Kaloji Narayana Rao University of Health Sciences
(KNRUHS)
Warangal, Telangana, India.

B.Sc ALLIED HEALTH SCIENCES

HAND BOOK 2024-2025

B.Sc ALLIED HEALTH SCIENCES COURSES OF KNRUHS	
Sl.No	**COURSES**
1	Anaesthesia Technology
2	Operation Theatre Technology
3	Cardiac and Cardio Vascular Technology
4	Renal Dialysis Technology
5	Optometry
6	Respiratory Therapy Technology.
7	Neuro Science Technology.
8	Critical care Technology.
9	Radiology and Imaging Technology.
10	Audiology and Speech Therapy Technology
11	Medical Records Science
12	Medical Lab Technology

REGULATIONS AND CURRICULAM OF B.Sc ALLIED HEALTH SCIENCES

Eligibility for Admission:-
The candidates should have passed the two year Intermediate course examination with Physics, Chemistry and Biology, conducted by the Board of Intermediate Education, OR any other examination considered as equivalent thereto by KNRUHS.

OR

Any other examinations of (10+2 pattern) from recognized Board under AISSCE/CBSE/ICSE/SSCE/HSCE/NIOS/TOSS of other equivalent Board with Biology, Physics and Chemistry recognized as equivalent by Board of Intermediate Education,Telangana State.

(OR)

Intermediate (10+2) with Bridge course with Biology and Physical Science.

AND

One must qualify in Telangana State EAMCET.

Duration of the course - 4 years including one year compulsory Internship.

Age Limit – Candidates should have completed the age of seventeen years on or before 31st December of the year of admission.

Medium:
The medium of instruction and examination shall be English.

Attendance:

a) A candidate shall be considered to have satisfied the requirement of attendance if he / she attends not less than 80% of the classes held in each of the subjects separately for theory and practical postings in each academic year. However, if the attendance of students is 70% and above but below 80%, it may be condoned by the University on the recommendation of the Principal and on the payment of condonation fee as prescribed by the University.

b) A candidate who does not satisfy the requirements of attendance in any subject shall not be permitted to take the University examination in that particular subject and he / she shall be required to appear the same in a subsequent exam.

PRACTICAL BOOK:
Each candidate has to maintain a practical book of cases attended and clinical hours posted in various sub specialties.

Examinations:
The examinations will be conducted at the end of each academic year both in theory and practicals. The supplementary examinations will be conducted within 6 months after the main examination conducted by the University for all the three phases of the course.

Internal Assessment:-

Theory : 20Marks
Practical: 20 Marks
Total : 40Marks

There shall be a minimum of two written examinations and two practicals examinations, preferable first one in first term,and the second one before the university examination (Pre-Final examination) in each subject in an academic year.The average marks of the two tests will be calculated and reduced to 20.The marks of IA shall be communicated to the University at least 15 days before the commencement of the University examination.The University shall have access to the records of such periodical tests.The marks of the internal assessment must be displayed on the board of the respective colleges within a fortnight from the date test is held.If a candidate is absent for anyone of the tests due to genuine and satisfactory reasons,such a candidate may be given a re-test within a fortnight.

Re-totaling of answer scripts:
There is no provision for reevaluation of answer books in the University. However, as per the rules of the university the students can request for retotaling on payment of Rs.500/-. On receipt of student's application along with fee, a date for re-totaling will be announced by the University. The student has to attend personally on the said date to identify the answer book, which will be shown to the student. The faculty members who are posted for the job will take up the correction of the errors in the re-totaling and correction of un-valued questions. Modification of the results if any will be declared as per the rules of the University.

Minimum for a Pass:
a) A candidate shall be declared to have passed in a subject if he / she obtains not less than 40% in the written and 50% in practical examinations in the University examination and an Aggregate of 50% marks including the Internal Assessment.

b) If a candidate fails in either theory or practicals he / she has to appear for both theory and practicals in the subject in any subsequent examination and he / she must obtain the minimum marks as specified above for a pass in that subject.

c) 50% of marks in each Section A& B separately where two subjects are combined in single paper. If a candidate who has failed to secure the minimum pass mark of 50% ether in Section A or B, the candidate has to write again both the Sections irrespective the fact whether the candidate has passed in one Section

classification of successful Candidates:
Class shall be declared for the first, second and third year examinations on the basis of aggregate marks

Percentage of marks for:-

I class with distinction : Not less than 70% of the aggregate marks.

