KRISHNA VISHWA VIDYAPEETH, "DEEMED TO BE UNIVERSITY", KARAD.

M. Sc. Medical Physiology
Revised syllabus

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 asresearch 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. A. G. Joshi (Professor & Head of Physiology)
2) Dr. S. N. Patil (Professor of Physiology)
3) Dr. S.S. Jagtap (Professor of Physiology)
4) Dr. S. N. Bamne (Professor of Physiology)
5) Dr. A. R. Gargate (Professor of Physiology)
6) Dr. D. S. Jankar (Associate Professor of Physiology)
7) Dr. J. K. Sahoo (Associate Professor of Physiology)
8) Dr. O.S. Kulkarni (Assistant Professor of Physiology)
9) Dr. J. S. Thorat (Assistant Professor of Physiology)
10) Dr. A. A. Joshi (Assistant 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 & it submission in consultation of respective PG guide.
- Carryout research work.

(M.SC. MEDICAL PHYSIOLOGY) SEMESTER I			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a - Theory			
1) Paper I	(Lectures, Tutorials) General Physiology (I)	45	3
2)Paper II	(Lectures, Tutorials) General Physiology (II)	45	3
3)Paper III	(Lectures, Tutorials) Blood (I)	45	3
4)Paper IV	(Lectures, Tutorials) Blood (II)	45	3
b – Practical			
1)Paper I	General Physiology (I)	60	2
2)Paper II	General Physiology (II)	60	2
3)Paper III	Blood (I)	60	2
4)Paper IV	Blood (II)	60	2
B. Generic Elective (Any One) Stress Management, Health Economics, Biosafety, Good Clinical Practice (GCP)			
Theory		30	2
Practical		90	3
C Dissertation		30	1
	Total	570	26

(M.SC. MEDICAL PHYSIOLOGY) SEMESTER II			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a. Theory			
1) Paper I	(Lectures ,Tutorials) Nerve Muscle (I)	45	3
2)Paper II	(Lectures ,Tutorials) Nerve Muscle (II)	45	3
3)Paper III	(Lectures ,Tutorials) Cardiovascular Physiology (I)	45	3
4)Paper IV	(Lectures ,Tutorials) Cardiovascular Physiology (II)	45	3
b. Practical			
1)Paper I	Nerve Muscle (I)	60	2
2)Paper II	Nerve Muscle (II)	60	2
3)Paper III	Cardiovascular Physiology (I)	60	2
4)Paper IV	Cardiovascular Physiology (II)	60	2
B. Discipline specific elective (Any One) Select any one Physical fitness Test or EMG/NCV			
a - Theory			
1.	Basic principle – Physical Fitness Test treadmill Test Electroencephalogram or EMG, NCV.	60	4
2.	Interpretation- Physical Fitness Test treadmill Test or EMG, NCV.		
b - Practical			
1.	Basics and Recording procedure of Physical Fitness Test treadmill Test Electroencephalogram or EMG, NCV.	90	3
2.	Record analysis Physical Fitness Test treadmill Test Electroencephalogram or EMG, NCV		
	Total	570	27

(M.SC. MEDICAL PHYSIOLOGY) SEMESTER III			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a. Theory			
1) Paper I	(Lectures, Tutorials) Respiratory Physiology (I)	30	2
2) Paper II	(Lectures, Tutorials) Respiratory Physiology (II)	30	2
3) Paper III	(Lectures, Tutorials) Endocrine System (I)	30	2
4) Paper IV	(Lectures, Tutorials) Endocrine System (II)	30	2
b. Practical			
1)Paper I	Respiratory Physiology (I)	60	2
2)Paper II	Respiratory Physiology (II)	60	2
3)Paper III	Endocrine System (I)	60	2
4)Paper IV	Endocrine System (II)	60	2
B. Dissertation	Data collection, Lab. Work.	180	6
	Total	540	22

