ALLIED HEALTH SCIENCES
B.Sc. Neuro Electrophysiology
Curriculum and Syllabus
(2018-19)

COURSE OVERVIEW

Course Description: The three year B.Sc. Neuro Electrophysiology course will empower the candidate to carry out and interpret the various neurophysiological tests. Neurophysiological testing is an important component and an extension to the clinical evaluation in the diagnosis and management of neurological disorders in children and adults. This includes electroencephalography (EEG), nerve conduction studies (NCV), evoked potentials, autonomic function tests, transcranial magnetic stimulation, intraoperative monitoring, and polysomnography.

Subjects to be covered (and hours of instruction)

	FIRST YEAR	**SECOND YEAR**	**THIRD YEAR**
University Exam Subjects	**Anatomy** (250) **Physiology** (150) **Biochemistry** (50)	**Electroencephalography** including Lab Work (800) **Electronics** (50) **Evoked Potentials** including Lab Work (200) **Clinical Neurology** including ward and OPD exposure (300) [Introduction to Neurology, Neuropathology, Neuropharmacology, Microbiology (including sterilization)]	**Nerve Conduction Studies and Electromyography** including Lab Work (800) **Polysomnography, Transcranial magnetic stimulation, autonomic lab, intraoperative monitoring** (400) **Application of Clinical Neurophysiology and their assessment** (200)
Internal Assessment alone	**Computers** (25) **Basic Nursing and First Aid** (25) **English** (25) **Medical Terminology** (25)	**Biostatistics** (30)	

	Introduction to the Lab (800)		

First Year

ANATOMY

1. GENERAL ANATOMY

a. Introduction to anatomy, descriptive terms, anatomical planes, types of tissues
b. Introduction to bones
c. Introduction to joints
d. Introduction to muscular system
e. Introduction to cardiovascular system
f. Introduction to nervous system

2. REGIONAL ANATOMY

a. Upper extremity

i. Osteology: clavicle, scapula and humerus
ii. Pectoral region, axilla and back
iii. Shoulder region, axilla including brachial plexus
iv. Shoulder joint
v. Front of arm
vi. Back of arm
vii. Osteology: Radius, ulna, articulated hand
viii. Front of forearm
ix. Palm
x. Back of forearm
xi. Dorsum of hand
xii. Elbow joint, radioulnar joints
xiii. Wrist joint, joints of hand
xiv. Nerve injuries, types of grip and dermatomes of upper limb

b. Lower extremity

i. Osteology: hip bone, femur, patella
ii. Front of thigh
iii. Medial side of thigh
iv. Gluteal region
v. Back of thigh, popliteal fossa
vi. Hip joint
vii. Osteology: tibia, fibula, articulated foot
viii. Front of leg, dorsum of foot
ix. Back of leg
x. Sole of foot
xi. Knee joint
xii. Ankle joint and joints of foot

c. Thorax

i. Introduction to thorax, bony thorax, dorsal vertebrae, intercostal spaces
ii. Joints of thorax and movements
iii. Mediastinum: definition, boundaries, subdivisions and contents
iv. Pleura, lungs
v. Heart: external and internal features, blood and nerve supply
vi. Arch of aorta, superior vena cava, brachiocephalic vein, trachea and thymus
vii. Oesophagus, descending aorta, sympathetic trunk, azygos system

d. Abdomen, pelvis and perineum

i. Osteology: hip bone, lumbar vertebrae, sacrum
ii. Anterior abdominal wall, inguinal canal, male external genitalia
iii. Muscles of posterior abdominal wall, peritoneal cavity
iv. Stomach and spleen
v. Duodenum and pancreas
vi. Liver and extrahepatic biliary apparatus
vii. Small and large intestines, portal vein
viii. Kidneys and suprarenal glands
ix. Aorta, inferior vena cava, lumbar plexus
x. Diaphragm
xi. Bony pelvis, joints and walls of pelvis
xii. Rectum and anal canal
xiii. Male pelvis: urinary bladder, prostate, seminal vesicles
xiv. Female pelvis: vessels and nerves of pelvis, uterus, Fallopian tubes, ovary
xv. Perineum