I class: 69% to 60% of the aggregate marks.

Second class : 59% to 50% of the aggregate marks.

Promotion Criteria:
a) A candidate with two backlog subjects in First year may be promoted to Second Year.
b)A candidate has to pass carried over subject before appearing the second year or third year university Examinations. A candidate who has failed in more than 2 subjects shall not be promoted to the next year.

Holidays and vacations: 15 days of summer vacation shall be granted in the month of May,apart from public holidays declared by the University.

MIGRATION/TRANSFER:

No Migration/Transfer of candidates from one recognized institution to another institution of this University or from another university will not be considered.

RE-ADMISSION :

As per G.O. Ms.No.155,HM&FW (CI) Dept.,Readmission rules of KNRUHS for UG course and Prospectus of all UG course,"Every candidate after his admission shall attend classes on all working days (theory,Practicals,Clinicals).if a student absent continuously for a period of (91) days or more and seeks permission to attend the course before 2 years after discontinuation,the candidate's application in the prescribed proforma shall be forwarded to the Registrar with the recommendation of the principal with requisite fees.If the Vice Chancellor is satisfied with the reasons for absence, the candidate may be granted leave of absence and be permitted for Re-admission attaching such conditions as deemed to have forfeited the admission into the course and the studentship shall stand canceled without any further notice.

DIS-CONTINUATION:

In case if a candidate is willing to discontinue the course that candidate have to submit discontinuation affidavit proforma and has to pay Rs.50,000/- (Fifty thousand) to the university.

Anti Ragging Act

Ragging is prohibited in the educational institutions in the State of A.p. vide act No.26 of 1997 dt21-08-1997 the anti ragging act is placed on the website of the university for information.

FIRST YEAR SUBJECTS ARE COMMON FOR ALL THE ALLIED HEALTH SCIENCES EXCEPT FOR THE OPTOMETRY TECHNOLOGY, AUDIOLOGY& SPEECH TECHNOLOGY AND MLT COURSES

S.NO	SUBJECT	NUMBER OF HOURS OF TEACHING (PRACTICAL AND THEORY)
Allied subject to be completed in first 6 months		
1	**ENGLISH**	**25**
2	**COMMUNITY MEDICINE AND MEDICAL ETHICS**	**25**
3	**PRINCIPLES OF NURSING**	**15**
4	**MEDICAL RECORDS**	**10**
Core Subjects to be completed in first 12 months		
1	**ANATOMY INCLUDING HISTROLOGY**	**75**
2	**PHYSIOLOGY**	**75**
3	**BIOCHEMISTRY & MICROBIOLOGY**	**75**
4	**PATHOLOGY(Clinical pathology,Haematology &Blood Banking)**	**75**
5	**MICROBIOLOGY**	**75**
	TOTAL HOURS	**450**

TEACHING SCHEDULE:

S.NO	ACADEMIC YEAR (12 MONTHS)	TIMINGS	
1	FIRST YEAR		THEORY CLASSES
		9.00 AM -4.00 PM	

PATTERN OF EXAMINATION:**COMMON FOR ALL THE SPECIALTIES DURING THE FIRST YEAR**

<table>
<tr><td>ACADEMIC YEAR</td><td colspan="2">SUBJECTS</td><td></td><td></td></tr>
<tr><td rowspan="6">FIRST YEAR</td><td>ALLIED</td><td>CORE</td><td>THEORY</td><td>PRACATICAL EXAM</td></tr>
<tr><td>ENGLISH</td><td>ANATOMY INCLUDING HISTROLOGY</td><td rowspan="5">ONE PAPER IN EACH SUBJECT</td><td rowspan="5">NO PRACTICAL EXAM</td></tr>
<tr><td>COMMUNITY MEDICINE MEDICINE AND MEDICAL ETHICS</td><td>PHYSIOLOGY</td></tr>
<tr><td rowspan="3">PRINCIPLES OF NURSING MEDICAL RECORDS</td><td>BIOCHEMISTRY</td></tr>
<tr><td>MICROBIOLOGY</td></tr>
<tr><td>PATHOLOGY</td></tr>
<tr><td>EXAMS AT THE END OF FIRST TERM (06 MONTHS)</td><td>EXAMS AT THE END OF THE YEAR</td></tr>
</table>

PERIODICITY OF THE EXAMINATION: There shall be only two examinations in each academic year.The annual examination shall be held at the end of each academic year,with the exit examination being conducted in the third year.Supplementary examination will be held in the middle of each academic year,not earlier than four months later than six months of the main exam.

