GIT</b>            Introduction – functional organization &amp; innervation            Salivary secretion, Deglutition            Stomach: Structure, Motor function of stomach, Gastric secretion            Liver-functions, bile secretion            Pancreas – Pancreatic juice secretion            Small intestine – movements, function            Large intestine - movements, function defecation            Digestion &amp; absorption of carbohydrates, fats &amp; proteins            Recent techniques to study GI functions &amp; diseases</p>
3	<p><b>Reproduction</b>            Male reproductive system Functional anatomy            Spermatogenesis, Testosterone            Female reproductive system-functional anatomy, menstrual cycle            Estrogen, Progesterone            Pregnancy, Lactation            Contraception, IVF            Neonatal &amp; fetal physiology</p>

**E) SUBJECT SPECIFIC ELECTIVE:**

**ELECTROENCEPHALOGRAM**

**CREDITS: 12**

**Theory Credits: 6 total hours: 90**

**Practical credits 6: total hours: 180**

**Electroencephalogram.** The Emergence of Electrophysiology as an Aid to Neurology

**Theory lectures: total hours: 90**

The Emergence of Electrophysiology as an Aid to Neurology

Electrophysiological Equipment and Electrical Safety

Electroencephalography: General Principles and Clinical Applications

Neonatal and Pediatric Electroencephalography

Electroencephalographic Artifacts and Benign Variants

Video-EEG Monitoring for Epilepsy

Invasive Clinical Neurophysiology in Epilepsy and Movement Disorders

Topographic Mapping, Frequency Analysis, and Other Quantitative Techniques in Electroencephalography.

**EEG. Practical.**

**Demonstrations, Hands on experience 180 hours.**

- 1) EEG machine.
- 2) Electrode placements.
- 3) Recording Procedure
- 4) Measurement of waves.
- 5) Integration of findings.

	<b>Text Books</b>
1	Electro diagnosis in Clinical Neurology – Aminoff 5 <sup>th</sup> Ed-1999
2	Electro diagnosis in Clinical Neurology –Michael J Aminoff5 <sup>th</sup> edition-2005
3	Clinical Neurophysiology Mishra &Kalita1st Ed.1999
4	Peripheral neuropathy - Vol. I Peter J.Dyck ,P.K.Thomas 4 <sup>th</sup> Edition
5	Peripheral neuropathy - Vol. II Peter J.Dyck ,P.K.Thomas 4 <sup>th</sup>

	Edition
6	Clinical Neurophysiology-Mishra J.Kalita2nd Ed.-2008
7	GUYTON & HALL Text Book Ed.12 <sup>th</sup>
8	Grays Anatomy. 39 <sup>th</sup> Edition
9	Orthopedic Physical Assessment -Magce 4 <sup>th</sup> edition-2002
10	Evoked Potentials in clinical Testing Ist EdVol.3-1982
11	Harrison's principles of Internal Medicine 16 <sup>th</sup> Edition.

### **E) ELECTIVE: ELECTROMYOGRAPHY (EMG) AND NERVE CONDUCTION STUDIES (NCV)**

**CREDITS: 12**

**Theory Credits: 6 total hours: 90**

**Practical credits 6: total hours: 180**

#### **-Preamble:**

. Physicians often refer their NCV, EMG cases to other specialists. Common neurological disorders like Polyneuropathy (Diabetic, alcoholic etc.), Guillain-Barre syndrome etc .can be confirmed By NCV/EMG studies. Orthopedic surgeons can confirm their clinical diagnosis of various cases like Entrapment neuropathies, carpal tunnel syndrome, Cervical Spondylosis , radiculopathies, Plexopathies, Axanotemesis etc. by NCV and EMG. Study. Physicians and surgeons who are interested in acquiring the medical and technical skills to perform nerve conduction studies in their practice. Physicians who want to increase their practice revenue by adding a separate reimbursable service, can take advantage of this opportunity. This NCV-EMG course will prepare the physician and surgeons to integrate the technical and business requirements to set up a full nerve conduction studies practice in their primary care office.

#### **OBJECTIVES:**

At the end of course student should be able to:

- 1) Know structure & functions of muscles and nerve.
- 2) Know surface anatomy of various muscles and nerves.
- 3) Know basic principles of nerve conduction and EMG studies.
- 4) To work out EMG & NCV studies of a patient.
- 5) To report the findings independently.