(M.SC. MEDICAL PHYSIOLOGY) SEMESTER IV			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a. Theory			
1) Paper I	(Lectures, Tutorials) Central Nervous System (I)	30	2
2)Paper II	(Lectures, Tutorials) Central Nervous System (II)	30	2
3)Paper III	(Lectures, Tutorials) Gastrointestinal Physiology (I)	30	2
4)Paper IV	(Lectures, Tutorials) Gastrointestinal Physiology (II)	30	2
b. Practical			
1)Paper I	Central Nervous System (I)	60	2
2)Paper II	Central Nervous System (II)	60	2
3)Paper III	Gastrointestinal Physiology (I)	60	2
4)Paper IV	Gastrointestinal Physiology (II)	60	2
B. Discipline specific elective (ANY ONE) Pulmonary Function Test or EEG or Autonomic Function Test.			
a.- Theory			
	Basic principle and interpretation of Pulmonary Function Test or EEG or Autonomic Function Test.	60	4
b.- Practical			
	Recording procedure and analysis of Pulmonary Function Test or EEG or Autonomic Function Test.	90	3
C. Dissertation	Lab. Work.	60	2
	Total	570	25

(M.SC. MEDICAL PHYSIOLOGY) SEMESTER V			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a. Theory			
1) Paper I	(Lectures, Tutorials) Renal Physiology (I)	30	2
2)Paper II	(Lectures, Tutorials) Renal Physiology (II)	30	2
3)Paper III	(Lectures, Tutorials) Special Senses (I)	30	2
4)Paper IV	(Lectures, Tutorials) Special Senses (II)	30	2
b. Practical			
1)Paper I	Renal Physiology (I)	60	2
2)Paper II	Renal Physiology (II)	60	2
3)Paper III	Special Senses (I)	60	2
4)Paper IV	Special Senses (II)	60	2
B Dissertation	Analysis of data. and Lab. Work.	150	5
	Total	510	21

(M.SC. MEDICAL PHYSIOLOGY) SEMESTER VI			
Sr. Number	**Content**	**No. Hours**	**Credits.**
A. CORE SUBJECT			
a. Theory			
1) Paper I	(Lectures, Tutorials) Reproductive Physiology (I)	45	3
2)Paper II	(Lectures, Tutorials) Reproductive Physiology (II)	45	3
3)Paper III	(Lectures, Tutorials) Physiology in special condition (I)	45	3
4)Paper IV	(Lectures, Tutorials) Physiology in special condition (II)	45	3
b. Practical			
1)Paper I	Reproductive Physiology (I)	30	1
2)Paper II	Reproductive Physiology (II)	30	1
3)Paper III	Physiology in special condition (I)	30	1
4)Paper IV	Physiology in special condition (II)	30	1
B. Discipline specific elective (ANY ONE) Nutrition or Evoked Potentials or reaction time			
a - Theory			
1.	Nutrition in health and disease OR	60	4
2.	Basic principles and interpretation of Evoked Potentials or reaction time		
b.- Practical			
1.	Diet prescribing in heath and diseases. OR	120	4
2.	Methodology of Evoked Potentials or reaction time.		
C. Dissertation	Statistical Analysis .Submission.	60	2
	Total	540	26

Semester I

Theory

Paper I General Physiology I:-

1. Functional Organization of the Human Body and Control of the Internal Environment
2. The cell and its functions
3. Genetic control of protein synthesis, cell function and cell reproduction
4. Transport of substances though cell membranes
5. Basics of research methodology
6. Applied Aspects, Historical aspects and Comparative physiology of general physiology

Paper II General Physiology II:-

1. The body fluid Compartments
2. Intracellular and Extracellular fluid compartments and Edema
3. Resting Membrane Potential
4. Applied Aspects, Historical aspects and Comparative physiology of general physiology
5. Basics of research methodology

Paper III Blood I:-

1. Introduction to blood and plasma proteins
2. Red Blood Cells (Erythrocytes)
3. Erythropoiesis
4. Hemoglobin
5. Anemia and Polycythemia
6. Jaundice
7. Applied Aspects, Historical aspects and Comparative physiology of blood

Paper IV Blood II:-

1. White Blood Cells
2. Immunity and Allergy
3. Platelets
4. Blood Coagulation
5. Blood Group
6. Applied Aspects, Historical aspects and Comparative physiology of blood

Practical

Paper I General Physiology: -

1. Guyton images and Instruments
2. Principles of research methodology

Paper II General Physiology: -

1. Guyton images and Instruments
2. Principles of research methodology

Paper III Blood: -

1. Study of microscope
2. Estimation of HB
3. Determination of RBC
4. Blood indices and Anemia
5. Osmotic fragility
6. Reticulocyte count

Paper IV Blood: -

1. WBC Count
2. Differential Leucocyte Count
3. Platelet Count
4. Bleeding Time, Clotting Time
5. Eosinophil count
6. Blood group