DISTRIBUTION OF MARKS-ALL SUBJECTS:

		Written Exam		I.A Theory	Total
Paper	**Subject**	**Duration (Hours)**	**Marks**	**Marks**	**Marks**
	Main Subject*				
1	Basic Anatomy(Including Histology)	3	80	20	100
2	physiology	3	80	20	100
3	biochemistry	3	80	20	100
4	pathology	3	80	20	100
5	microbiology	3	80	20	100
	Subsidiary Subject				
1	English	3	80	20	100
2	Community Medicine & Medical Ethics	3	80	20	100
3	Principles of Nursing and Medical Records	3	80	20	100
		University theory Exam		Internal Assessment	
		(Min 50%)		(Min 50%)	

Note: I A= Internal Assessment

Main Subjects shall have University Examination.There shall be no University Practical Examination.

** subsidiary Subjects: Examination for Subsidiary subjects shall be conducted by respective college.

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

PAPER CODE: AHS

KALOJI NARAYANA RAO UNIVERSITY OF HEALTH SCIENCES
WARANGAL, TELANGANA-506002

B.Sc. (Allied Health Sciences) SECOND YEAR DEGREE EXAMINATIONS:

(COURSE/SPECIALITY: _____)

(SUBJECT/PAPER: _____)

Time:3hours
Max Marks:80
Note: Answer all Questions
Draw diagrams whichever necessary with Black Ball point pen,HB Pencil any dark Color pencil.

Write essay on any TWO of the following questions: 2 X 10=20

1
2
3

Write a short note on any FIVE of the following: 5 X 6=30

4.
5.
6.
7.
8.
9.

Write briefly on the following: 10 X 3=30

10 X 3=30

10.
11.
12..
13.
14.
15.
16.
17.
18.
19.

* * * * *

NOTE:

1. Classes will be scheduled Monday to Friday between 2 and 4 pm on all working days.
2. The students will be posted in their respective department from 9 am to 1 pm from Monday to Friday and from 9 am to 4 pm on Saturday.
3. Teaching of the above core subjects shall be completed one month before the final 1st yr university examination.
4. The Teaching hours and Exam pattern for second and third years are furnished separately under each speciality.
5. There shall be an internship during the fourth year which includes clinical work, maintenance of log-book and project work if any.
6. Workshop including basic life support, advanced cardiac life support and advanced trauma life support will be conducted during the internship.

1ST YEAR

ENGLISH

Total Teaching hours: 25

Unit 1. Communication

Role of communication, Defining Communication Classification of communication, Purpose of communication, Major difficulties in communication, Barriers to communication, Characteristics of successful communication –The seven Cs Communication at the work place, Human needs and communication, "Mind mapping" Information communication.

Unit 2. Comprehension passage

Reading purposefully, Understanding what is read, Drawing conclusion, Finding and analysis.

Unit 3. Explaining

How to explain clearly, Defining and giving reasons, Explaining differences, Explaining procedures and Giving directions.

Unit 4. Writing business letters

How to construct correctly, Formal language, Address, Salutation, Body, Conclusion.

Unit 5. Report writing

Reporting an accident.

Reporting what happened at a session

Unit 6. Reporting what happened at a meeting

Unit 7. Language activity

Syllable division, Precis – Writing, Common errors, Expansion of proverbs, Resume writing, One-word substitutes

Unit 8. Grammar

Unit 9. Prose

- 1.After twenty years – O. Henry
- 2.Once more to the lake – E.B White
- 3.Playing the English gentle man – M.K. Gandhi
- 4.The Boy who Broke the bank – Ruskin Bond

Recommended text book

1. Paths to skills in English. Orient Blackswan. Sundaravalli, AS. Kamalakar et al.
2. English Grammar in use. Raymond Murphy. Cambridge University Press.
3. Practical English Usage by Michael Swan 20

COMMUNITY MEDICINE

Total teaching hours: 25

Unit 1. Concepts of health and disease

- Dimensions and determinants of health.
- Indicators of health.
- Health service philosophies.
- Concept of disease, its causation and natural history.
- Concept of disease control and prevention.
- Disease classification.

Unit 2. Principles of epidemiology and epidemiological methods

Unit 3. Infectious disease epidemiology, Dynamics and Model of transmission of disease.

