



MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Syllabus

B. Sc. Neuro Electrophysiology

(Three Years Program)

Edition 2020-21

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.

Rules & Regulations
B.Sc. Neuro Electrophysiology
(3 Years Degree Course)

1. TITLE OF THE COURSE

The title of the course shall be “B.Sc. Neuro Electrophysiology”.

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:

- (a) Each Theory paper examination shall be of 3 hours duration and of maximum marks 70.
- (b) Internal assessment shall be of **30** marks for each Theory Paper

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

- (c) 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).
- (d) 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 30 marks for Each Theory & practical 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 30 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 (3rd) 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
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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 1st Attempt – Revaluation shall be permitted in 25% of the appeared papers. Scrutiny shall be permitted for all the papers.
2. In 2nd 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 1st 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 –

S. No.	Situation	Attempt in next examination	
1.	Candidate is detained in all subjects	His attempt in all the subjects in the next examination will be treated as	1 st Attempt
2.	Candidate permitted in all subjects But did not appear in all permitted	His attempt in the next examination will be treated as	1 st Attempt

	subjects		
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 nd 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 st 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 nd Attempt

Selection of Generic Elective and skills Enhancement Courses

Every student has to select any one elective subject out of seven elective subjects mentioned below at the beginning of the academic year during his/her course duration. The Examination of these subjects shall be conducted at the college level.

S. No.	Subject	Teaching hours		
		theory	practical	total
1.	Disaster Management	45	15	60
2.	Information and Communication Technology in Health Education	45	15	60
3.	Clinical Nutrition	45	15	60
4.	Yoga	45	15	60
5.	Effective English	45	15	60
6.	Health Care	50	-	50
7.	Constitution of India	50	-	50

Distribution of marks

S. No.	Subject	Theory	Internal Assessment	Total
1	Disaster Management	70	30	100
2	Information and Communication Technology in Health Education	70	30	100
3	Clinical Nutrition	70	30	100
4	Yoga	70	30	100
5	Effective English	70	30	100
6	Health Care	70	30	100
7	Constitution of India	70	30	100

A candidate can appear in the elective subject examinations to be conducted at the college level before the University examinations at the end of I year or II year or III year. Only such

candidates shall be eligible to fill University examination form of III year (final year) who have passed their elective subject. It shall be mandatory to obtain 50% marks in the aggregate of prescribed total marks (i.e. 50 out of 100) to pass the elective subjects. Marks of all such candidates who have passed their elective subject shall be sent in the following format by the Principal of the college to the University while sending their examination forms of III year (final year) :

S. No.	University Roll No.	Name of the student	Father's Name	Name of elective subject	Marks obtained	Result

Those candidates who do not pass their elective subjects shall not be eligible to submit their III year (final year) University examination form and accordingly they will not be permitted to appear in the University examination of III year (final year) of the course.

Marks obtained by the candidates in their elective subject shall be mentioned separately in the marks sheets of the University examinations. These marks shall not be counted for preparing the merit list.

Curriculum Outline

Distribution of Teaching hours

1ST Year B.Sc. Neuro Electrophysiology

S. N	Course Title	Hours
1.	Neuro Anatomy	80
2.	Neuro Physiology	140
3.	Electrical concepts and elements of electronics	80
4.	Digital circuits	60
5.	Electrical safety and medical equipments	80
6.	Bioelectricity and transducers	60
7.	Electroencephalograph- Block diagram, Amplifier, electrode, filter, Calibration	80
8.	Computer system	60
9.	Clinical neurology	100
10.	Applied Pharmacology	60
	Total Theory Hours	800
	Practical	400
	Total Hours	1200

2nd Year B.Sc. Neuro Electrophysiology

S. N	Course Title	Hours
1.	Basic electroencephalograph- Principle, types, Montages, recording technique	200
2.	Nerve conductions- Motor, sensory& RNS	150
3.	Electromyography- Principle, electrodes, MUPs, SP	150
4.	Evoked Potentials	150
5.	Management of patient and machine	150
	Total Theory Hours	800
	Practical	400
	Total Hours	1200

3rd Year B.Sc. Neuro Electrophysiology

S. N	Course Title	Hours
1.	Disorders of nervous system	150
2.	Advanced electroencephalography	150
3.	Electromyography	100
4.	Nerve conduction studies	100
5.	Evoked potentials	100
6.	Quantative sensory testing	100
7.	Intra-operative brain and spinal cord monitoring	100
	Total Theory Hours	800
	Practical	400
	Total Hours	1200

B. Sc Course in Neuro Electrophysiology 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.
- Students should learn about Nerve Conduction Studies, motor & sensory, EMG, Repetitive nerve stimulation and various visual evoked potentials.
- 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, EMG, NCV, evoked potential and other neurophysiology techniques.