Semester II

Theory

Paper I Nerve Muscle I:-

1. Stimulus and excitability of Nerve
2. Action potential of the nerve
3. Propagation of the nerve impulse
4. Peripheral nerve damage
5. Neuromuscular Transmission
6. Applied Aspects, Historical aspects and Comparative physiology of nerve muscle

Paper II Nerve Muscle II:-

1. Excitation – Contraction Coupling
2. Molecular Basis of Skeletal Muscle Contraction
3. Chemical Changes During Skeletal Muscle Contraction
4. Characteristics of Skeletal Muscle contraction
5. Applied Skeletal Muscle Physiology
6. Applied Aspects, Historical aspects and Comparative physiology of nerve muscle

Paper III Cardiovascular Physiology I:-

1. Organization of the cardiovascular system
2. Properties of cardiac muscle
3. Cardiac Action Potentials
4. Origin and conduction of the cardiac impulse
5. The normal Electrocardiogram
6. Clinical Applications of the Electrocardiogram
7. Cardiac Cycle
8. Cardiac output and venous return
9. Regulation of cardia output
10. Hemodynamics
11. Microcirculation
12. The lymphatic System
13. Applied Aspects, Historical aspects and Comparative physiology of CVS

Paper IV Cardiovascular Physiology II:-

1. Vascular Dispensability of the Venous System
2. Determinants of Arterial Blood Pressure
3. Short – term Regulation of arterial Blood Pressure
4. Long– term Regulation of arterial Blood Pressure
5. Regional Circulation: An Overview
6. Coronary Circular
7. Cerebral Circulation

8. Splanchnic Circulation
9. Fetal and Neonatal Circulation
10. Valvular Heart Disease
11. Cardiac Failure
12. Circulatory Shock
13. Applied Aspects, Historical aspects and Comparative physiology of CVS

Practical

Paper I Nerve Muscle :-

1. Practical - Study of instruments,
2. Demonstrations - Strength Duration curve
3. Demonstrations - Velocity of nerve impulse
4. Demonstrations - Effect of temperature on frog's skeletal muscles
5. Demonstrations - Effect of various strengths stimuli on skeletal muscles
6. Study of chart graphs and Photographs

Paper II Nerve Muscle: -

1. Demonstration -Effect of load on SMC on moving and stationary drum
2. Demonstration -Genesis of tetanus
3. Demonstration -Phenomenon of fatigue
4. Ergography
5. Nerve conduction study
6. Study of chart graphs and Photographs

Paper III Cardiovascular Physiology:-

1. Clinical Examination Pulse
2. ECG, Calculation
3. Clinical Examination of CVS
4. Applied Aspects and Historical aspects and Comparative physiology
5. Study of chart graphs and Photographs

Paper IV Cardiovascular Physiology: -

1. Blood Pressure
2. Effect of various grades of exercise on Pulse & BP
3. Autonomic Function Tests
4. Demonstration- Capillary circulation
5. Demonstration - Finger plethysmography
6. Phonocardiography
7. Applied Aspects and Historical aspects and Comparative physiology
8. Study of chart graphs and Photographs

Semester III

Theory

Paper I Respiratory Physiology I

1. Organization of the respiratory System
2. Mechanics of Breathing
3. Lunge Volumes and Capacities
4. Ventilation
5. Pulmonary Circulation
6. Diffusion of Gases
7. Oxygen Transport
8. Applied Aspects, Historical aspects and Comparative physiology of RS

Paper II Respiratory Physiology II-

1. Carbon Dioxide Transport
2. Chemical Regulation of respiration
3. Neural Regulation of respiration
4. Respiration in Unusual Environments
5. Applied Respiratory Physiology
6. Applied Aspects, Historical aspects and Comparative physiology of RS

Paper III The Endocrine System I

1. Organization of the Endocrine system
2. Hormone – Receptor Interactions
3. Anterior Pituitary Gland and Hypothalamus
4. Posterior Pituitary Gland
5. Thyroid Gland, Thymus & pineal gland
6. Applied Aspects, Historical aspects and Comparative physiology of Endocrine system

Paper IV The Endocrine System II-

1. Calcium homeostasis
2. Adrenal cortex
3. Adrenal medulla
4. Endocrine pancreas & glucose homeostasis
5. Applied Aspects, Historical aspects and Comparative physiology of Endocrine system