Unit 4. Health programmes in India

- Malaria, TB, AIDS, Universal immunisation programme, minimum needs programme

Unit 5. Disinfection

- Common infections, Disinfection, Disinfestations and Sterilization at the health centre level.

Unit 6. Hospital Waste Management

- Hazards of health care waste
- Disposal of wastes in Hospital and Primary Health Centre

Unit 7. Health services

- Brief description of organization of health services at the centre and state levels.

Unit 8. Primary Health Care

- Definition, components and principles of primary health care.
- Millennium Development Goals.
- Primary Health Centre -The functions, staffing pattern and the role of paramedicals in primary Health Centre.

Unit 9. Nutritional Health

- Vitamins and Minerals protein Energy malnutrition obesity & Nutritional Assessment.

Unit 10. Epidemiology of Communicable and Non communicable disease polio, measles

Unit 11. Demography & Population control

- The factors influencing population growth, death rate, birth rate, Age pyramid and methods of contraception.
- Sources of Health information – Census, SRS

Unit 12. Environmental sanitation

- Water borne diseases, Methods of water purification and disinfection, collection of water samples, their transport and bacteriological analysis
- Air pollution
- Noise pollution
- Radiation and hazards
- Methods of excreta disposal and solid waste disposal.

Recommended text book

1. Park's text book of Preventive and social Medicine – Latest edition

Reference books

1. Community Medicine with recent advances by A.H. Surya Kantha
2. Short text book of preventive and social medicine by G.N. Prabhakar
3. Text book of community medicine by Sunderlal.

MEDICAL ETHICS

Total teaching hours: 10

Unit 1. Introduction to medical ethics

- What's special about medicine?
- What's special about medical ethics?
- Who decides what is ethical?
- Does medical ethics change?
- Does medical ethics differ from one country to another?
- The role of the WMA
- How does the WMA decide what is ethical?
- How do individuals decide what is ethical?

Unit 2. Major principles of medical ethics.

Unit 3. Perspective of medical ethics

- The Hippocratic oath
- The Declaration of Helsinki
- The WHO Declaration of Geneva, International code of Medical Ethics (1993)
- Medical Council of India Code of Ethics (2002)

Unit 4. Ethics of the individual

- The rights of the patient
- Truth and confidentiality
- The concept of disease, health and healing
- The right to health and responsibilities of individuals

Unit 5. The ethics of human life

- Beginning-of-life issues
- Prenatal sex determination
- The family and society in medical ethics
- Euthanasia, cancer and terminal care. Death and dying. Use of life-support systems, the right to die with dignity
- Suicide – the ethical outlook.
- Communication and consent,
- Decision-making for incompetent patients
- Confidentiality

Unit 6. Ethics in relation to society, colleagues and research

- Contract and confidentiality, malpractice and negligence
- Increasing the awareness and knowledge of students of the value dimensions of interactions with the patients, colleagues, relations and public.
- Dual loyalty, Resource allocation.
- Professional Ethics. Respect and equal treatment
- Relationships with physician colleagues, teachers and students. Relationships with other health professionals. Cooperation. Conflict resolution
- Reporting unsafe or unethical practices.
- Duties and responsibilities of the technologists.

PRINCIPLES OF NURSING

Total teaching hours: 20

Unit I. Health care

- Health care services, promotive, preventive, Curative & rehabilitative services
- Health care infrastructure - primary, secondary and teritiary level

Unit 2. Hospital

- Functions, Departments - OPDs Wards ICUs, OT & Labs
- Health Team - Members and their functions
- Communication among health team members
- Categories of nursing personnel and their roles
- Hospital Admission and Discharge
- Documentation and Reporting

Unit 3. Health Assessment

- Health History
- Physical Examination - inspection, palpation
- Percussion & Auscultation
- Vital signs (Temperature, Pulse, Respirations & Blood pressure)
- Nutritional Assessment

Unit 4. Concept of asepsis

- Medical Asepsis
- Surgical Asepsis
- Infection Control

Unit 5. Administration of Medication

- Purposes, Broad Classification & Forms of Drugs
- Storage & Maintainance of Drugs
- Routes of Administration

Unit 6. Mobility & Immobility

- Body Alignment, Comfort Devices & Positions

Unit .7 Communication & Health Education

- Types, Process Elements and Skills of communication.
- Communication with patient and family members

Recommended text books

1. Kozier and Erb's Fundamentals of Nursing. Audrey Berman et al. Pearson.
2. Principles and Practice f Nursing. SR Nancy. NR publishing house.

