

**MAHATMA GANDHI UNIVERSITY  
OF MEDICAL SCIENCES &  
TECHNOLOGY, JAIPUR**

**EEG Technology**  
Three year B.Sc. course

**Syllabus**  
**B.Sc. EEG Technology**  
Three year B.Sc. course

## **NOTICE**

1. Amendments made by the Board of Management of the University in Rules / regulations of Graduate Medical Courses shall automatically apply to the Rules/ Regulations of the Mahatma Gandhi University of Medical Sciences & Technology.
2. The University reserves the right to make changes in the syllabus/books/ guidelines, fee-structure or any other information at any time without prior notice. The decision of the University shall be binding on all.
3. The Jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

**SYLLABUS**  
**B.Sc. EEG Technology**  
(3 Years Degree Course)

**Rules & Regulations**

**1. TITLE OF THE COURSE**

The title of the course shall be “**B.Sc. EEG Technology**”.

**2. DURATION OF COURSE/TRAINING**

The course shall be of three years duration from the date of commencement of academic session

**3. MEDIUM OF INSTRUCTION**

English shall be the medium of instruction.

**4. ELIGIBILITY FOR ADMISSION:**

- For admission a candidate should have passed the 10+2 (Senior Secondary) Examination or its equivalent Examination Science stream i.e. Physics, Chemistry and Biology OR Physics, Chemistry and Mathematics Subjects with 45% marks in the aggregate for General Category and 40% for SC/ST/OBC/MBC candidates or as per Govt. Guidelines from a recognized Board.
- Candidate should have completed the minimum age of 17 years as on 31st December of the year of admission.

**5. CRITERIA FOR ADMISSION**

- Selection shall be done by an Admission Board of the University strictly on merit. It will consist of two-step process –Written Entrance Examination followed by Counseling/Personal Interview (PI).

**6. RESERVATION POLICY**

Reservation shall be applicable as per policy of the State Government.

**7. ENROLMENT**

- Every candidate who is admitted to the Course in Mahatma Gandhi Medical College shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility and enrolment fees.
- A candidate shall deposit enrolment fees along with tuition fees at the time of his/her admission to the course. Such a candidate who fails to submit, through the college Principal, duly filled enrolment form along with original documents

including migration certificate required for enrolment within two months of his/her admission or up to November 30 of the year of admission whichever is later, he/she will have to pay late fee prescribed by the University.

## 8. MIGRATION RULES

- No student, once admitted to the course and enrolled by the University, will be permitted to migrate to any other Course/ University.
- No student will be admitted to the Course on migration from any other Course/ University.

## 9. ATTENDANCE

- Minimum 75% attendance in each year, both for theory and practical classes separately. Student with deficient attendance will not be permitted to appear in University examination.

## 10. CONDUCTION OF THE UNIVERSITY EXAMINATION:

- University examination shall be conducted twice in a year; that is Main and Supplementary Examination. Supplementary examination shall be conducted after 2-4 months of the main examination.

### SCHEME OF EXAMINATION

#### 1. Theory papers:

- Each Theory paper examination shall be of 3 hours duration and of maximum marks 80.
- There will be two question papers for each year in B.Sc. EEG Technology course.

Theory Papers	Theory		Paper Set & Evaluated	
	Total Marks	Pass Marks	No. of Internal Paper Setters	No. of External Paper Setters
Ist Year: Two Theory Papers	200	100	2	-
IInd Year: Two Theory Papers	200	100	2	-
IIIrd Year: Two Theory Papers	200	100	1	1

- For the First and Second year examinations – these respective above theory papers shall be set by the Internal Examiners covering their respective areas of syllabus. For each question paper there shall be a separate Internal Examiner. The answer books shall be evaluated by the concerned Internal Examiners (Papers Setters).
- In Third (Final) Year examination, one of the paper shall be set and evaluated by an External Examiner. In other words, one of the Internal has to be substituted by

the External Examiner. The External and Internal Examiners (Paper Setters) shall evaluate the answer books related to their question papers.