Practical

Paper I Respiratory Physiology

1. Clinical Examination of RS
2. Stethography
3. Spirometry
4. Applied Aspects and Historical aspects and Comparative physiology
5. Study of chart graphs and Photographs

Paper II Respiratory Physiology

1. Cardiopulmonary efficiency test
2. Physical fitness test and Trade mill test
3. PEER
4. Computerized PFT
5. Artificial Respiration and Basic Life Support
6. Demonstration - Basal Metabolic Rate
7. Calculations regarding dead space, FEV1
8. Applied Aspects and Historical aspects and Comparative physiology
9. Study of chart graphs and Photographs

Paper III The Endocrine System

1. Interpretation of Thyroid function Test
2. Photographs (Disorders of endocrine glands)
3. Applied Aspects and Historical aspects and Comparative physiology
4. Study of chart graphs

Paper IV The Endocrine System

1. Photographs
2. Discussion
3. Demonstration- Glucose Tolerance Test
4. Applied Aspects and Historical aspects and Comparative physiology
5. Study of chart graphs

Semester IV

Theory

Paper I Central Nervous System I

1. Synapses
2. Sensory Receptors
3. Somatic Sensory Pathways
4. Pain and Temperature
5. Somatosensory Cortex
6. Functions of the Hypothalamus
7. Cerebrospinal Fluid
8. The Limbic System and Behavior
1. Applied Aspects, Historical aspects and Comparative physiology of CNS

Paper II Central Nervous System II-

2. Introduction to the motor system: spinal cord
3. Pyramidal tract
4. Muscle spindle
5. Motor reflexes
6. Regulation of tone & posture
7. Cerebellum
8. Vestibular apparatus
9. Basal ganglia
10. Applied Aspects, Historical aspects and Comparative physiology of CNS

Paper III Gastrointestinal Physiology I

1. Organization of the Gastrointestinal System
2. Salivary Glands and Secretion
3. Gastric Secretions
4. Exocrine Pancreas
5. Functions of the Liver
6. Applied Aspects, Historical aspects and Comparative physiology GIT

Paper IV Gastrointestinal Physiology II-

1. Digestion & absorption of carbohydrates
2. Digestion & absorption of proteins
3. Digestion & absorption of fats
4. Functions of the small & large intestine
5. Gastrointestinal motility
6. Physiology of gastrointestinal diseases
7. Applied Aspects, Historical aspects and Comparative physiology GIT

Practical

Paper I Central Nervous System

1. Clinical Examination of Higher functions
2. Clinical Examination of other Cranial nerves
3. Clinical Examination of sensory System
4. Demonstration - SSEV
5. Applied Aspects and Historical aspects and Comparative physiology
6. Study of chart graphs and Photographs

Paper II Central Nervous System

1. Clinical Examination of Motor I & II
2. Demonstration -EEG Recording & interpretation
3. Applied Aspects and Historical aspects and Comparative physiology
4. Study of chart graphs and Photographs

Paper III Gastrointestinal Physiology

1. Demonstration - Liver function tests,
2. Demonstration - Liver biopsy
3. Clinical examination of Alimentary System
4. Applied Aspects photographs and charts
5. Demonstration - ERCP +PH monitoring

Paper IV Gastrointestinal Physiology

1. Photographs of gastric function and deglutition disorders
2. Demonstration -Upper gastrointestinal investigation
   (Ba swallaw, gastroscopy, colonoscopy, capsule endoscopy, sigmoidoscopy)
3. Demonstration -USG & MRI
4. Applied Aspects photographs and charts

Semester V

Theory

Paper I Renal Physiology I

1. Functional Anatomy of the kidney
2. Urine Formation by the Kidneys: Renal Blood Flow, Glomerular Filtration, and Their Control
3. Tubular Function
4. Concentration and Dilution of Urine
5. Applied Aspects, Historical aspects and Comparative physiology of excretory system

Paper II Renal Physiology II-

1. Control of extracellular fluid osmolarity & sodium concentration
2. Renal regulation of potassium, phosphate & magnesium
3. Acid base regulation
4. Micturition
5. Applied Aspects, Historical aspects and Comparative physiology of excretory system

Paper III Special Senses I

1. Optics of Vision
2. The Retina
3. Visual Pathways and Central Processing
4. Applied Aspects and Historical aspects and Comparative physiology of special senses

Paper IV Special Senses II-

1. Mechanism of hearing
2. Audiometry
3. Smell & taste pathways
4. Applied Aspects, Historical aspects and Comparative physiology of special senses