e. Head and neck

i. Osteology: external features of skull, cervical vertebrae
ii. Face and scalp
iii. Posterior triangle
iv. Main vessels of head and neck
v. Main nerves of head and neck
vi. Parotid region and infratemporal fossa
vii. Cranium and meninges
viii. Cranial nerves
ix. Orbit and eye
x. Ear
xi. Mouth and pharynx
xii. Palate, nose, larynx

f. Neuroanatomy

i. Spinal cord: gross anatomy
ii. Spinal cord: tracts
iii. Brainstem
iv. Cerebellum
v. Cerebral hemispheres
vi. Diencephalon
vii. Basal ganglia

viii. Cranial nerve nuclei
ix. Ventricles of brain, CSF circulation
x. Internal capsule, commissures of brain and visual pathway
xi. Autonomic nervous system
xii. Limbic system

PHYSIOLOGY

1. Cell
   a. Basic concepts of cell structure, components, functions and transport
2. Skin
   a. Structure, functions, temperature regulation
3. Blood
   a. Composition and function of blood
   b. Red blood cells: morphology, formation, normal counts, functions
   c. White blood cells: morphology, formation, normal counts, functions
   d. Platelets: morphology, formation, normal counts, functions
   e. Hemoglobin: basic chemistry, function and fate of hemoglobin
   f. Blood clotting: definition, clotting factors, theories of clotting
   g. Blood group: ABO system, Rh system
   h. Blood volume and regulation
   i. Blood transfusion
4. Cardiovascular
   a. Structure and properties of cardiac muscle
   b. Cardiac cycle, conductive system, ECG
   c. Heart sounds
   d. Heart rate and regulation
   e. Cardiac output and regulation
   f. Blood pressure and regulation
   g. Regional circulation: cerebral, coronary, pulmonary, renal
   h. Effect of exercise on cardiovascular system
5. Respiration
   a. Structure and functions of respiratory system
   b. Mechanics of respiration: muscles, lungs and chest wall compliance, V/Q ratio, surfactant
   c. Transport of gases: O_2 and CO_2
   d. Nervous and chemical regulation of respiration
   e. Hypoxia, cyanosis, and dyspnea
   f. Acid base balance
   g. Principles of lung function tests
   h. Artificial respiration
   i. Effect of exercise on respiratory system
   j. Defense mechanisms
6. Digestion
   a. Structure and function of gastrointestinal system
   b. Mastication and deglutition
   c. Saliva: composition, function, regulation

d. Gastric secretion: composition, phases of secretion, function
e. Pancreatic secretion: composition, function, regulation
f. Bile: composition and function
g. Movements of small and large intestine
h. Digestion in mouth, stomach, intestine
i. Defecation

7. Excretion
   a. Structure and function of kidney
   b. Structure and function of nephron
   c. Formation of urine: filtration, reabsorption, secretion
   d. Micturition
8. Endocrine
   a. General organization of endocrine glands
   b. General metabolism: carbohydrate, fat, protein
   c. Physiological actions, regulation and disorder of hormones: adrenal, pancreatic, parathyroid, thyroid
9. Reproduction
   a. Male reproductive system
   b. Female reproductive system
   c. Pregnancy, function of placenta, parturition, lactation, contraception
   d. Puberty and menopause
   e. Spermatogenesis and oogenesis
   f. Menstrual cycle
10. Nervous system
    a. General organization of nervous system
    b. Structure, type and function of neuron
    c. Properties of neurons
    d. Synapse and synaptic transmission
    e. Neurotransmitters
    f. Reflex: properties and types
    g. Sensory: receptors, sensory pathway, pain pathway, referred pain, modulation of pain
    h. Motor: basal ganglia, cerebellum, cortex – functions and effects of lesions
    i. Ascending and descending pathways
    j. Posture and equilibrium
    k. Muscle tone
    l. Autonomic nervous system: organization and functions of sympathetic and parasympathetic nervous systems
    m. Cerebrospinal fluid: composition, formation, circulation and function
    n. Lower motor neuron and upper motor neuron lesion
11. Special senses
    a. Vision: rods and cones, retina and its function, visual pathway
    b. Hearing: organ of Corti, auditory pathway
    c. Olfaction
    d. Taste: taste buds
12. Muscle
    a. Structure of muscle: macroscopic and microscopic
    b. Properties of skeletal muscle
    c. Cardiac and smooth muscle
    d. Chemical processes involved in muscle contraction

e. Motor unit and electromyography
f. Effect of exercise of muscular system, exercise metabolism, O_2 debt, respiratory quotient