- (e) The Paper Setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by Academic Council. Model question paper for examination is annexed herewith.
- (f) It is to be noted that the Internal Examiners of the First and Second year shall be appointed by the President of the University in consultation with the Coordinator of the course. This exercise shall be conducted through the office of the Controller of the Examinations of the University. The External Examiner of Second year shall also be appointed by the President out of the panel of names submitted by the Coordinator of the course through the Controller of Examinations to the President. The President may or may not consult the Coordinator before the appointment of the External Examiner. The President shall decide in consultation with the Coordinator of the course as to which of the Theory paper is to be given to the External Examiner.
- (g) **Attendance:** A candidate is required to attend at least 75% of the total classes conducted every year in all subjects, prescribed for the year, separately in theory and practical/ clinical to be eligible to appear for the University examination.
- (h) **Internal Assessment:** Internal assessment shall be of 20 marks for Each Theory paper.
- (i) **Passing Marks:** A candidate will have to obtain at least 50% marks in each Theory paper to pass. This means that he will have to score 50 marks in each paper. This shall include the marks obtained in Theory paper of 80 marks and internal assessment for that paper of 20 marks (Marks obtained in Theory paper + Marks obtained in internal assessment = the Total Marks obtained in respect of each paper).

## 2. Practical and Viva-Voce Examination:

- a) Each year there shall be practical and viva-voce examination of 100 marks. It shall consist of one University practical exam of 70 marks and internal assessment of 30 marks. It shall be conducted after the Theory examination is over.
- b) The pattern of practical examination shall be as follows –

B. Sc. Course	Practical		Practical Examiners
	Total Marks	Pass Marks	
First Year	100	50	Two Internal Examiner(s)
Second Year	100	50	Two Internal
Third Year	100	50	One Internal & One External Examiner

- a. **The experts** – There shall be the provision for the experts where needed to be inducted as adviser(s) who shall only help the Internal Examiners to evaluate the students in adjunct areas of the course which do not warrant the appointment of separate examiners. It is to be noted that the experts shall not award any marks.
- b. The Coordinator of the course shall submit the name(s) of the expert(s) which shall be approved by the President.
- c. It shall be left to the examiners – Internals and the External, as the case may be, to examine and evaluate the students in practical in the way they wish and award the marks without giving any specific details. The total marks obtained by the candidate in the practical examination shall be the aggregate of the marks awarded by all the examiners put together as one figure. This shall then be submitted to the University. The award sheet shall be signed by all the practical examiners. The experts (where inducted) shall not sign the award sheet of the practical examination.
- d. A candidate who fails to obtain 50% marks shall be declared failed in the practical examination.

**c) Result:**

1. A candidate will have to obtain at least 50% marks separately in each Theory paper including internal assessment and a minimum of 50% marks in the practical examination inclusive of internal assessment for him to be declared pass.
2. A Candidate who has failed in theory paper/s will reappear in respective theory papers/s in supplementary examination.
3. Candidate who has failed in Practical examination only will reappear only in practical examination in Supplementary examination.

**d) Supplementary Examination:**

- a. Eligibility for the failed candidates to appear at the supplementary examination shall be as below–
  - i. Failed in Theory Paper(s) and failed in Practical – shall reappear in the respective failed Theory paper(s) and Practical examination.
  - ii. Failed in Theory paper/papers and passed in Practical examination – shall reappear only in the concerned failed Theory paper(s).
  - iii. Passed Theory papers but failed in Practical – shall reappear only in the Practical Examination.
- b. There shall be a supplementary examination within two months of the declaration of the result of the main examination. Internal assessment marks obtained in main examination in the concerned failed paper/papers shall be carried forward for working out the result of supplementary Theory paper(s) examination. Such candidate who has secured less than 50% marks in the internal assessment will be allowed to improve his internal assessment marks in the repeat supplementary internal assessment examination.

c. Marks secured by the candidate in the main examination passed Theory paper(s) and/or practical of the main examination, as the case may be, will be carried forward for working out his result.

**d. Result:**

- i. A candidate obtaining at least 50% marks in the supplementary Theory paper(s) and 50% marks in the supplementary practical examination, as the case may be, shall be declared successful.
- ii. A candidate who has failed in supplementary practical examination shall have to reappear both I theory (all papers) and practical at the next main examination.