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

3. NEUROPHYSIOLOGY

- a. Nerve Conduction Studies (NCV)
- b. Electro Myography studies (EMG)
- c. Visual Evoked Potential (VEP)
- d. Somatosensory Evoked Potential (SSEP)
- e. Brainstem Auditory Evoked Response (BAER)
- f. Repetitive Nerve Stimulation (RNS)

FIRST YEAR Theory Paper: Neuro Electrophysiology

Subject		Maximum Marks		
		Theory	I Ass.	Practical
Paper I	Neuro-Anatomy, Neuro-Physiology & , Applied pharmacology	70	30	200
Paper II	Clinical neurology Electronics and computer science	70	30	

Paper-I –

Neuro 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.
5. Concept of myotomes and dermatomes

Neuro Physiology

PHYSIOLOGY SYLLABUS

- EEG Generators
- Restingmembranepotentialandactionpotentialgeneration.
- Physiology of Nerve Conduction and Muscle Contraction.
- 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.

d) ELECTRICAL CONCEPTS

a. Definition and units of Basic electrical quantities.

Voltage, current, charge, 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, colourcoderepresentationseriesandparallelcombinationandtheirequivalent.
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, 1st complement and 2st 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:-

- e) 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 S_n ratio.

VIII. COMPUTER SYSTEM:

- a. Introduction to computers – Application of computers – Concept of Data and information – A typical computer system – Memory concepts – History of computers – Types of computers.
- b. Input-output devices – Data source 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 MisraUk**
7. Clinical Neurophysiology (2Nd Edition)- **byMisraUk**
8. Principles of Biomedical Instrumentation- **by Andrew Webb**
9. Biomedical Instrumentation- **byR. S Khandpur and RaghbirKhandpur**

SECONDYEAR

2nd year theory: Neuro Electrophysiology

Subject		Maximum Marks		
		Theory	I Ass.	Practical
Paper I	Technical and neuro clinical aspects of EEG	80	20	200
Paper II	Technical and neuro clinical aspects of EMG , NCV, evoked potential and other neuro electrophysiological techniques	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.

Paper II-

Nerve conductions

- Principles of Nerve Conduction
- Motor Nerve Conduction
- Sensory Nerve Conduction
- Late response: H – reflex & F – response
- Repetitive Nerve Stimulation

Electromyography

- Principle
- Electrodes
- Qualitative EMG
- Spontaneous activity
- Motor unit action potential
- Interference pattern

Evoked Potentials

- Principles of Evoked Potentials
- Averaging
- Visual Evoked Potentials
- Auditory Evoked Potentials
- Somatosensory Evoked Potentials

Practicals

- Electrodes Identification
- Electrode Application
- Care of Electrodes
- Calibration
- Biocalibration
- Maintenance of Electrodes and EEG – EMG machinery
- Normal EEG
 - Awake
 - Sleep
- Calculation of Nerve Conduction Parameters

- Interpretation of basic Nerve Conductions studies
- Recording of EEG
- Interpretation of basic EMG studies
- Interpretation of Normal Evoked Potential
- 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 Misra Uk**
7. Clinical Neurophysiology (2nd Edition)- **by Misra Uk**
8. Principles of Biomedical Instrumentation- **by Andrew Webb**
9. Biomedical Instrumentation- **by R. S Khandpur and Raghbir Khandpur**
10. Electromyography and Neuromuscular Disorders: Clinical-electrophysiologic Correlations- **by Barbara E. Shapiro and David C. Preston**
11. Current Practice of Clinical Electroencephalography- **by John S. Ebersole**

THIRD YEAR

3rd year Theory : Neuro Electrophysiology

Subject		Maximum Marks		
		Theory	I Ass.	Practical
Paper I	Clinical Neurology and advanced EEG	80	20	200
Paper II	Advances in NCV, EMG, Evoked potential, QST, Intra-operative brain and spinal cord monitoring.	80	20	