BIOCHEMISTRY

1. Enzymes
   a) Definition – Nomenclature – Classification – Factors affecting enzyme activity – Active site – Coenzyme
   b) Enzyme Inhibition – Units of enzyme – Isoenzymes – Enzyme pattern in diseases
2. Carbohydrates
   a) Overview of glucose metabolism
   b) Overview of glycogen metabolism, diabetes mellitus- clinical features, investigations
3. Proteins
   a) Classification of proteins and functions
4. Lipids
   a) Classification of lipids and functions
5. Vitamins
   a) Fat soluble vitamins (A,D,E,K)
   b) Water soluble vitamins – B-complex vitamins, vitamin C
6. Minerals
   a) Major elements Calcium, Phosphorus,
   b) Trace elements, Magnesium, Sodium, Potassium, Chlorine and sulphur
7. Nutrition
   a) Calorific value of foods – Basal metabolic rate(BMR) – respiratory quotient(RQ) Specific dynamic action (SDA) – Balanced diet
   b) Marasmus – Kwashiorkar, obesity, diet in DM, CVD, Kidney disease
8. Acids and bases
   a) Definition, pH, Henderson – Hasselbalch equation, Buffers, Indicators, Normality, Molarity, Molality
   b) Acid base balance in the body
9. Body fluids, hormones
   a) Chemistry of the body fluids in health and diseases (Urine- normal and abnormal, blood/serum, CSF)
   b) Hormones,
   c) Clotting mechanisms of the blood

COMPUTERS

Introduction to computers – Key board usage
Hardware:

A) Knowledge of the following terminology -Micro processor(CPU), Memory, Monitor, Keyboard ,Storage device, hard discs, printers, Microcomputers.
B) Switching on and switching off the computer and printer
C) Accessory Management: Explorer and Outlook Express.
D) Printers, Modem, CD.
E) Simple trouble shooting.
F) Simple Preventive Maintenance techniques (dust, Mouse pad maintenance, gentle use of keys)

Software :

Operating Systems: E.g. Windows, Linux, DOS. The student should know how to use any one.
Word processing Software: E.g. MS Word, Star Office, Word Perfect .The student should be able to use any one
Spread sheet software: E.g. MS Excel, Star Office, Lotus. The student should be able to use anyone
Application Software: Power Point, Graphics
Browser/ Mail: Netscape Communication, Internet.
Internet: searching Medline and related research –Key terms, Privacy issues and ethics.

BASIC NURSING AND FIRST AID

1. Introduction to Nursing, patient positioning and safety
2. Bandaging including practical work
3. Lifting and transporting patients
4. Providing for patients elimination
5. Methods of giving nourishment
6. Surgical dressing (aseptic technique) including demonstration
7. Parenteral administration of medicine
8. Vital signs including practical work
9. First aid for Burns and Scalds, degrees of burns
10. Poisoning: Irritants, acids, alkali, narcotics
11. Trauma due to foreign body: eye ear, nose, throat, stomach and lung
12. Bites: insects, dog and snake
13. Skeletal injuries
14. Respiratory emergencies: Ventilators, monitors including demonstration
15. Transportation of the injured
16. Community emergencies
17. Community resources
18. Cardio pulmonary resuscitation (practical)

ENGLISH

Communication:

i) Role of communication
ii) Defining Communication
iii) Classification of communication
iv) Purpose of communication
v) Major difficulties in communication
vi) Barriers to communication
vii) Characteristics of successful communication – The seven Cs
viii) Communication at the work place
ix) Human needs and communication “Mind mapping”
x) Information communication

Comprehension passage:

i) Reading purposefully
ii) Understanding what is read
iii) Drawing conclusion
iv) Finding and analysis

Explaining:

i) How to explain clearly
ii) Defining and giving reasons
iii) Explaining differences
iv) Explaining procedures
v) Giving directions

Writing business letters:

i) How to construct correctly
ii) Formal language
iii) Address
iv) Salutation
v) Body
vi) Conclusion

Report writing:

i) Reporting an accident
ii) Reporting what happened at a session
iii) Reporting what happened at a meeting