## **COURSE OUTCOMES:**

At the end of the course

- 1) Students should be able to study sensory motor Nerve conduction of patient.
- 2) Students should be able to record needle EMG of given patient.
- 3) Students should be able to report the findings to give electrophysiological diagnosis

## **SYLLABUS/COURSE CONTENT:**

60 didactic lectures.

30 demonstrations

180 hours hands on experience. Practical's

### **a) Theory**

1. History of Clinical Neurophysiology.
2. An Introduction to Electro diagnostic Signals and their Measurements,
3. Electro physiologic Equipment and Electrical Safety
4. Major components of electro diagnostic instrument

Filters, Saturation, Electrodes, Amplifier, Gain and Sensitivity, Analog Filters, Analog-to-Digital Conversion, Digital Circuitry, Advantages of Digital Circuitry, Digital Filters, Display, Stimulators, Electrical Stimulators, Auditory Stimulators, Visual Stimulators, Magnetic Stimulators, factors that reduce signal fidelity

Noise, White Noise, Impulse Noise, Mains Noise, In-band Noise Source, Synchronous Noise, Signal-to-Noise Ratio(SNR)

### **NERVE CONDUCTION STUDY:**

Principles of Nerve Conduction Study, Median Nerve, Ulnar nerve, Radial Nerve, Brachial Plexus, Cervical Radiculopathy, Lumbar Plexus and its terminal Branches, Sacral Plexus and its terminal Branches, Lumbosacral Radiculopathy, Anomalous Innervations of the Extremities, Nerve Conduction of Non limb Nerves.

Quantization, Instrument malfunction, Calibration, Bad Electrodes, Damaged Acoustic Transducers.

Signal - enhancing techniques

Common Mode Rejection Ratio, Grounding, Patient Grounding, Instrument Grounding, Isolation, Interference Reduction, Nonlinear Filtering, Averaging, Reject, Stimulus Rate.

### **SAFETY:**

Electrical and Mechanical Safety, Electromagnetic Interference and Susceptibility, Misuse of Equipment

a) **PRACTICAL :**

Late Responses: H-Reflex and F-Response Studies

**H REFLEX**

Physiology, Technique of Recording H reflexes, Uses Of H-Reflex Studies, Disorders of the Peripheral Nervous System, Disorders of the Central Nervous System

**F RESPONSE**

Physiology, Technique of Recording F Waves, Clinical Application of F Wave studies, Disorders of the Peripheral Nervous System, Disorders of the Central Nervous System

Electromyography

Clinical Electromyography

1 Introduction to Electromyography .2 Technique of Electromyography

Clinical Application of Electromyography and Nerve Conduction

1. Electromyography Findings in Neurological Disorders, 2 Nerve Conduction and EMG Studies in Polyneuropathies

Practical aspects

Procedure: Electrical activity of normal muscle

Myopathies caused by Drugs or Alcohol, EMG Activity at Rest, EMG Findings during Activity, Motor Unit Action Potential, and Motor Unit Recruitment pattern

**EMG ACTIVITY IN PATHOLOGIC STATES**

EMG Activity at Rest, Insertion Activity, Fibrillation Potential, Positive Sharp Waves, Fasciculation Potential, Myotonic Discharges, Complex Repetitive Discharges, EMG Findings During Activity, Motor Unit Action Potential Motor Unit Action Potential, Abnormalities of Recruitment pattern

**EMG FINDINGS IN VARIOUS CLINICAL DISORDERS**

Myopathic Disorders, Muscular Dystrophies and other Familial, Myopathies. Inflammatory Disorders of Muscle, Endocrine and Metabolic Myopathies, Critical illness Myopathy, Congenital Myopathies of Uncertain, Etiology, Myotonic Disorders, Rippling Muscle Disease, Neuropathic Disorders, Spinal Cord Pathology. Root Lesions, Plexus Lesions, Peripheral Nerve Lesions, Disorders of Neuromuscular Transmission, Miscellaneous Disorders

7) Repetitive Nerve Stimulation

8) Quantitate aspects of electromyography.