Paper I-

Disorders of Nervous system

- Cerebrovascular disorder
- Viral encephalitis
- Bacterial meningitis
- Cerebral abscess granuloma
- Brain death
- Brain tumors
- Sleep disorder
- Peripheral neuropathies
- Guillain Barre syndrome
- Mononeuritis simplex and multiplex
- Traumatic neuropathies
- Myelopathy – compressive and non compressive
- CNS demyelination and multiple sclerosis
- Myasthenia Gravis
- Dystrophies, polymyositis and dermatomyositis
- Myotonia, tremors, dystonia
- 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 telemetryEEG
 - Recording ictal period and reporting pre/ictal/postal phases
 - Intraoperative recording –(Corticogram)

Paper II-

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.
8. Nerve Conductions in pathological states
 - Demyelination
 - Axonopathy
 - Entrapment
 - Plexopathy
 - Radiculopathy
 - Traumatic neuropathy
9. Factors affecting the NCV

ELECTROMYOGRAPHY

1. E.M.G.
 - a) Insertion activity
 - b) Spontaneous activity (Fibs, Fascics, Myotonia, positive Sharps, pseudomyotonia)
 - c) Interference pattern
 - d) Motor units and polyphasic
 - e) Different types of neurogenic and myopathic patterns.
2. Root stimulation study
3. Single fiber 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
 - f) Blink Reflex.
3. Intraoperative monitoring.
 - Pinal cord surgeries – monitoring SSEP – median/tibial
 - Motor evoked potential – in Brainstem surgeries/thalamic surgeries
 - f) Magnetoencephalography

AUTONOMIC FUNCTION TESTING

QST – Qauantative sensory testing

- a) Thermal
- b) Vibratory

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 cords syndrome.

Practical : EMG, NCV, Evoked potentials and Polysomography

1. Basic knowledge about the machines
2. Electrodes
3. Electrode impedance
4. Identification of wave pattern
5. Artifacts
6. Normal laboratory values
7. Electromyography reporting
8. Record keeping
9. Motor NCS
10. Sensory NCS
11. F-wave
12. H-reflex
13. Blink reflex and others
14. Repetitive nerve stimulation
15. Abnormalities in disease
16. Central motor conduction
17. Disease of muscle and neuromuscular junctions
18. Normal EMG recording – Resting/ Insertional activity/ Volitional recruitment pattern, Interference pattern
19. Abnormal EMG – Myopathies, Neurogenic muscle involvement, Involuntary muscle contractions, Neuromuscular transmission disorder
20. Needle EMG – Conventional, Macro EMG, Surface EMG, Single fibre EMG
21. Visual evoked potential
22. Brainstem auditory evoked potential
23. Somatosensory evoked potential

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. Clinical Neurophysiology (2Nd Edition)- **byMisraUk**
8. Principles of Biomedical Instrumentation- **by Andrew Webb**
9. Biomedical Instrumentation- **byR. S Khandpur and RaghbirKhandpur**
10. Electromyography and Neuromuscular Disorders: Clinical-electrophysiologic Correlations- **by Barbara E. Shapiro and David C. Preston**
11. Current Practice of Clinical Electroencephalography- **by John S. Ebersole**
12. Intraoperative Monitoring of Neural Function – **by Marc R. Nuwer**

MODEL PAPER

BSc Neuro Electrophysiology I

Short Name

B.Sc. Neuro Electrophysiology
Part –I Examination Month Year

Paper I

Neuro-Anatomy, Neuro-Physiology & Applied pharmacology

Time : Three Hours

Maximum Marks: 70

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.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
(a) Neurotransmitters
(b) Synaptic activity
(c) Benzodiazepines
(d) Generation of epileptiform activity
(e) Membrane potentials and action potentials
(f) Discuss course and branches of median nerve . | 30 |