MEDICAL TERMINOLOGY

Introduction to Medical Terminology

1. Definition and Origin of Medical Terms.
2. Components of Medical Terms
3. Prefixes
4. Suffixes
5. Roots and Combining forms
6. External Anatomy and Internal Anatomy
7. Additional Lists and their combining forms grouped as:
    - Verbs
    - Adjectives
    - Body Fluids
    - Body Substances

- Chemicals
- Colours
- Phobias

The Nervous System
(A). Neurological Disorders
1. Pathologic conditions
2. Hereditary Congenital and Developmental Disorders
3. Circulatory Disturbances
4. Other Organic Abnormalities
5. Oncology
6. Diagnostic Terms
7. Surgical and other Procedures
8. Laboratory Tests and Procedures
(B). Psychiatric Disorders
1. Psychiatric Disorders
2. Other Descriptive and Diagnostic Terms
3. Various Tests
4. Treatment Methods for Psychiatric Conditions

The Sensory Organs
(A). Sense of Vision
1. Pathologic conditions
2. Hereditary, Congenital and Developmental Disorders
3. Diagnostic Terms
4. Operative terms
5. Oncology
6. Vision Tests and Procedures
(B). Sense of Hearing
1. Pathologic condition
2. Hereditary, Congenital and Developmental Disorders
3. Oncology
4. Surgical Procedures
5. Hearing Tests.
(C). Sense of Smell
1. Pathologic and Other terms
2. Laboratory Tests
(D). Sense of Taste
1. Pathologic and Other terms
(E). Touch and Other Cutaneous Senses
1. Terms referring to these senses

INTRODUCTION TO LABORATORY

Introduction to Laboratory
Orientation to Lab
1. Glossary of terms

2. Lab etiquette
3. Reception area
4. Requisition slips
5. Lab procedures overview
6. Electroencephalography laboratory
7. Electroneuromyography laboratory
8. Evoked potentials laboratory
9. Transcranial magnetic stimulation laboratory
10. Autonomic functions tests laboratory
11. Observing procedures

Orientation to Hospital

1. Wards – Neurology, General Medicine and Pediatrics
2. Outpatient Department, including Epilepsy Clinic, Neuromuscular Clinic
3. Accident and Emergency (Casualty)
4. Intensive Care Units – Neurology, Medicine and Pediatrics
5. Central Sterile Supply Department

Second Year

ELECTROENCEPHALOGRAPHY (EEG)

1. Historical aspects of EEG
2. Neurophysiologic basis of EEG and DC potentials
3. Analog signal recording principles
4. Digital EEG
5. Polarity and field determination – electrode placement, montages, ten-twenty system
6. Normal EEG and sleep in preterm and term neonates
7. Normal and sleep from infancy to adolescents
8. Normal EEG and sleep in adults and elderly
9. Activation methods
10. Artefacts of recording
11. Epileptiform and non-epileptiform paroxysmal EEG abnormalities
12. Clinical EEG in seizures and epilepsies in the preterm and term neonate
13. Clinical EEG in seizures and epilepsy in infants to adolescents
14. Clinical EEG in epilepsy in adults and the elderly
15. EEG in status epilepticus and nonconconvulsive status epilepticus
16. Special techniques in recording – depth electrodes, intracranial monitoring, electrocorticography
17. Techniques for Long term EEG recording – video EEG, ambulatory EEG, ICU recordings
18. Polysomnography
19. Magnetoencephalography
20. EEG in brain tumors and strokes
21. EEG in Central nervous system infections and infestations
22. EEG in dementia and degenerative diseases
23. EEG in metabolic disorders
24. EEG in coma and brain death
25. EEG in psychiatric diseases
26. Role of EEG in presurgical evaluation of epilepsy

ELECTRONICS

I Basic Electronics

Conductors, Insulators, Semiconductors, Energy band diagram of semiconductors, Ohm's Law, Kirchhoff's voltage and current law, Resistors, Capacitors, Inductors, Resistors in serial and parallel combination, transformer.

P-N junction diode, forward and reverse bias characteristics, PNP and NPN transistors, Half wave rectifier, Full wave rectifier, filters, voltage regulator.