**F) GENERIC SUBJECT: ANY ONE**

## REFERENCE BOOKS:

	<b>Text Books</b>
1	Electro diagnosis in Clinical Neurology – Aminoff 5 <sup>th</sup> Ed-1999
2	Electro diagnosis in Clinical Neurology –Michael J Aminoff5 <sup>th</sup> edition-2005
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8	Grays Anatomy. 39 <sup>th</sup> Edition
9	Orthopedic Physical Assessment -Magce 4 <sup>th</sup> edition-2002
10	Evoked Potentials in clinical Testing Ist EdVol.3-1982
11	Harrison's principles of Internal Medicine 16 <sup>th</sup> Edition.

Here will be University examination of 200 marks after each term.

Theory ---100 marks.

Practical's -- 100 marks.

Total: 200 marks

Internal assessment examination will be converted to of 20 marks theory and 20 marks practical and will be added in End semester examination.

End semester examination:

Question Paper Pattern:

**Theory:** 80 Marks

Answer all the questions.

- I. Multiple Choice Question (MCQ) =  $20 \times 20 = 20$
  - II. Essay question :  $20 \times 1 = 20$
  - III. Long Answers(Answer 2 out of 3) =  $2 \times 10 = 20$
  - IV. Short Answers (Answers 4 out of 6) =  $4 \times 5 = 20$
- Total = 80 Marks

**PRACTICAL:**

Oral Examination: 30 Marks

Practical Examination 50 Marks

Total Marks: 80.

Total exam marks for end semester are 100 marks theory and 100 marks practical.

**1. Promotion and award of grades**

A student shall be declared PASS and eligible for getting he/she secures at least 50% marks in that particular course including internal assessment.

**2. Carry forward of marks**

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified, then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

**3. Improvement of internal assessment**

A student shall have the opportunity to improve his/her performance only once in the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

Grading of performances:

**Letter grades and grade points allocations:**

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in table I

**Table –I Letter grades and grade points equivalent to Percentage of marks and performances**

<b>Percentage of Marks Obtained</b>	<b>Letter Grade</b>	<b>Grade Point</b>	<b>Performance</b>
90.00 – 100	O	10	Outstanding
80.00 – 89.99	A	9	Excellent
70.00 – 79.99	B	8	Good
60.00 – 69.99	C	7	Fair
50.00 – 59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

**18. The Semester grade point average (SGPA)**

The performance of a student in a semester is indicated by a number called ‘Semester Grade Point Average’ (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester. For example, if a student takes five courses(Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student’s grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students’ SGPA is equal to:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4 + C5G5}{C1 + C2 + C3 + C4 + C5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * ZERO + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

**Cumulative Grade Point Average (CGPA)**

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$CGPA = \frac{C1S1 + C2S2 + C3S3 + C4S4 + C5S5 + C6S6 + C7S7 + C8S8}{C1 + C2 + C3 + C4 + C5 + C6 + C7 + C8}$$

where C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>,... is the total number of credits for semester I,II,III,... and S<sub>1</sub>,S<sub>2</sub>, S<sub>3</sub>,...is the SGPA of semester I,II,III,....

### 19. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with distinction= CGPA of. 7.50 And above

First Class= CGPA of 6.00 to7.49

Second Class= CGPA of 5.00 to5.99

### 20. Award of Ranks

Ranks and Medals shall be awarded on the basis of final CGPA.

### 21. Award of degree

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

#### Final Mark list Of University Examination

Sr. No.	Semester	Internal Assessment		End Semester Examination		Total	
		Theory 20 marks	Practical 20 marks	Theory 80 marks	Practical 80 marks	Theory 100 marks	Practical 100 marks
1	Semester I						
2	Semester II						
3	Semester III						
4	Semester IV						
5	Semester V						
6	Semester VI						