Medical Records Sciences: Teaching hours 10

1. **Introduction to Medical Records Services**
2. **Standards for Medical Record Services**
3. **Medical Records**
    - Needs and Management of MRD
    - Hospital's General Rules and Regulations
    - Control and Movement of Medical Records
    - Rights and Responsibilities of a Patient
4. **Medical Record Systems**
    - Comprehensive Record System – Procedures followed at AIIMS
5. **Personal Health Records (PHR)**
6. **Hospital Statistics**

7. **International Classification of Diseases -10th Revision**
    - Introduction; What is Coding?
    - History of ICD
    - Hierarchical Structure
    - Differences between ICD-9 and ICD-10
    - Basic Coding Guidelines
    - Other ICD Classification Systems
    - No-shortcut for ICD
    - International Classification of Procedures in Medicine
    - Morbidity ICD codes for National Ayurveda, Siddha, and Unani.
8. **Hybrid from Manual to Electronic Records**
9. **Historical Background of Health Information Technology**
10. **How to Comupurerize the M.R. Management System (MRMS)**
11. **Electronic Health Records (E.H.R)**

12. **The Strategic E.H.R.Planning**
13. **Challenges of E.H.R Adoption**
14. **Electronic Health Record Limitations**
15. **E.H.R Functional Requirement Specifications**
16. **Check List for Assessing HIM Dept. Readiness and Planning for E.H.R.**
17. **Electronic Health Record Standards**
18. **Technology Infrastructure Assessment**
19. **E.H.R System Implementation and Maintenance**
20. **Introduction to Electronic Nursing Records**
21. **Medical Records Role in HCD in 21st Century**
22. **The Physician treats the Patient and the HIM treat the Hospital for controlling**
23. **Healthcare Cost**
24. **Role of HIM in the next 10 to 20 years**
25. **Transformation of HIM Status in the Developing Countries in the next 10 to 20 years**
26. **Health Information Manager (HIM) Education and Training in the next 10 to 20 years**
27. **Evolution of the International Federation of Health Information Management**
28. **Association (IFHIMA) from the 20th Century and What will grow in 21st Century**
29. **Medico-legal Aspects of Manual and Electronic Health Records**

BASIC ANATOMY
(Including Histology)

Total Teaching hours: 50

Unit 1. Human Body as a whole

Definition of anatomy, List the sub-divisions of anatomy, Anatomical terms of location and position of various parts and organs in the human body, Fundamental planes of the body, Levels of organization of human body, Structure of cell, Basic Tissues of the body - classification and preparation of tissue for observation under microscope – describe properties of various basic tissues of the body with examples –Epithelial tissue, connective tissue, muscular tissue, nervous tissue along with illustrations of histological slides of basic tissues.

Unit 2. Locomotor System

Classification of different types and description of different parts of bones, Identification of major bones and their parts, Classification of various types of joints, Understanding blood supply of a long bone, Description of a synovial joint, Classification of different types of synovial joints with type of movements and examples and Classification different types of muscles.Names of muscles as functional groups, Important muscles in the body - Trapezius, Deltoid, Pectoralis major, Gluteus maximus, Hamstring muscles, Soleus, sternocleidomastoid, oblique muscles of abdomen, muscles of tongue, scapular muscles, Description of Axilla, cubital fossa, popliteal fossa, Triangles of neck, Flexor and Extensor Retinaculum, Palmar and Plantar Apo neurosis. Description of Articular surface, Ligaments, Relations, Blood supply, Nerve supply, Movements and Clinical Anatomy of Shoulder joint, Elbow Joint, Wrist joint, 1stcarpo-metacarpal joint, Hip Joint, Knee Joint, Ankle Joint along with Illustrations- major bones, important muscles, and joints.

Unit 3. Nervous System

Description of the parts of nervous system, Structure of nervous tissue, Spinal cord - coverings, extent, general features, sub-divisions, structural organization of grey matter and white matter, Blood supply, Formation of tracts –Posterior column, pathway, pyramidal tract and their clinical importance, Injuries to spinal cord, Brain stem – components, Blood supply, important functional components and effect of their injury, Cerebellum – location, parts, functional subdivisions, connexions, blood supply and functional importance, Cerebrum – surfaces, poles, lobes, blood supply, sulci, gyri and important functional areas and their clinical importance, Thalamus, hypothalamus, basal ganglia, corpus striatum, hippocampus and amygdala – their location and function, Cranial nerves – names, location

of nucleus and the functional components, Spinal nerves – Course of a typical spinal nerve, Formation of plexuses – brachial, lumbar – important nerves of upper limb, lower limb with Illustrations– Brain, spinal cord and their sections.