II Neurology Equipments

Bio potentials electrodes, Transducers, Differential amplifiers, Filters (Hi-pass, low-pass, band-pass), Analog to digital convertor, recording devices – CRO, PMMC. Computers in neurology equipments, calibration.
EEG machine – Block diagram
EMG machine – Block diagram

III Overview of all Medical Electronic Equipment

1. Types of medical equipment – Diagnostic, Therapeutic, Analytical
2. Hazards and safety measures in medical equipments
3. Classification of equipment based on electrical safety
4. International standards and certification of medical equipment
5. Various symbols, color coding, controls and their meaning pertaining to medical equipment
6. Dos and don'ts for users of medical equipment.
7. Calibration - for different medical equipment and their importance

REFERENCE:

1. Bio medical Instrumentation and measurements - Leslie Corniwell, Fred J Weibell, Erich A Pfeiffer
2. Medical Devices – use and safety – Bertil Jacobson and Alan Murray
3. Biomedical Instrumentation – Dr. M. Arumugam
4. Hand book of Biomedical Instrumentation –R.S. Khadpur

EVOKED POTENTIALS

1. Event-related potentials (ERP): general aspects and quantification
2. Visual evoked potential (VEP)
    a. Anatomical basis of VEP
    b. Method of recording VEP
    c. Normal VEP and waveforms
    d. Variables influencing VEP
    e. Clinical applications of VEP
3. Brainstem auditory evoked potentials (BAEP)
    a. Anatomical basis of BAEP
    b. Method of recording BAEP
    c. Variables influencing BAEP
    d. Normal BAEP, potential field distribution, waveforms
    e. Clinical applications of BAEP
4. Somatosensory evoked potentials (SEP)
    a. Anatomical basis of SEP
    b. Stimulation and recording procedures
    c. Median somatosensory evoked potential
    d. Tibial somatosensory evoked potential
    e. Clinical applications of SEP

CLINICAL NEUROLOGY

1. Introduction to Neurology
   - i) Neurological diseases – a basic approach
   - ii) Clinical examination basics
   - iii) Episodic impairment of consciousness
   - iv) Delirium and altered sensorium
   - v) Stupor and Coma
   - vi) Memory Impairment
   - vii) Child with developmental delay
   - viii) Behavioral disorders
   - ix) Apraxia, agnosia and aphasia
   - x) Disorders of vision
   - xi) Hearing impairment and vertigo
   - xii) Cranial and facial pain
   - xiii) Brainstem syndromes
   - xiv) Ataxic disorders
   - xv) Movement disorders
   - xvi) Gait disorders
   - xvii) Hemiplegia and monoplegia
   - xviii) Paraplegia
   - xix) Proximal and distal weakness
   - xx) Floppy infant
   - xxi) Sensory abnormalities of face, trunk and limbs
   - xxii) Neurological causes of bladder, bowel and sexual dysfunction
   - xxiii) The Epilepsies
2. Neuropathology
   - i) General pathology
   - ii) Disorders of muscle
   - iii) Disorders of nerve
   - iv) Disorders of brain
3. Neuropharmacology
   - i) General pharmacology: definitions, routes of drug administration, pharmacokinetics, pharmacodynamics
   - ii) Drugs acting on the autonomic nervous system
   - iii) General and local anesthetics, skeletal muscle relaxants
   - iv) Sedative hypnotics, ethyl alcohol
   - v) Antiepileptic drugs
   - vi) Antiparkinsonian drugs
   - vii) Drugs used in mental illness
   - viii) CNS stimulants and cerebroactive drugs
   - ix) Drugs affecting coagulation, bleeding and thrombosis
   - x) Antiseptics, disinfectants
4. Microbiology (including sterilization)
   - i) Morphology and physiology of bacteria
   - ii) Sterilization and disinfection
   - iii) Infection and immunity
   - iv) Important bacteria, viruses, and parasites

v) Normal microbial flora of body, bacteriology of water and air, hospital infection

BIOSTATISTICS

- Introduction: Concepts, Types, significance, and scope of statistics, Meaning data, sample, parameter, type and level of data and their measurement organization and presentation of data – Tabulation of data, Frequency distribution Graphical and tabular presentation.
- Measures of central tendency: Mean, Median, Mode
- Measures of variability: Range, Percentiles, Average deviation, Quartile deviation, Standard deviation.
- Normal distribution: Probability, characteristics and application of normal probability curve, sampling error.
- Measures of relationship: Correlation- need and meaning rank order correlation, Scatter diagram method, Product moment correlation, simple linear regression analysis and prediction.
- Significance of statistic and significance between two statics (Testing hypothesis)
- Non-parametric test- chi-sqaure test, sign, median test, Mann Whitney test.
- Parametric test -'t' test, ANOVA, MANOVA, ANCOVA and reliability tests