MODEL PAPER

B.Sc Neuro Electrophysiology I
Code

Short Name

B.Sc Neuro Electrophysiology
Part –I Examination Month Year

Paper II

Clinical neurology, Electronics and computer science

Time : Three Hours

Maximum Marks: 70

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.No.1 | Write in detail about CNS infections ? | 20 |
| Q.No.2 | Write in detail about transducers -their principle, active and passive transducer, transducer used in bio-medical applications? | 20 |
| Q.No.3 | Short Notes
(a) Capacitance
(b) Transformer – types and construction detail.
(c) Application of diodes as a switch and rectifier
(d) Physiological effect of electrical current
(e) Acute intermittent demyelinating polyneuropathy
(f) EEG electrode types | 30 |

MODEL PAPER

B.Sc Neuro Electrophysiology II
Code

Short Name

B.Sc Neuro Electrophysiology
Part –II Examination Month Year

Paper I

Technical and neuro clinical aspects of EEG

Time : Three Hours

Maximum Marks: 70

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.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
(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) Structure of Neuron
(f) Calibration and Bio-calibration | 30 |

MODEL PAPER

B.Sc Neuro Electrophysiology II
Code

Short Name

B.Sc Neuro Electrophysiology
Part –II Examination Month Year

Paper II

Technical and neuro clinical aspects of EMG , NCV, evoked potential and other neuro electrophysiological techniques

Time : Three Hours

Maximum Marks: 70

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.No.1 | Explain in detail the electrophysiological changes in peripheral neuropathy. | 20 |
| Q.No.2 | Documentation basic electrophysiology changes in myopathies. | 20 |
| Q.No.3 | Short Notes
(a) Sensory NCV
(b) F - wave
(c) Blink reflex
(d) Central motor conduction
(e) Visual evoked potential
(f) Needle EMG | 30 |

MODEL PAPER

B.Sc Neuro Electrophysiology III
Code

Short Name

B.Sc Neuro Electrophysiology
Part –III Examination Month Year

Paper I

Clinical Neurology and advanced EEG

Time : Three Hours

Maximum Marks: 70

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.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
(a) Video EEG
(b) EEG maturation
(c) Prolonged telemetry EEG
(d) EEG changes in CNS infections
(e) Status epilepticus
(f) Calibration and Bio-calibration
(g) EEG in metabolic disease of cerebrum | 30 |

MODEL PAPER

B.Sc Neuro Electrophysiology III
Code

Short Name

B.Sc Neuro Electrophysiology
Part –III Examination Month Year

Paper II

Advances in NCV, EMG, Evoked potential, QST, Intra-operative brain and spinal cord monitoring

Time : Three Hours

Maximum Marks: 70

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.No.1 | Discuss the EMG findings in details of amyotrophic lateral sclerosis with diagram. | 20 |
| Q.No.2 | Describe in details the nerve conduction study findings in patients with GBS.
(Guillain–Barré syndrome) | 20 |
| Q.No.3 | Short Notes
(a) F-latency
(b) Compound motor action potential
(c) Spontaneous Activity
(d) BAER/BAEP
(e) CTS Protocol
(f) Distal latency | 30 |

Elective Paper- Non – University Examination
DISASTER MANAGEMENT

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

Introduction to Disasters

- a. Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)
- b. Disasters
- c. Classification Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.)
- d. Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters. urban disasters, pandemics, complex emergencies, Climate Change

Approaches to Disaster Risk reduction

- a. Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- non structural ensures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake- holders.

Inter-relationship between Disasters and Development

- a. Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

Disaster Risk Management in India

- a. Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management institutional Arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).

Project Work: (Field Work, Case Studies)

- a. The project /fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located

Suggested Reading list:

- Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
- Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008

- Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge.
- Coppola P Damon, 2007. Introduction to International Disaster Management,
- Cuny, F. 1983. Development and Disasters, Oxford University Press.

INFORMATION AND COMMUNICATION TECHNOLOGY IN HEALTH EDUCATION

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

Learning objectives

Upon successful completion of this subject, students should

1. To obtain the basic knowledge on computer, devices used in computers.
2. To know the uses of computers like MS office, Power point Presentations, Excel documents.
3. To know about uses of internet, its advantages in regular updating the knowledge in Occupational therapy profession.

SYLLABUS

Introduction

1. Introduction to computers-History of Computer, Generation of Computer, Classification of Computers, Input Devices, Output Devices, Central Processing Unit, Components of CPU, Memory Unit, Peripheral Devices
2. Introduction to M.S. Windows
3. Internet and its applications
4. MGUMST web forum & portal
5. Google Applications
6. Introduction to M.S. Office - Word, Power Point, Excel,
7. Publisher

The Digital Age

Computer and communications, the five operations of a computer-and communication system-input, processing, output, storage and communications as well as the corresponding categories of hardware, five major categories of computers, development I communication Technology.

