Proposed Syllabus for B.Sc. In Neuro Electrophysiology

FIRST YEAR:

College of Nursing

1. Medical Terminology
2. Basic Nursing
3. First Aid
4. English

Biomedical Dept.

5. Electronics
6. Computer basics

Dept. of Anatomy

7. Anatomy

Dept. of Physiology

8. Physiology

5. Electronics – Biomedical Dept.

1. ELECTRICAL CONCEPTS

a. Definition and units of Basic electrical quantities.

Voltage, current, change, power, resistance, capacitance, impedance reactance, Ac and Dc, power factor, RMS, average and maximum value of Ac.

b. Circuit Elements:

Resistors, capacitors, inductors-types symbol, colour code representation series and parallel combination and their equivalent.
Transformer – types and construction detail.

c. Circuit laws:

Ohm's law, Kirchoff's voltage lay, Kirchoff's current law, Wheat stone bridge.

d. Motors: types and uses.

II.ELEMENTS OF ELECTRONICS

a. Atomic structures, material classification according to their conduction, electronic emission.

b. **Semi conductors**- intrinsic, extrinsic, P type, N type, diodes, transistors, characteristics, schematic representation.

c. **Application of diodes** as a switch and rectifier, HWR, FWR, bridge rectifier.

d. **Application** of transistor as an amplifier

e. Power supply Unit.

f. Introduction to integrated circuit.

g. Introduction to **Operational amplifiers** - adder, subtractor multiplier, since wave generator, square wave generator triangular generator, Schmitt trigger.

III. DIGITAL CIRCUITS

a. Binary number system, bits, bytes, octal, hexadecimal, addition, subtraction, 1"s comprement and 2"s complement.

b. **Gates:** Universal gates OR. AND. NOT. EXOR, EXNOR. Truth table and boolean expression.

c. A-D convertor

IV ELECTRICAL SAFTEY AND MEDICAL EQUIPEMENTS

Physiological effect of electrical current, shock hazards from electrical equipment, methods of accident prevention.

Classification of medical equipments according to the

1. Type of protection
2. Mode of protection

V. BIOELECTRICITY

Biological potentials, ECG, EEG, EMG sources of Bio-electric potential, cell testing potential, action potential and their propagation, electrodes and transducers.

VI. TRANSDUCERS

Their principle, active and passive transducer, transducer used in bio-medical applications.

VII. ELECTROENCEPHALOGRAPH:- a. Block diagram, EEG amplifier – preamplifier, differential amplifier, basic concept, input impedance, common mode rejection ratio, pen amplifier, buffer amplifier, driving amplifier, isolation amplifier.

b. Electrodes, types, surface or sub-dermal, ground reference electrode – metal clip on the ear lobe.

c. Filters – low frequency filters, high frequency filters, 60 Hz or notch filters, frequency response curves and time constant.

d. Sensitivity and calibration of EEG amplifiers, paper speed, pen mechanism, other recording devices – CRO, principles of averaging, analogus section, digital section SN ratio.

VIII PRINCIPES OF AVERAGING

3. Evoked potential instrumentation

    a) General
    b) Analog section
    c) Digital section

4. Signal to noise ratio.
5. Common Mode Rejection Ratio.
6. Frequency response
7. Internal noise

VIII. COMPUTER SYSTEM:

a. Introduction to computers – Application of computers – Concepts of Data and information – A typical computer system – Memory concepts – History of computers – Types of computers.

b. Input-output devices – Data sourage devices – Software – The definition – the role of software – Housekeeping.

c. The computer Internals – Typical PC configuration – Booting – Virus, Anti-virus, Data compression Techniques – On software – Versions of software.

d. Number system – Binary Arithmetic – Standard codes for unit of Information.

e. Operating system-Definition – Classification – Introduction to windows – Features of Windows – Desktop and Desktop icons – Starting programs – Browsing and managing windows explorer – setting – Taskbars and creating shortcuts.

Introduction to MS-DOS and WINDOWS
MS Office – MS – Word, Powerpoint, Access & Excel.

Introduction to Internet, Intranet and E-Mail

7. Anatomy - Dept of Anatomy

ANATOMY SYLLABUS

Sub Divisions of Nervous System:

a) Central
b) Peripheral
c) Autonomic

BRAIN

Lobes, functions – Dissection Hall
Gyri, Sulci, Cortical areas – Demonstration
Association commissural areas
Brain Stem, Cerebellum

Sensory and motor pathways
Pyramidal system
Upper and lower motor neuron
Spinal cord
Peripheral nervous system

1. Cranial nerves – origin, distribution, pathways
2. Spinal cord and spinal nerves
3. Formation of plexus
4. Muscles – origin, insertion nerve supply and action.