Research Methodology

1. Stages of research process
2. Developing ideas and defining a research question
3. Literature review
4. Errors in measurement and their control,
5. Reliability and validity
6. Epidemiological measures of disease frequency
7. Research design:
    - I. Quantitative (epidemiological)
        1. a. Experiment (clinical, field, community)
        2. b. Observational
            3. i. Cohort
            4. ii. Case control
            5. iii. Cross sectional study
            6. iv. Ecological study
    - II. Qualitative Research Method (Sociological)
        - i. Developing instruments (Delphi technique)
        - ii. Focus groups
        - iii. Indepth interview
        - iv. Key informant interview
8. Ethical issues
9. Critical Appraisal of a research report

Third Year

NERVE CONDUCTION AND ELECTROMYOGRAPHY

1. History of nerve conduction studies
2. Electro diagnostic signals and their measurements
    a. Principles of motor nerve conduction
    b. Principles of sensory nerve conduction
3. Basic components of electromyography instruments
4. Nerve conduction techniques
5. Anatomical guide and normative data for common nerve conduction studies
    a. Brachial plexus and branches
    b. Lumbar plexus and branches
    c. Sacral plexus and branches
6. Required tests for specific problems like carpal tunnel syndrome
7. Pediatric nerve conduction study
8. Artefacts in NCS
9. Nerve conduction of non limb nerves – techniques and normal values
10. Physiological and non physiological factors affecting NCS
11. Anomalous innervations of extremities
12. Late responses
13. Autonomic nervous system testing
14. Introduction to EMG
15. Technique of EMG
16. Clinical applications of EMG and NCV in neurological disorders
17. Repetitive nerve stimulation
18. Single fibre and macro electromyography

POLYSOMNOGRAPHY, TRANSCRANIAL MAGNETIC STIMULATION, AUTONOMIC LAB, INTRAOPERATIVE MONITORING

I] SLEEP MEDICINE AND POLYSOMNOGRAPHY

1. Anatomy of Sleep
2. Medical Disorders of Sleep
    a) Insomnia
    b) Obstructive Sleep Apnea
    c) Central Sleep Apnea
    d) Sleep disorders in elderly
    e) Narcolepsy and related disorders
3. Polysomnography
4. Median Sleep Latency (MSLT)
5. Actigraphy

II] TRANSCRANIAL MAGNETIC STIMULATION (TMS) AND AUTONOMIC LABORATORY

Transcranial Magnetic Stimulation
a) Anatomical basis of TMS
b) Recording procedures
c) Clinical application

Autonomic Laboratory
a. Cardiovascular autonomic functions
b. Using head up tilt test and beat to beat recording
c. Assessment of other cardiac physiology and dysfunction

III] INTRA-OPERATIVE MONITORING

1. Instrumentation for Intraoperative monitoring (IOM)
2. Precautions to be taken during IOM
3. Electrode placement, stimulation parameters for tethered cords, brachial plexus, dorsal column, cranial nerves, peripheral nerves and brainstem nuclei
4. Brainstem auditory evoked potentials for cerebello-pontine angle tumors, microvascular decompression cases
5. Somatosensory evoked potentials for aneurysm surgery, spinal cord surgery
6. Motor evoked potentials using transcranial electrical stimulation for spinal cord monitoring, monitoring of cases with intramedullary tumors, intradural extramedullary tumors and scoliosis correction
7. Electrocorticography

APPLICATION OF CLINICAL NEUROPHYSIOLOGY AND ASSESSMENT

CLINICAL NEUROLOGY

1. Neurological complications of systemic disease
2. Trauma and the nervous system
3. Vascular diseases of the nervous system
4. Cancer and the nervous system
5. Infections of the nervous system
6. Multiple sclerosis and other white matter diseases
7. Hypoxic, toxic and metabolic encephalopathies
8. Nutritional diseases of the nervous system
9. Disorders of cerebrospinal fluid circulation and brain edema
10. Inborn errors of metabolism, mitochondrial disorders, channelopathies
11. The Dementias
12. Sleep and its disorders
13. Headache and other cranio-facial pain
14. Cranial neuropathies
15. Parkinsonism and related movement disorders
16. Disorders of cerebellum and tracts
17. Disorders of bones, joints, ligaments, and meninges