Practical

Paper I Renal Physiology

1. Calculation of GFR & PAH
2. Renal Function Test I +Calculations (GFR, Blood electrolytes, Creatinine, Urea)
3. Chart and Photographs and applied

Paper II Renal Physiology

1. Demonstration - Acid base imbalance
2. Demonstration -Cystometrogram
3. Demonstration -Renal Function Test II (Urine analysis, tubular function tests, Albumin Urea & Protein Urea)
4. Chart and Photographs and applied

Paper III Special Senses

1. Clinical Examination III, IV, VI
2. Perimetry
3. Colour Vision, Acuity of Vision, fundus scopy
4. Clinical Examination and Visual reflexes
5. Demonstration -Digital Perimetry
6. Demonstration -Visual Evoked Potential, Visual Reaction time
7. Chart and Photographs and applied

Paper IV Special Senses

1. Clinical Examination Smell and Taste
2. Demonstration -Auditory Evoked Potential, Auditory Reaction time
3. Chart and Photographs and applied

Semester VI

Theory

Paper I Reproductive Physiology I

1. Physiological Anatomy of the Male Sexual Organs and Spermatogenesis
2. Testosterone and Other male sex hormones

Paper II Reproductive Physiology II-

1 Female Physiology before pregnancy & female hormone
2 The sexual act & fertilization
3 Physiology of pregnancy
4 Parturition & lactation
5 Applied Aspects and Historical aspects & comparative physiology of reproductive system

Paper III Physiology in special Condition I

1. Infant
2. Aging
3. Yoga
4. Body Temperature regulation
5. Physiology of stress
6. Components of energy expenditure.
7. Attitude ethics and communication (AETCOM)
8. Principles of Medical Education

Paper IV Physiology in special Condition II-

1. Sports Physiology
2. Space Physiology
3. Physiology of starvation & obesity
4. Physiology of physical activity & inactivity
5. Attitude ethics and communication (AETCOM)
6. Principles of Medical Education

Practical

Paper I Reproductive Physiology

1. Demonstration - Semen Analysis
2. Demonstration - Investigation in infertility
3. Applied aspects Graphs, Charts, Photographs

Paper II Reproductive Physiology

1. Demonstration - Determination of ovulation time
2. Pregnancy Test
3. Applied aspects Graphs, Charts, Photographs

Paper III Physiology in special Condition

1. Measurement of TPR Chart
2. Physical fitness Tests
3. Applied Aspects and Historical aspects and Comparative physiology
4. Demonstration and training for AETCOM during patient examination
5. Use of principles of Medical Education Technology in Teaching Learning and Evaluation of student

Paper IV Physiology in special Condition

1. Demonstration and training for AETCOM during patient examination
2. Use of principles of Medical Education Technology in Teaching Learning and Evaluation of student

D) 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 Electro encephalography.

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.

	Text Books

1	Electro diagnosis in Clinical Neurology – Aminoff 5th Ed-1999
2	Electro diagnosis in Clinical Neurology –Michael J Aminoff5th edition-2005
3	Clinical Neurophysiology Mishra &KalitaIst Ed.1999
4	Peripheral neuropathy - Vol. I Peter J.Dyck ,P.K.Thomas 4th Edition
5	Peripheral neuropathy - Vol. II Peter J.Dyck ,P.K.Thomas 4th Edition
6	Clinical Neurophysiology-Mishra J.Kalita2nd Ed.-2008
7	GUYTON & HALL Text Book Ed.12th
8	Grays Anatomy. 39th Edition
9	Orthopedic Physical Assessment -Magce 4th edition-2002
10	Evoked Potentials in clinical Testing Ist EdVol.3-1982
11	Harrison's principles of Internal Medicine 16th Edition.

E) ELECTIVE: ELECTROMYOGRAPHY (EMG) AND NERVE CONDUCTIONSTUDIES (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 able to study sensory motor Nerve conduction of patient.
2) Students should able to record needle EMG of given patient.
3) Students should 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-DigitalConversion, 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, SacralPlexus 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 thePeripheral 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 Studiesin Polyneuropathies
Practical aspects
Procedure: Electrical activity of normal muscle
Myopathies caused by Drugs or Alcohol, EMG Activity at Rest, EMG Findings duringActivity, 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.