Concept of myotomes and dermatomes

8. Physiology – Dept. of Physiology

PHYSIOLOGY SYLLABUS

EEG Generators
Resting membrane potential and action potential generation.
Physiology of Nerve Conduction and Muscle Contraction.
Commissural pathways and association areas
Physiology of Neuromuscular Junction transmission.

Motor and sensory tracts.
Sensory receptors.
CLINICAL NEUROLOGY

Concepts of Disease and outlines of Clinical Evaluation related to Neural Science

Epilepsies
CNS Infections
Meningitis
Encephalitis

Peripheral Neuropathics
Muscle Disorders
Neuromuscular Junction Disorders
Demyelinating disorders

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SECOND YEAR - ELECTROENCEPHALOGRAPH

A. RECORDING TECHNIQUE.

1. Electrodes:

    a) Types, materials and characteristics
    b) Modes of application.
    c) Impedance
    d) Effects on E.E.G.

2. The 10-20 System.
3. Reference and Bipolar Technique
4. Reference contamination
5. Fields
6. Montage and localization.

    a) Cancellation and summation
    b) Phase reversal.

B. PATIENT GROUNDING AND ELECTRICAL SAFETY

C.TROUBLE SHOOTING

D.OTHER RECORDING DEVICES:

    a) Cathode Ray Oscilloscope
    b) Averager .

E. BASIC MEASUREMENT.

CLINICAL E.E.G.

A. Basic E.E.G. Patterns.

1. Awake

a) Normal
b) Abnormal

2. Sleep

a) Normal
b) Abnormal

3. Sphenoid EEG recording

a) Assisting in inserting leads
b) Techniques of recording

4.Epulepsy surgery -

a) Prolonged telemetry EEG
b) Recording ictal period and reporting pre/ictal/postal phases
c) Intraoperative recording – (Corticogram)

5. Artifacts:
a) Types
b) Monitoring.

6) Seizures:

a) Classification
b) E.E.G. Finding
c) Clinical Finding

MANAGEMENT OF PATIENT AND MACHINE.

1. Cerebral vascular diseases
2. Space occupied lesion
3. Toxic, metabolic and endocrine conditions
4. Infections, disease
5. Psychiatric disorder.
6. Pediatric condition.
7. Drug effects on E.E.G.
8. Disorders of sleep
9. Electrocerebral silence.

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THIRD YEAR

1. ELECTROMYOGRAPHY
2. NERVE CONDUCTION STUDIES
3. EVOKED POTENTIALS
4. QUANTATIVE SENSORY TESTING
5. INTRA-OPERATIVE BRAIN AND SPINAL CORD MONITORING.

NERVE CONDUCTION STUDIES

1. Nerve conduction velocity studies – motor and sensory and cranial nerves.
2. H-Reflex and F-Wave
3. Repetitive stimulation with high and low frequency
4. Mac. Mani's Test for periodic paralysis
5. Proximal conduction
6. MUNE – Motor unit estimation study
7. SSR – Sympathetic skin response.

Factors affecting the NCV

ELECTROMYOGRAPHY

1. E.M.G.

   a) Insertion activity
   b) Spontaneous activity (Fibs, Fasics, Myotonia, positive Sharps, pseudomyotonia)

c) Interference pattern
d) Motor units and polyphasics
e) Different types of neurogenic and myopathic patterns.

2. Root stimulation study

3. Single fibers EMG

EVOKED POTENTIALS

1. Evoked potential – definition.
2. Different types of studies.

a) B.A.E.R.
b) V.E.P.
I. Pattern Reversal.
II. L.E.D. Goggles.

c) S.S.E.P. - Median.

d) S.S.E.P. - Tibial

c) Blink Reflex.

3. Intraoperative monitoring.

Pinal cord surgeries – monitoring SSEP – median/tibial
Motor evoked potential – in Brain stem surgeries/thalamic surgeries

QST – QAUANTATIVE SENSORY TESTING

a) Thermal
b) Vibratory

III.**INTRA-OPERATIVE BRAIN AND SPINAL CORD MONITORING.**

Intraoperative monitoring of Facial nerve
Intraoperative monitoring of spinal cord
Intraoperative monitoring of the brainstem
Intraoperative monitoring for tethered cord syndrome.