**e. Promotion to Second/Third Year**

1. A candidate appeared in the University examination and failed in theory paper(s) /Practical examination shall be promoted to next year
2. A candidate will be allowed to appear for the Final (3<sup>rd</sup>) year examination only when the backlog of all papers (theory and practical) of first year and second year exams is cleared
3. The student is required to complete the course within 6 years from the joining of the course

**f. Result - Division:** Successful candidates will be categorized as under –

1.	Those, securing 50% and above but less than 60% in the aggregate marks of First, Second & Third year taken together	-	Pass
2	Those, securing 60% and above but less than 75% in the aggregate marks of First, Second & Third year taken together	-	Pass with I Division
3	Those, securing 75% and above in the aggregate marks of First, Second & Third year taken together	-	Pass with Honours

**g. GRACE MARKS**

1. A student who appears in the whole examination in first attempt and obtains the required minimum pass marks in the total aggregate of an examination but fails to obtain the minimum pass marks in one subject (in theory and / or practical as the case may be) will be awarded the grace marks up to a maximum of 05 marks according to the following scale, provided the candidate passes the examination by award of such grace marks:

Marks obtained by the candidate above the required minimum aggregate pass marks		Grace marks can be given up to
Up to 6 marks	-	02
Up to 12 marks	-	03

Up to 18 marks	-	04
19 marks and above	-	05

2. No grace marks would be awarded to a candidate who appears in part/ supplementary/remand examination. Non appearance of a candidate in any part of the examination on account of any reason will make him ineligible for grace marks.
3. A candidate who passes the examination after the award of grace marks in a paper/practical or the aggregate will be shown in the marks sheet to have passed the examination by grace. Grace marks will not be added to the marks obtained by a candidate from the examiners.
4. If a candidate passes the examination but misses First or Second Division by one mark as applicable to the Faculty, he will be given one mark in the paper in which he gets the least marks and also in the aggregate of the subject as well as the complete examination to upgrade his division and make him entitled for the first or second division, as the case may be. Indication of this up-gradation will be given in the tabulation register as well as in the marks sheet of the candidate.
5. Non appearance of a candidate in any part of the examination will make him ineligible for grace marks.
6. A candidate who is awarded grace marks in any subject to pass the examination will not be entitled for distinction in any subject.
7. The place of the candidate who is awarded given grace marks to pass the examination or given one mark for up-gradation of his division in the examination merit list will, however, be determined by the aggregate marks he secures from the examiners.

#### **h. REVALUATION / SCRUTINY**

##### **Permission for revaluation / scrutiny**

1. In 1<sup>st</sup> Attempt – Revaluation shall be permitted in 25% of the appeared papers. Scrutiny shall be permitted for all the papers.
2. In 2<sup>nd</sup> Attempt – Only scrutiny shall be permitted in all the papers. Revaluation shall not be permitted.
3. Revaluation shall also be permitted in 25% of such papers in which a candidate appears for the 1<sup>st</sup> time irrespective of his attempt in the whole examination.
4. Candidates passing all the subjects of one examination at different times shall be issued their mark-sheets showing actual attempts taken by them in passing the particular examination.
5. For determining the attempt, following criteria shall be followed –

<b>S. No.</b>	<b>Situation</b>	<b>Attempt in next examination</b>	
1.	Candidate is detained in all subjects	His attempt in all the subjects in the next examination will be treated as	1 <sup>st</sup> Attempt



2.	Candidate permitted in all subjects But did not appear in all permitted subjects	His attempt in the next examination will be treated as	1 <sup>st</sup> Attempt
3.	Candidate is detained in one / few subjects Permitted for the rest of the subjects Appeared in permitted subjects	His attempt in the detained subject(s) in the next examination will be treated as	2 <sup>nd</sup> Attempt
4.	Candidate is detained in one / few subjects Permitted in the rest of the subjects Did not appear in the permitted subjects	His attempt in the next examination In detained subject(s) will be treated as In permitted subject(s) will be treated as	1 <sup>st</sup> Attempt
5.	Candidate permitted in all subjects But did not appear in few subjects	His attempt in the permitted subjects in the next examination will be treated as	2 <sup>nd</sup> Attempt

## Curriculum Outline

### Distribution of Teaching hours

#### 1<sup>ST</sup> Year B.Sc. EEG Technology

Course Title	Hours
NeuroAnatomy	80
NeuroPhysiology	140
Electrical concepts and elements of electronics	80
Digital circuits	60
Electrical safety and medical equipments	80
Bioelectricity and transducers	60
Electroencephalograph- Block diagram, Amplifier, electrode, filter, Calibration	80
Computersystem	60
Clinical neurology	100
Applied Pharmacology	60
<b>Total Theory Hours</b>	<b>800</b>
Practical	400
<b>Total Hours :</b>	<b>1200</b>