Unit 4. Circulatory System

Description of circulatory system. Pulmonary, portal and systemic circulations. Structure of cardiac muscle, blood vessels. Thoracic cavity – Bony cage, muscles – intercostal muscles, diaphragm. Mediastinum – sub-divisions, contents. Heart - coverings, external features, chambers, blood supply, nerve supply. Major arteries of upper limb, lower limb, head and neck, abdomen and pelvis. Important veins – superior and inferior vena cava, portal vein, veins of upper limb and lower limb - varicose veins and their importance. Lymphatic system – components, Describe in brief anatomy and microscopic structure of lymphoid organs – lymphnode, tonsil, thymus, spleen, thoracic duct with Illustrations -thoracic cavity, mediastinum, heart, major vessels, lymphoid organs.

Unit 5. Respiratory System

Describe the parts of respiratory system. Nasal cavity, paranasal air sinuses, nasal septum, lateral wall of nose. Pharynx – extent, sub-divisions, muscles. Larynx – cartilages, muscles, parts, nerve supply. Trachea and bronchial tree – extent, measurements, histological structure of trachea – subdivisions of bronchial tree – broncho-pulmonary segments and their clinical importance. Pleura – types, reflections, recesses. Lung – location, relations, lobes, fissures, surfaces. Illustrations – Cut section of head & neck, trachea, lungs.

Unit 6. Digestive System

Describe the abdomen – quadrants, musculature of wall, Formation inguinal canal, rectus sheath and their importance. Components of digestive system. Mouth - Tongue, palate – Structure of tongue. Salivary glands – parotid, sub-mandibular – Brief anatomy and structure. Stomach – position, parts, blood supply, nerve supply, lymphatic drainage, relations, structure. Small intestine – sub-divisions, microscopic structure. Large intestine in general - sub-divisions, microscopic structure. Specific -caecum and appendix. Accessory organs of digestive system –Liver, pancreas, extra hepatic biliary apparatus-Gross features, relations, blood supply, microscopic structure. Illustrations of abdominal wall, inguinal canal, various organs of digestive system.

Unit 7. Excretory and Reproductive Systems

Describe the parts of excretory system. Kidney – Gross anatomy and microscopic structure. Ureter, urinary bladder and urethra – gross anatomy in brief. Male reproductive system – parts – external genitalia – Testis and duct system in detail. Female reproductive system - parts – external genitalia – Ovaries and duct system in detail. Accessory organs of reproduction – prostate gland, mammary gland- gross anatomy and their structure. Illustrations – urinary system, reproductive system of male and female.

Unit 8. Endocrine System

List the endocrine glands and their location. Thyroid and parathyroid glands – location, relations, blood supply, functions, clinical importance. Pituitary gland – location, parts, relations, blood supply, functions, clinical importance. Supra renal gland - location, parts, relations, blood supply, functions, clinical importance -Illustrations – Demonstration of Thyroid, Pituitary, supra renal glands.

Recommended text book

1. B.D. Chaurasia – General Anatomy.

Reference Books

1. P R Ranganath, Suruchi Singhal, Leelavathy N, Vani Vijay Rao, Roopa R - Basics in Human Anatomy For BSc paramedical Courses, Jaypee publishers.

HISTOLOGY

General Slides:

1. Hyaline Cartilage
2. Fibro Cartilage
3. Elastic Cartilage
4. T.S & L.S.Bone
5. Blood Vessels
6. Tonsils
7. Spleen
8. Thymus
9. Lymph node
10. Epithelial Tissue
11. Skeletal and Cardiac Muscle - Excluded
12. Peripheral nerve and optic nerve - Excluded

II. Systemic Slides:

1. G.I.T – Fundamental structure of G.I.T. &
   Liver, Stomach, Small intestine
2. R.S. - Lung, Trachea
3. Kidney
4. Endocrines - Pituitary, Thyroid and Parathyroid
   - Adrenal
   - Pancreas.
5. Reproductive System: Ovary, Testis
   Uterus - Excluded,

PHYSIOLOGY

Total Teaching hours: 50

Unit 1. General Physiology

The structure and function of cell, Cell structure and functions, Transport across membranes, Body water and bloody fluids.