Applications Software

Applications and systems software, ethics of copying software, four types of applications software, entertainment education and reference, productivity and business and specialized, key functions of word processors, spreadsheets, database managers, graphics programs and suites, group-ware, and internet web browsers.

Storage Devices

Units of storage capacity, primary and secondary storage, data compression, data storage on diskette, hard disks, optical disks, and magnetic tape and describe the purposes of storage media.

Communications

Usage of communications technology, telephone-related services, online information services, the internet

Multimedia

What is multimedia – Multimedia PC– Multimedia Hardware - Central processor – color display, Multimedia accessories – CD ROM – Digital Audio – Audio speakers
– Digital video– MIDI – deodisc Read/write storage device- Multimedia software

Radio propagation:

Use of computers in physical therapy – Application Packages used in statistical analysis.

Recommended books

1. Free T. Hotstetter, —Multimedia Literacy| M<egraw Hill,
2. Simon J. Gibbs, Dinoysios C. Tsihriziz, —Multimedia programming|, Addison Wesley
3. John F.Koefgel Buford, —Multimedia Systems|, Addison Wesley
4. John Vince, —Virtual Reality Systems| Addison Wesley.
5. AndressF.Molisch, —Wideband Wireless digital communication| Pear Education Asia

CLINICAL NUTRITION

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

COURSE OBJECTIVE:

The objective of this course is that after 30 hours of L, D, P the student shall be able to understand the basic knowledge about Diet, balanced diet, metabolism, malnutrition, under nutrition, over nutrition, deficiency disease.

COURSE OUTCOME:

1. Become familiar about the nutritive values of food.
2. Explain about the food sources from which we obtain vitamins.
3. Become familiar with various compositions of food.
4. Well versed with digestion at each stages of digestive system.
5. Become familiar with different cooking methodologies.
6. Know and explain about food preparations by food manufacturer.
7. Explain thoroughly about the advantages and disadvantages of various convenience foods.

UNIT ISOURCES OF FOOD

1. Nutritive value of foods,
2. Food Sources from which key vitamins are derived

UNIT II DIGESTIVE SYSTEM

1. Digestion and absorption –Digestion at each stage of the digestive system
2. Dietary guidelines- Factors affecting food requirements. Planning and serving of family meals. Meals for all ages and occupations.

UNIT III COMPOSITION OF FOOD

Composition and value of the main foods in the diet - Milk, meat, fish, cheese, eggs, margarine and butter cereals (wheat, rice, maize, millets, oats) fruits and vegetables

UNIT IV PROCESSING OF FOOD

1. Cooking of food -Transfer of heat by conduction, convection and radiation.
2. Principles involved in the different methods of cooking – boiling, stewing, grilling, baking, roasting, frying, steaming, pressure cooking, cooking in a microwave oven.

FOOD PREPARATION

1. Convenience foods- Foods partly or totally prepared by a food manufacturer – dehydrated, tinned, frozen, ready to eat. Intelligent use of these foods.
2. Advantages and disadvantages

Text Book:

1. Agarwal, Textbook of human nutrition, JP, 1 Ed, 2014

Reference:

1. Kenneth F. Kiple, Kriemhild Coneè Ornelas, The Cambridge world history of food, Cambridge University Press, 1st ed, 2000

YOGA

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

COURSE OBJECTIVE:

The objective of this course is that after 30 hours of lectures & demonstrations, the student will be able to understand the basic concepts about Asanas and its effects, therapeutics effects of Yoga

COURSE OUTCOME:

1. Demonstrate the introduction and principles of yoga.
2. Knowledge of history of yoga and yoga in modern India.
3. Outline of yoga background and importance of yoga in modern world.
4. Learning the types and forms of Asanas and description of physiological effect of yoga.
5. Understanding the role of yoga in Occupational Therapy