**CBCS FOR Physiology**

**Program: M. Sc Medical**

**Department: KIMS  
CBCS**

**Subject: Physiology**

**Scheme:**

Subject		Sem-I			Sem-II			Sem-III			Sem-IV			Sem-V			Sem-VI			Total		
		T	P	Total	T	P	Total															
<b>Core-I</b>	Hr	45	60	105	45	60	105	30	60	90	30	60	90	30	60	90	45	30	75	<b>225</b>	<b>330</b>	<b>555</b>
	Cr	3	2	5	3	2	5	2	2	4	2	2	4	2	2	4	3	1	4	<b>15</b>	<b>11</b>	<b>26</b>
<b>Core-II</b>	Hr	45	60	105	45	60	105	30	60	90	30	60	90	30	60	90	45	30	75	<b>225</b>	<b>330</b>	<b>555</b>
	Cr	3	2	5	3	2	5	2	2	4	2	2	4	2	2	4	3	1	4	<b>15</b>	<b>11</b>	<b>26</b>
<b>Core-III</b>	Hr	45	60	105	45	60	105	30	60	90	30	60	90	30	60	90	45	30	75	<b>225</b>	<b>330</b>	<b>555</b>
	Cr	3	2	5	3	2	5	2	2	4	2	2	4	2	2	4	3	1	4	<b>15</b>	<b>11</b>	<b>26</b>
<b>Core-IV</b>	Hr	45	60	105	45	60	105	30	60	90	30	60	90	30	60	90	45	30	75	<b>225</b>	<b>330</b>	<b>555</b>
	Cr	3	2	5	3	2	5	2	2	4	2	2	4	2	2	4	3	1	4	<b>15</b>	<b>11</b>	<b>26</b>
<b>Total</b>	<b>Hr</b>	<b>180</b>	<b>240</b>	<b>420</b>	<b>180</b>	<b>240</b>	<b>420</b>	<b>120</b>	<b>240</b>	<b>360</b>	<b>120</b>	<b>240</b>	<b>360</b>	<b>120</b>	<b>240</b>	<b>360</b>	<b>180</b>	<b>120</b>	<b>300</b>	<b>900</b>	<b>1320</b>	<b>2220</b>
	<b>Cr</b>	<b>12</b>	<b>8</b>	<b>20</b>	<b>12</b>	<b>8</b>	<b>20</b>	<b>8</b>	<b>8</b>	<b>16</b>	<b>8</b>	<b>8</b>	<b>16</b>	<b>8</b>	<b>8</b>	<b>16</b>	<b>12</b>	<b>4</b>	<b>16</b>	<b>60</b>	<b>44</b>	<b>104</b>

**CBCS FOR Physiology**

**Program: M. Sc Medical**

**Department: KIMS**

**Subject: Physiology**

**Scheme: CBCS**

Subject		Sem-I			Sem-II			Sem-III			Sem-IV			Sem-V			Sem-VI			Total		
		T	P	Total	T	P	Total															
<b>Elective DSE/AEC</b>	Hr	-	-	-	60	90	150	-	-	-	60	90	150	-	-	-	60	120	180	<b>180</b>	<b>300</b>	<b>480</b>
	Cr	-	-	-	4	3	7	-	-	-	4	3	7	-	-	-	4	4	8	<b>12</b>	<b>10</b>	<b>22</b>
<b>Generic Elective</b>	Hr	30	90	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<b>30</b>	<b>90</b>	<b>120</b>
	Cr	2	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<b>2</b>	<b>3</b>	<b>5</b>
<b>Dissertation</b>	Hr	0	30	30	0	0	0	0	180	180	0	60	60	0	150	150	0	60	60	<b>0</b>	<b>480</b>	<b>480</b>
	Cr	0	1	1	0	0	0	0	6	6	0	2	2	0	5	5	0	2	2	<b>0</b>	<b>16</b>	<b>16</b>
<b>Grand Total</b>	Hr	<b>210</b>	<b>360</b>	<b>570</b>	<b>240</b>	<b>330</b>	<b>570</b>	<b>120</b>	<b>420</b>	<b>540</b>	<b>180</b>	<b>390</b>	<b>570</b>	<b>120</b>	<b>390</b>	<b>510</b>	<b>240</b>	<b>300</b>	<b>540</b>	<b>1110</b>	<b>2190</b>	<b>3300</b>
	Cr	<b>14</b>	<b>12</b>	<b>26</b>	<b>16</b>	<b>11</b>	<b>27</b>	<b>8</b>	<b>14</b>	<b>22</b>	<b>12</b>	<b>13</b>	<b>25</b>	<b>8</b>	<b>13</b>	<b>21</b>	<b>16</b>	<b>10</b>	<b>26</b>	<b>74</b>	<b>73</b>	<b>147</b>

**Generic Elective – Any One**

1. Stress Management 2. Personality Development

**Discipline Specific Elective – Any One**

**Semester II-** 1. EEG 2. EMG and NCV

**Semester IV-** 1. PFT 2. Fitness Test

**Semester VI-** 1. Nutrition 2. Autonomic Function Test