Unit 2. Blood and Body Fluids

Composition and functions of blood, Plasma proteins, Erythrocytes – morphology and functions, Platelets-morphology and functions, Blood groups, Coagulation of blood, the immune system.

Unit 3. Nerve Muscle Physiology

Nerve structure and function, classification of nerve fibres, Mechanism of impulse formation and conduction. Muscles-classification, structure, Neuro muscular junction, Muscle contraction – mechanism, types.

Unit 4. Digestive System

Physiological anatomy of gastrointestinal tract, physiology of salivary secretion, mouth and esophagus, the stomach, pancreas, liver and gall bladder, small intestine, large intestine, digestion and absorption. GIT hormones.

Unit 5. Cardiovascular system

Physiological anatomy of the heart, properties of the cardiac muscle, cardiac cycle, Electrocardiogram, principles of circulation Heart rate, arterial pressure, cardiac output, cardiovascular regulatory mechanisms, regional circulation. Effect of exercise on CVS & respiration.

Unit 6. Skin

Structure of sweat glands; temperature regulation.

Unit 7. Excretory System

Physiological anatomy of the kidney mechanism of formation of urine, renal clearance, countercurrent mechanism, regulation of volume and concentration of the body fluids, physiology of micturition, kidney function tests.

Unit 8. Endocrine System

Posterior pituitary hormones and their actions, Hypothalamohypophyseal inter relationship, Diabetes Insipidus. Anterior pituitary hormones and their functions. Dwarfism, giganitism, acromegaly. Thyroid hormones, biosynthesis and functions. Cretinism, Myxoedema, Goiter and Grave's disease. Parathyroid hormones, functions, tetany. Insulin, glucagon actions and diabetes mellitus. Adrenal medullary hormones and their actions. Adrenal cortex hormones and their functions.

Unit 9. Reproductive System

Male reproductive organs-spermatogenesis and testosterone actions. Female reproductive organs-menstrual cycle, ovarian, uterine. Cervical, vaginal and breast changes, hormonal control. Contraceptive methods of couple (rhythm method). Male and female contraceptive methods.

Unit 10. Respiratory System

Structure of upper and lower respiratory tract. Muscles of respiration and mechanism of Respiration. Lung volumes and capacities – definitions, normal values intra pulmonary and intra pleural pressures, surfactants Oxygen transport, Carbon-di-oxide transport. Nervous and chemical regulation of respiration Hypoxia, cyanosis and artificial respiration.

Unit 11. Nervous System

Structure of neurons. Properties of neurons (excitation and conduction). Synapses and synaptic transmission, reflexes and properties of reflexes. Sensory endings and sensory mechanisms Spinal cord-pathways in the spinal cord. Brain stem, thalamus, basal ganglia, cerebellum, cortex and reticular formation. Cerebrospinal fluid. Control of posture and control of voluntary motor activity Autonomic nervous system.

Unit 12. Special Senses

Vision, Audition, olfaction, gustation and vestibular apparatus.

Recommended text book

1. Basics of Medical Physiology By Dr. D.Venkatesh.

Reference Books

1. Text book of Human Physiology Dr. D. Venkatesh.
2. Text book of physiology Prof AK Jain.

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

BIOCHEMISTRY

Unit 1. H+, Acids, Bases, Buffers

Equilibrium constant, dissociation of water, H+ concentration, pH, acids-strong and weak, bases, titration behaviour, Henderson-Hesselbach equation, buffers, pH measurement, physiological buffers.

Unit 2. Membrane and Cell

Organelles, functions, membrane structure, transport across membranes, ionophores, membrane proteins, transporters.

Unit 3. Chemistry of Carbohydrates

Classification, important monosaccharides, stereoisomerism, anomerism. Reaction with acids, amines, oxidizing agents, reducing agents. Osazones, Disaccharides, polysaccharides.

Unit 4. Chemistry of lipids

Definition, classification, nature of fatty acids, triacyl glycerol, saponification and iodine number, rancidity, antioxidants, complex lipids, steroids. energitics, Lipolysis.

Unit 5. Chemistry of amino acids, peptides, proteins

Structure of 20 amino acids, grouping isomerism, charge properties, ninhydrin reaction, peptide bond, examples of peptides, Proteins –classification, Structure-primary, secondary, tertiary and quaternary forms, denaturation.