#### 2<sup>nd</sup> Year B.Sc. EEG Technology

Course Title	Hours
Basic electroencephalograph- Principle, types, Montages, recording technique	200
Clinical aspects of electroencephalograph	250
Technical aspects of electroencephalograph	200
Management of patient and machine	150
<b>Total Theory Hours</b>	<b>800</b>
Practical	400
<b>Total Hours :</b>	<b>1200</b>

### 3<sup>rd</sup> Year B.Sc. EEG Technology

<b>Course Title</b>	<b>Hours</b>
Disorders of nervous system	250
Advanced electroencephalography	200
Polysomnogram	150
Epilepsy surgery	100
Intra-operative brain and spinal cord monitoring	100
<b>Total Theory Hours</b>	<b>800</b>
Practical	400
<b>Total Hours :</b>	<b>1200</b>

## **UNIVERSITY B.SC COURSE IN EEG TECHNOLOGY**

### **LEARNING OBJECTIVES:**

- Students will learn the basics of patient care and in particular the basics of the neurodiagnostic field and how it relates to other allied health professions. They will be given information about the professional societies and credentialing boards.
- Students will learn the foundations of performing electrophysiology and investigation including the anatomical structures of the brain, patterns and waveforms, neurological disorders and the 10-20 system as concerning EEG.
- Students who want to advance in the field of neurodiagnostics must have a good comprehensive understanding of the nervous system which they will be able to apply to the clinical settings in which they work.
- Students will learn about the origin of EEG activity, how to obtain interpretable EEG data and give descriptive terms of the EEG activity.
- The student will learn the physiological basis of EEG, EMG and be able to describe the patterns seen. They will be able to identify normal, normal variants and abnormal patterns in adult patients. They will learn the normal and abnormal pediatric patterns and learn about neonatal patterns. The students will learn first aid for seizures and how to classify the types of seizures.
- To acquire knowledge to differentiate true seizures from pseudo seizures by means of EEG.
- To study various changes in EEG in normal sleep and Sleep disorders.
- To familiarize oneself in recent advances in EEG, Ambulatory EEG, Video EEG, Intra-operative EEG.

Procedures the student will be trained during the 3 year course

**1. EEG**

- a. Routine EEG
- b. Video EEG
- c. Prolonged EEG
- d. Neonatal EEG
- e. Ambulatory EEG
- f. Intra-operative EEG

**2. POLYSOMNOGRAPHY**

**FIRST YEAR Theory Paper: EEG Technology**

Subject		Maximum Marks		
		Theory	I Ass.	Practical
Paper I	Neuro-Anatomy, Neuro-Physiology & , Applied pharmacology	80	20	200
Paper II	Clinical neurology Electronics and computer science	80	20	

**Paper-I -**

**NeuroAnatomy**

ANATOMY SYLLABUS

Sub Divisions of Nervous System:

- a) Central
- b) Peripheral
- c) Autonomic

BRAIN

Lobes, functions – Dissection Hall  
Gyri,Sulci,Corticalareas–Demonstration  
Association commissuralareas  
Brain Stem, Cerebellum

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

1. Cranialnerves–origin,distribution,pathways
2. Spinal cord and spinalnerves
3. Formation ofplexus
4. Muscles – origin, insertion nerve supply andaction.
5. Concept of myotomes and dermatomes

## **NeuroPhysiology**

### PHYSIOLOGY SYLLABUS

- EEG Generators
- Restingmembranepotentialandactionpotentialgeneration.
- Physiology of Nerve Conduction and MuscleContraction.
- Commissural pathways and association areas Physiology of Neuromuscular Junction transmission.
- Motor and sensory tracts.
- Sensory receptors.

## **Applied Pharmacology**

- Sedatives and hypnotics
- Antiepileptic drugs
- Tranquilizers
- Drugs acting on autonomic nerve system
- Drugs acting on neuromuscular junction
- Antiparkinsonian drugs
- Local and general anesthetics drugs
- CNS stimulants
- Sterilization – materials & methods

## **Paper II-**

## **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, colourcode representation series and parallel combination and their equivalent.

Transformer – types and construction detail.

c. Circuit laws:

Ohm's law, Kirchoff's voltage law, 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, sine wave generator, square wave generator triangular generator, Schmitt trigger.