18. Disorders of upper and lower motor neurons
19. Disorders of nerve roots and plexuses
20. Disorders of peripheral nerves
21. Disorders of autonomic nervous system
22. Disorders of neuromuscular transmission
23. Disorders of skeletal muscle
24. Neurological problems of the newborn

Neuro Electro Physiology:- (Internship postings for one year)

1. Routine electroencephalography, video electroencephalography, sleep lab - **6 months**
2. Neve conduction & electromyography, autonomic lab, transcranial magnetic stimulation lab - **4 months**
3. Evoked potentials and intraoperative monitoring - **2 months**

SCHEME OF EXAMINATION

FIRST YEAR

S.No.	Subject	Internal Examination		UNIVERSITY			
				Theory		Orals/ Practical	
		Max	Min	Max	Min	Max	Min
1	Anatomy	50	25	100	50	50	25
2	Physiology & Biochemistry	50	25	100	50	50	25

INTERNAL EXAMINATION ONLY

		Internal Assessment		IP Theory	
		Max	Min	Max	Min
1	Computers	50	25	100	50
2	Basic Nursing	50	25	100	50
3	English	50	25	100	50
4	Medical Terminology	50	25	100	50
5	Introduction to Lab	50	25	100	50

*IP = Internal Paper

SECOND YEAR

S.No.	Subject	Internal Examination		University			
				Theory		Orals/ Practical	
		Max	Min	Max	Min	Max	Min
1	Electroencephalography & Electronics	50	25	100	50	50	25
2	Evoked Potentials and Clinical Neurology	50	25	100	50	50	25

INTERNAL EXAMINATION ONLY

		Internal Assessment		IP Theory	
		Max	Min	Max	Min
1	Biostatistics	50	25	100	50

THIRD YEAR

S.No.	Subject	Internal Examination		University			
				Theory		Orals/ Practical	
		Max	Min	Max	Min	Max	Min
1	Nerve Conduction Studies and Electromyography	50	25	100	50	50	25
2	Polysomnography, transcranial magnetic stimulation, autonomic lab, intraoperative monitoring	50	25	100	50	50	25
3	Application of Clinical Neurophysiology and assessment	50	25	100	50	50	25

QUESTION PAPERS

Common Format for University Question Papers - Total marks 100 - Time 3 hours

Type of Question	Number of questions	Maximum mark for each	Maximum Mark for Section
Essay type	3	10	30
Short answers	8	5	40
Short answers	10	3	30
Total	**21**	**-**	**100**

Break up of questions for Year 2, Paper 1 (Electroencephalography & Electronics)

	Electroencephalography		Electronics	
Type of Question	**Number of questions**	**Maximum Mark for Section**	**Number of questions**	**Maximum Mark for Section**
Essay type	3	30	-	-
Short answers	6	30	2	10
Short answers	7	21	3	9
Total	**16**	**81**	**5**	**19**

Total marks = 81 + 19 = 100

Question Paper Code - B.Sc. Neuroelectrophysiology - changes from 2018-2019

Year	2012-2013		2018-2019	
	Subject	**QP Code**	**Subject**	**QP Code**
First Year	Anatomy	802501	Anatomy	802501
	Physiology & Biochemistry	802502	Physiology & Biochemistry	802502
Second Year	Electroencephalography	802511	Electroencephalography and Electronics	**802511**
	Electronics	802512	Evoked Potentials and Clinical Neurology	**802512**
	Evoked Potentials and Clinical Neurology	802513		
Third Year	Nerve Conduction Studies & Electromyography	802521	Nerve Conduction Studies & Electromyography	802521
	Polysomnography, Transcranial Magnetic Stimulation, Autonomic Lab, Intraoperative Monitoring	802522	Polysomnography, Transcranial Magnetic Stimulation, Autonomic Lab, Intraoperative Monitoring	802522
	Application of Clinical Neurophysiology	802523	Application of Clinical Neurophysiology	802523