REFERENCE BOOKS:

	Text Books
1	Electro diagnosis in Clinical Neurology – Aminoff 5th Ed-1999
2	Electro diagnosis in Clinical Neurology –Michael J Aminoff5th edition-2005
3	Clinical Neurophysiology Mishra &Kalita Ist Ed.1999
4	Peripheral neuropathy - Vol. I Peter J.Dyck ,P.K.Thomas 4th Edition
5	Peripheral neuropathy - Vol. II Peter J.Dyck ,P.K.Thomas 4th Edition
6	Clinical Neurophysiology-Mishra J.Kalita2nd Ed.-2008
7	GUYTON & HALL Text Book Ed.12th
8	Grays Anatomy. 39th Edition
9	Orthopedic Physical Assessment -Magce 4th edition-2002
10	Evoked Potentials in clinical Testing Ist EdVol.3-1982
11	Harrison's principles of Internal Medicine 16th Edition.

PHYSICAL FITNESS TEST **CREDITS: -12**

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

Practical credits 6 **total hours: 180**

Physical Fitness Test :- The Emergence of Electrophysiology as an Aid to Neurology

Theory lectures: total hours: 90

Physical Fitness Test assesses individuals physical capacity like muscular strength cardio vascular endurance flexibility etc.

This elective includes actual methodology, various precautions taken while conducting the test and interpretation.

It also includes recent advances and newer techniques for analysis and diagnosis of cardio respiratory disorders.

	Text Books
1	Electro diagnosis in Clinical Neurology – Aminoff 5th Ed-1999
2	Electro diagnosis in Clinical Neurology –Michael J Aminoff5th edition-2005
3	Clinical Neurophysiology Mishra &KalitaIst Ed.1999
4	Peripheral neuropathy - Vol. I Peter J.Dyck ,P.K.Thomas 4th Edition
5	Peripheral neuropathy - Vol. II Peter J.Dyck ,P.K.Thomas 4th Edition
6	Clinical Neurophysiology-Mishra J.Kalita2nd Ed.-2008
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8	Grays Anatomy. 39th Edition
9	Orthopedic Physical Assessment -Magce 4th edition-2002
10	Evoked Potentials in clinical Testing Ist EdVol.3-1982
11	Harrison's principles of Internal Medicine 16th Edition.

AUTONOMIC FUNCTION TEST **CREDITS: -12**

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

Practical credits 6 **total hours: 180**

Autonomic Function Test :- The Emergence of Electrophysiology as an Aid to Neurology

Theory lectures: total hours: 90

AFT is used commonly as one of the important investigation for patients with autonomic dysfunction. It evaluates sympathetic and parasympathetic nervous system including heart rate blood pressure and other vital functions.

This elective includes actual methodology, various precautions taken while conducting the test and interpretation. It includes deep breathing test, Valsalva maneuver, test of sweat gland function etc.

It also includes recent advances and newer techniques for analysis and diagnosis of respiratory disorders.

	Text Books
1	Autonomic Failure: A test book of clinical disorders of the autonomic nervous system
2	Primer on the Autonomic nervous system- Robertson, Low, Polansky
3	Autonomic Function Testing – Peter Novak
4	Handbook of Autonomic Nervous System, Dysfunction
5	Autonomic Function Testing- Brandly RF

PULMONARY FUNCTION TEST **CREDITS: -12**

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

Practical credits 6 **total hours: 180**

Autonomic Function Test :- The Emergence of Electrophysiology as an Aid to Neurology

Theory lectures: total hours: 90

PFT is used commonly as one of the important investigation for patients having respiratory diseases this helps in differentiating obstructive from restrictive disorder.

This elective includes actual methodology, various precautions taken while conducting the test and interpretation.

It also includes recent advances and newer techniques for analysis and diagnosis of respiratory disorders.

	Text Books
1	Pulmonary Function Testing: Practical Approach
2	API Text book of Medicine – 12th edition
3	Golwalla's Medicine for students - 26th edition

EVOKED POTENTIAL **CREDITS: -12**

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

Practical credits 6 **total hours: 180**

Evoked Potential :- The Emergence of Electrophysiology as an Aid to Neurology

Theory lectures: total hours: 90

Evoked Potential Test measures electrical activity in the brain and spinal cord in response to sensory stimuli. It assess function of sensory pathways and diagnose various neurological conditions. It includes visual auditory, somatosensory evoked potentials.

This elective includes actual methodology, various precautions taken while conducting the test and interpretation.