## III. DIGITAL CIRCUITS

a. Binary number system, bits, bytes, octal, hexadecimal, addition, subtraction,  $1^{\text{st}}$  complement and  $2^{\text{nd}}$  complement.

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

c. A-D convertor

## IV ELECTRICAL SAFETY AND MEDICAL EQUIPMENTS

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 earlobe.
- 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, analog section, digital section SN ratio.

## **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 storage 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 and E-Mail

## **CLINICAL NEUROLOGY**

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

- Epilepsies
- CNS Infections- Meningitis, Encephalitis
- Peripheral Neuropathies
- Muscle Disorders
- Neuromuscular Junction Disorders
- Demyelinating disorders
- Cerebral vascular diseases
- Space occupied lesion
- Toxic, metabolic and endocrine conditions
- Pediatric condition.
- Disorders of sleep
- Psychiatric disorder.
- Electroencephalogram.

### **PRACTICAL:**

1. Neuroanatomy
2. Neurophysiology
3. Clinical neurology
4. Applied pharmacology
5. Electronics and computer

### **Reference books-**

1. Human Anatomy- **by BD Chaurasia**
2. Gray's Anatomy- **by Henry Gray**
3. Ganong's Review of Medical Physiology
4. Essentials of Medical Pharmacology- **by KD Tripathi**
5. Clinical Neurology Made Easy – **by HV Srinivas**
6. Clinical Electroencephalography- **by Misra Uk**
7. Principles of Biomedical Instrumentation- **by Andrew Webb**
8. Biomedical Instrumentation- **by R. S Khandpur and Raghbir Khandpur**

### **SECOND YEAR-**

## 2<sup>nd</sup> year theory: EEG technology

Subject		Maximum Marks		
		Theory	I Ass.	Practical
Paper I	Technical aspects of EEG	80	20	200
Paper II	Clinical Aspects of EEG	80	20	

### Paper I-

#### Basic electroencephalograph

- Principles of EEG recording
- Recording techniques
- Electrodes:
  - Types, materials and characteristics
  - Modes of application.
  - Impedance
  - Effects on E.E.G.
- The 10-20 System.
- Reference and Bipolar Technique
- Reference contamination
- Fields
- Montage and localization.
- Cancellation and summation
- Phase reversal.

#### TECHNICAL ASPECTS:

- A. Different parts of EEG machine and its functions, i.e. montage, electrodes, filter, calibration, sphenoidal electrode, depth electrodes
- B. Electroencephalographic monitoring (in patients and ambulatory), Video Electroencephalography, Intraoperative records, Quantitative electroencephalography, Brain mapping and others (in brief)
- C. Electroencephalographer's reporting
- D. Record keeping

### Paper II-

## CLINICAL

- A. Seizure disorder and its differential diagnosis
- B. i) Normal EEG pattern in children and adult, awake and sleep
- ii) Neonatal EEG
- iii) Normal variants
- iv) Artifacts : Eye movements, muscle pulse
- v) Activation methods: Hyperventilation, photic stimulation, sleep deprivation, others
- vi) Abnormal EEG records, definition-spike, sharp, slow waves, other abnormalities
- vii) Abnormal EEG in neurological diseases
- viii) Brain death

## Practicals

- EEG Machine
- Electrodes Identification
- Electrode Application
- Care of Electrodes
- Calibration
- Biocalibration
- Maintenance of Electrodes and EEG machinery
- Normal EEG
  - Awake
  - Sleep
- Recording of EEG
- Trouble shooting

## 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. Electroencephalographic silence.

## **Reference books-**

1. Human Anatomy- **by BD chaurasia**
2. Gray's Anatomy- **by Henry Gray**
3. Ganong's Review of Medical Physiology
4. Essentials of Medical Pharmacology- **by KD Tripathi**
5. Clinical Neurology Made Easy – **by HV Srinivas**
6. Clinical Electroencephalography- **by MisraUk**
7. Principles of Biomedical Instrumentation- **by Andrew Webb**
8. Biomedical Instrumentation- **by R. S Khandpur and RaghbirKhandpur**
9. Current Practice of Clinical Electroencephalography- **by John S. Ebersole**
10. EEG in Clinical Practice.**by KurupathRadhakrishnan, Jagarlapudi MK Murthy, ChaturbhujRathore**