UNIT-I Introduction to Yoga

1. Introduction to Yoga
2. Principles of Yoga

UNIT- II Patanjali

1. History of Yoga
2. Yoga in Ancient and Modern India

UNIT- III Folds of Yoga

1. Types & Forms of Yoga
2. Asanas & its physiological effects

UNIT- IV Yogic Science

1. Scientific background of Yoga
2. Yoga in modern world

UNIT -V Advantages of Yoga

1. Physiological Effects of Yoga
2. Therapeutic Uses of Yoga

Textbook:

1. BKS Iyengar, Light of Yoga, JP, 1st Ed, 2012.

Reference:

1. PayalGidwaniTiwari, Body Gaurders, CBS, 2nd Ed, 2009

EFFECTIVE ENGLISH

Theory Hours: 60

Total Hours: 60

Course Objective:

The objectives of this course is that after 40 hours of lectures, demonstrations and practicals the student will be able to Speak fluently, intelligibly and appropriately to teachers, Colleagues, Doctors, Patients and friends at the college, Hospital and hostel etc. about academic or (occupational) areas of interest. Course Outcome:

1. Students can gain knowledge about the various traditions writer and followed in English
2. Individuals can gain self – confidence in their own voice and speak out their opinions with confidence
3. Students will gain the ability to become a accomplished active readers
4. Helps to build the knowledge and understanding simultaneously through listening and give their point of view
5. Students will be able to write effectively in variety of professional and social setting
6. Acquire the ability to read and understand the literature and have the ability to identify the topics and formulate questions
7. Good communication skills which helps in easy rapport between the patient and therapist
8. Gain the fluency in speaking which helps in easy teaching method and presentation

UNIT – I INTRODUCTION

1. History of the language
2. Regional distribution
3. Variation in dialect and accent

UNIT – II PHONOLOGY

1. Consonants and vowels
2. Phontactics
3. Stress, rhythm and intonation
4. Regional variation

UNIT – III GRAMMER

1. Noun, Pronoun
2. Verb, Tense
3. Adjuncts
4. Adjectives

UNIT – IV SYNTAX

1. Clause syntax
2. Auxillary verbs
3. Vocabulary
4. Word formation

5. Pronunciation

UNIT – V PRESENTATION

1. Oral presentation & Panel discussion
2. Interview preparation
3. Clarity and specificity

Text Book:

1. O' Connor, I.D., Better English Pronunciation - Cambridge, Cambridge University.2009

Reference:

1. Water F.V.A , Proficiency Course in English – Hodder and Stronghton, London.1994
2. Tone Daniel, I.M. , English Pronouncing Dictionary –Dent and sons Ltd. London.2004

HEALTH CARE

Theory Hours: 50

Total Hours: 50

Introduction to Health

1. Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept.
2. National Health Policy
3. National Health Programmes (Briefly Objectives and scope) Population of India and Family welfare programme in India

Introduction to Nursing

1. What is Nursing? Nursing principles. Inter-Personnel relationships. Bandaging: Basic turns; Bandaging extremities; Triangular Bandages and their application.
2. Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.
3. Lifting and Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.
4. Bed Side Management: Giving and taking Bed pan, Urinal: Observation of stools, urine. Observation of sputum, understand use and care of catheters, enema giving.
5. Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion Care of Rubber Goods
6. Recording of body temperature, respiration and pulse, Simple aseptic technique, sterilization and disinfection. Surgical Dressing: Observation of dressing procedures

First Aid:

1. Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

Reference Books:

1. Preventive and Social Medicine by J.Park
2. Text Book of P & SM by Park and Park
3. Counseling & Communicate skills for medical and health, Bayne- Orient Longman Pvt. Ltd.

Constitution of India

Theory Hours: 50

Total Hours: 50

Unit-I:

Meaning of the term 'Constitution'. Making of the Indian Constitution 1946- 1950.

Unit-II:

The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.

Unit-III:

Fundamental Rights and Duties their content and significance.

Unit – IV:

Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

Unit – V:

Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

Unit-VI:

Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.

Unit – VII:

The Election Commission and State Public Service commissions.

Unit – VIII:

Method of amending the Constitution.

Unit – IX:

Enforcing rights through Writs:

Unit – X:

Constitution and Sustainable Development in India.

Reference Books:

1. J. C. Johari: The Constitution of India- A Politico-Legal Study-Sterling Publication, Pvt. Ltd. New Delhi.
2. J. N. Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution – Corner Stone of a Nation-Oxford, New Delhi, 2000.