It also includes recent advances and newer techniques for analysis and diagnosis of neurological disorders.

Text Books

Clinical Neurophysiology-Mishra J.Kalita2nd Ed.-2008
GUYTON & HALL Text Book Ed.12th
Evoked Potentials in clinical Testing Ist EdVol.3-1982
Harrison's principles of Internal Medicine 16th Edition.

REACTION TIME **CREDITS: -12**

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

Practical credits 6 **total hours: 180**

Reaction Time :- The Emergence of Electrophysiology as an Aid to Neurology

Theory lectures: total hours: 90

Visual and Auditory reaction time test measures persons response to visual and auditory stimuli. This test assess individual attention, concentration and processing speed.

This elective includes actual methodology, various precautions taken while conducting the test and interpretation.

It also includes recent advances and newer techniques for analysis and diagnosis of neurological disorders.

Text Books

1	Clinical Neurophysiology-Mishra J.Kalita2nd Ed.-2008
2	GUYTON & HALL Text Book Ed.12th
3	Evoked Potentials in clinical Testing Ist EdVol.3-1982
4	Harrison's principles of Internal Medicine 16th Edition.

EVOKED POTENTIAL **CREDITS: -12**

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

Practical credits 6 **total hours: 180**

Evoked Potential :- The Emergence of Electrophysiology as an Aid to Neurology

Theory lectures: total hours: 90

Evoked Potential Test measures electrical activity in the brain and spinal cord in response to sensory stimuli. It assess function of sensory pathways and diagnose various neurological conditions. It includes visual auditory, somatosensory evoked potentials.

This elective includes actual methodology, various precautions taken while conducting the test and interpretation.

It also includes recent advances and newer techniques for analysis and diagnosis of neurological disorders.

Text Books

Clinical Neurophysiology-Mishra J.Kalita2nd Ed.-2008
GUYTON & HALL Text Book Ed.12th
Evoked Potentials in clinical Testing Ist EdVol.3-1982
Harrison's principles of Internal Medicine 16th Edition.

NUTRITION

CREDITS: -12

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

Practical credits 6 **total hours: 180**

Reaction Time: - The Emergence of Electrophysiology as an Aid to Neurology

Theory lectures: total hours: 90

This elective includes knowledge about the science of food and how it impacts the body.
It covers topics like macro-nutrients, micro nutrients, dietary need at different age groups and life styles.
It also includes recent advances and newer techniques in this field.

Text Books

1	Endocrinology & Metabolism- J.L.H.O.' Riordan. Ist Ed.-1982
2	GUYTON & HALL Text Book Ed.12th
3	Textbook of Medical physiology-Ganong 22nd edition 2005
4	Metabolic & Endocrine physiology- Tapperman Ist Ed-1962.
5	Gastroenterology- Livingstone Ist Ed -1983

E) GENERIC SUBJECT: ANY ONE

There will be University examination of 800 marks after each term.Theory - 400 marks. Practical- 400 Marks

Total: 800 marks

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

End semester examination:

Question Paper Pattern:

Theory: 80 Marks (For Each Paper)

I. Multiple Choice Question (MCQ) = 20 X 20 = 20
II. Essay question : 20 x1 =20
III. Long Answers(Answer 2 out of 3) = 2 X 10 = 20
IV. Short Answers (Answers 4 out of 6) = 4 x 5 = 20Total = 80 Marks

PRACTICAL: (For each Paper)

Oral Examination:

30 Marks Practical

Examination 50

MarksTotal

Marks: 80.

Total exam marks for end semester are 100 marks theory and 100 marks practical for each paper

1. **Promotion and award of grades**

A student shall be declared PASS and eligible for getting he/she secures at least 50% marks inthat 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

Percentage of Marks Obtained	Letter Grade	Grade Point	Performance
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 allthe 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:

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

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_1, C_2, C_3,.... is the total number of credits for semester I,II,III,…. and S_1,S_2, S_3,....is theSGPA 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 aboveFirst 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 degreeduring 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** **Subject: Physiology Scheme:CBCS**

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

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

Generic Elective – Any One

1. Stress Management 2. Personality Development 3. Health Economic, Biosafety, Good Clinical Practices

Discipline Specific Elective – Any One

Semester II- 1. Physical Fitness Test or EMG and NCV

Semester IV- 1. Pulmonary Function Test or EEG or Autonomic Function Test.

Semester VI- 1. Nutrition or Evoked Potentials or Reaction Time