## **THIRD YEAR**

### **3<sup>rd</sup> year Theory :EEG technology**

<b>Subject</b>		<b>Maximum Marks</b>		
		<b>Theory</b>	<b>I Ass.</b>	<b>Practical</b>
Paper I	Clinical Neurology and EEG changes in clinical conditions	80	20	200
Paper II	Recent advances in EEG, Intraoperative EEG, Polysomnography	80	20	

### **Paper I-**

#### **Disorders of Nervous system**

- Cerebrovascular disorder
- Viral encephalitis
- Bacterial meningitis
- Cerebral abscess granuloma
- Brain death
- Brain tumors
- Sleep disorder
- Various Types of epilepsy
- Various Epilepsy syndrome
- Resistant Epilepsy
- Status epilepticus
- NEAD- Non epileptiform attack disorder
- Metabolic conditions and EEG

#### **Advanced Electroencephalography**

- Normal EEG (awake & sleep)
- Pediatric EEG
- EEG maturation
- Epilepsies
  - Primary generalized Epilepsies
    - Generalised tonic clonic
    - Absence
    - Myoclonic
  - Parital Epilepsies
    - Simple parital seizures
    - Complex partial seizures
    - Partial with secondary generalized seizures
- EEG in metabolic disease of cerebrum

- EEG changes in CNS infections
- EEG in head trauma, strokes, tumors
- Video EEG
- Spike detection
- Epilepsy surgery-
  - Prolonged telemetry EEG
  - Recording ictal period and reporting pre/ictal/postal phases
  - Intraoperative recording –(Corticogram)

## **Paper II-**

### **Recent Advances in EEG**

### **POLYSOMNOGRAM**

#### **Practical :**

1. EEG Machine
2. Methods of application and electrodes
3. Activation procedures
4. Record documentation
5. Digital EEG
6. Bedside recordings
7. Basic montages
8. Technical descriptions
9. Electrical safety
10. Artifact recognition
11. Trouble shooting
12. Calibration
13. Biocalibration
14. Polysomnogram
15. Sleep EEG
16. Practical initiating EEG
17. Review of EEG in class
18. Review of EEG in faculty
19. Ambulatory EEG

#### **Reference books-**

1. Human Anatomy- **by BD chaurasia**
2. Gray's Anatomy- **by Henry Gray**
3. Ganong's Review of Medical Physiology
4. Essentials of Medical Pharmacology- **by KD Tripathi**
5. Clinical Neurology Made Easy – **by HV Srinivas**
6. Clinical Electroencephalography- **by MisraUk**

7. Principles of Biomedical Instrumentation- by **Andrew Webb**
8. Biomedical Instrumentation- by **R. S Khandpur and Raghbir Khandpur**
9. Current Practice of Clinical Electroencephalography- by John S. Ebersole
- 10. EEG in Clinical Practice.**by **Kurupath Radhakrishnan, Jagarlapudi MK Murthy, Chaturbuj Rathore**
11. Intraoperative Monitoring of Neural Function – by **Marc R. Nuwer**



## **MODEL PAPER**

B.Sc EEG technology I  
Code

Short Name

**B.Sc EEG technology**  
Part –I Examination Month Year

### **Paper I**

**Neuro-Anatomy, Neuro-Physiology & Applied pharmacology**

Time : Three Hours

Maximum Marks: 80

Students shall be allowed to take only one supplementary copy along with one main answer book.  
All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

**Attempt all questions**

Q.1 Essay Type question	20
Q.2 Essay Type question	20
Q.3 Short Notes (any 4out of 6)	
<b><u>MODEL PAPER</u></b>	40

Q.No.1	Explain in detail with suitable illustration the various lobes of brain and their function.	20
Q.No.2	Explain the physiology or generation of EEG rhythms & basic EEG rhythms.	20
Q.No.3	Short Notes (any 4out of 6) (a) Neurotransmitters (b) Synaptic activity (c) Benzodiazepines (d) Generation of epileptiform activity (e) EEG Generators (f) CNS stimulants (g) Antiepileptic drugs	40

## **MODEL PAPER**

B.Sc EEG technology I  
Code

Short Name

### **B.Sc EEG technology**

Part –I Examination Month Year

### **Paper II**

**Clinical neurology Electronics and computer science**

Time : Three Hours

Maximum Marks: 80

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

**Attempt all questions**

Q.1 Essay Type question	20
Q.2 Essay Type question	20
Q.3 Short Notes (any 4out of 6)	40

## **MODEL PAPER**

Q.No.1	Write in detail about CNS infections ?	20
Q.No.2	Write in detail about <b>transducers</b> -their principle, active and passive transducer, transducer used in bio-medical applications?	20
Q.No.3	Short Notes (any 4out of 6) (a) Capacitance (b) Transformer – types and construction detail. (c) Application of diodes as a switch and rectifier (d) Physiological effect of electrical current (e) EEG electrode types (f) Operating system-Definition and Classification	40

## **MODEL PAPER**

B.Sc EEG technology II  
Code

Short Name

### **B.Sc EEG technology**

Part –II Examination Month Year

#### **Paper I**

#### **Technical aspects of EEG**

Time : Three Hours

Maximum Marks: 80

Students shall be allowed to take only one supplementary copy along with one main answer book.  
All the parts of one question should be answered at one place. Different parts of one question should  
not be answered at different places in the answer book

Draw diagrams wherever necessary

**Attempt all questions**

Q.1 Essay Type question	20
Q.2 Essay Type question	20
Q.3 Short Notes (any 4out of 6)	40

## **MODEL PAPER**

Q.No.1	Explain in detail the principles of generation of epileptiform activity.	20
Q.No.2	Documentation basic EEG rhythm and their channel importance.	20
Q.No.3	Short Notes (any 4out of 6): (a) Absence seizure channel and EEG features (b) Activation procedure (c) Photic drive & photic convulsive response (d) Change in EEG with eye opening & closure (e) Different parts of EEG machine and its functions (f) Calibration and Bio-calibration	40

## **MODEL PAPER**

B.Sc EEG technology II  
Code

Short Name

**B.Sc EEG technology**  
Part –II Examination Month Year

### **Paper II**

#### **Clinical Aspects of EEG**

Time : Three Hours

Maximum Marks: 80

Students shall be allowed to take only one supplementary copy along with one main answer book.  
All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

**Attempt all questions**

Q.1 Essay Type question	20
Q.2 Essay Type question	20
Q.3 Short Notes (any 4out of 6)	40

## **MODEL PAPER**

Q.No.1	Explain in detail the abnormal EEG records ?	20
Q.No.2	Describe Seizure disorder and its differential diagnosis ?	20
Q.No.3	Short Notes (any 4out of 6) (a) EEG changes in brain death (b) Neonantal EEG (c) Video EEG (d) Types, materials and characteristics of Electrodes (e) Status epilepticus (f) Artifacts	40

## **MODEL PAPER**

B.Sc EEG technology III  
Code

Short Name

### **B.Sc EEG technology**

Part –III Examination Month Year

#### **Paper I**

#### **Clinical Neurology and EEG changes in clinical conditions**

Time : Three Hours

Maximum Marks: 80

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

**Attempt all questions**

Q.1 Essay Type question	20
Q.2 Essay Type question	20
Q.3 Short Notes (any 4out of 6)	40

## **MODEL PAPER**

Q.No.1	Classify Epilepsy? Discuss management of Generalised tonic clonic seizure and Partial seizures?.	20
Q.No.2	Describe the clinical feature, diagnosis and management of TB meningitis.	20
Q.No.3	Short Notes (any 4out of 6): (a) Digital EEG (b) EEG maturation (c) Prolonged telemetry EEG (d) EEG changes in CNS infections (e) EEG in head trauma, strokes, tumors (f) Sleep disorder	40

## **MODEL PAPER**

B.Sc EEG technology III  
Code

Short Name

**B.Sc EEG technology**  
Part –III Examination Month Year

### **Paper II**

#### **Recent advances in EEG, Intraoperative EEG, Polysomnography**

Time : Three Hours

Maximum Marks: 80

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

**Attempt all questions**

Q.1 Essay Type question	20
Q.2 Essay Type question	20
Q.3 Short Notes (any 4out of 6)	40

## **MODEL PAPER**

Q.No.1 Describe in detail Polysomnography – Indications, Technique & sleep scoring?	20
Q.No.2 Describe role of Intraoperative EEG in Epileptic surgery?	20
Q.No.3 Short Notes (any 4out of 6): (a) Magnetoencephalography (b) Intracranial depth Electrodes (c) Ambulatory EEG (d) Multiple sleep latency test (e) EEG in COVID-19 patients (f) Electrocorrigraphy	40