Unit 6. Chemistry of Nucleic Acids including protein synthesis

History, bases, nucleosides, nucleotides. DNA and gene. Types of RNAs, Nucleotides coenzymes.

Unit 7. Haemoglobin

Structure and functions of haemoglobin,Hb derivatives, degradation of Hb,Jaundice, Haemoglobin opathies.

Unit 8. Enzymes

History, catalyst, classification, efficiency, specificity, basic account of mechanism of action. Factors affecting enzyme activity. Units of measurement, Inhibitors – competitive, noncompetitive, examples. Coenzymes, proenzymes, isoenzymes, Clinical enzymology, normal values.

Unit 9. Vitamins

History, Vitamins A, D, E and K. B-complex vitamins – thiamine, riboflavin, niacin, pyridoxine, folic acid, pantothenic acid, biotin, B-12, Vitamin C. Brief account of chemistry, source, requirements, deficiency diseases, biochemical functions, Hypervitaminosis.

Unit 10. Mineral metabolism

Bulk and trace elements. Sodium, potassium, Calcium, Phosphorous, Iron. Brief account of iodine, magnesium, copper, zinc, fluoride, manganese, selenium and molybdenum.

Unit 11. Energy Metabolism

Calorimetry, basal metabolism, specific dynamic action, energy requirements under different conditions. Hormonal influence.

Unit 12. Nutrition

Distribution of energy in dietary factors, Nitrogen balance, Protein quality, Kwashiorkar and Marasmus. Protein supplementation, Recommended dietary allowance and diet planning.

Unit 13. Immunology:

Innate & acquired immunity, humoral & cell mediated immunity, antigen & antibodies.

Recommended text book

1. Biochemistry by U. Sathyanarayana.

Reference Books

1. Text book of Biochemistry for Medical students by D.M.Vasudevan.
2. Text book of Biochemistry for Medical students by Dr. MD.Rafi.

MICROBIOLOGY

Total Teaching hours: 30

Unit 1. Introduction and History of microbiology.

Unit 2. Classification, shape and arrangements of micro-organisms, special characteristics, spores, capsules, enzymes, motility and reproduction.

Unit 3. Disinfection and antiseptics.

Unit 4. Sterilization and asepsis.

Unit 5. Anti-bacterial agents.

Fundamental aspects and susceptibility tests.

Unit 6. Infection.

Sources of infection, portals of entry and spread of infection.

Unit 7. Non-specific immunity.

Immunity – natural and acquired; Immunisation schedule.

Unit 8. Allergy and Hyper sensitivity.

Unit 9. Outline of common pathogenic bacteria, diseases produced by them, treatment and Prevention.

Respiratory tract infections, meningitis, enteric infections, anaerobic infections, urinary tract infections, leprosy, TB and miscellaneous infections, wound infections, sexually transmitted infections, hospital acquired infections.

Unit 10. Pathogenic Yeasts and Fungi.

Unit 11. Virology.

Viral infections with special mention of hepatitis, poliomyelitis, HIV and rabies, FLU (Influenza) , Dengue, Chikungunya.

Unit 12. Basic Parasitology .

Recommended text books

1. Anantha narayana Paniker Text book of Microbiology. **2**

Reference books

1. SC Parija, Text book of parasitology.
2. Monika Chesbrow District laboratory practice in Tropical countries II volume.
3. Baveja Medical Paracytology.

PATHOLOGY

Total Teaching hours: 30

Unit 1. Introduction

Concept of diseases, classification of lesions

Unit 2. Bacterial, viral and parasitic infections – A general outline

Unit 3. Inflammation and repair

Unit 4. Degeneration, necrosis and gangrene

Unit 5. Haemorrhage, shock, embolism and thrombosis.

Unit 6. Tuberculosis

Unit 7. Leprosy and Typhoid.

Unit 8. Deficiency diseases

Unit 9. Tumors – Terminologies, Nomenclature. Differences between benign and malignant tumors

Unit 10. Tumors – Etiology, pathogenesis and spread of tumors

Unit 11. Anaemias

Unit 12. Coronary Heart Disease (Ischaemic Heart Disease) to include atherosclerosis

Unit 13. Congenital and Valvular Heart Diseases

Unit 14. Bone and Joints – Autoimmune diseases, septic arthritis, osteomyelitis.

Unit 15. Rheumatoid Arthritis

Unit 16. Diseases of the Kidney

Unit 17. Diseases of other parts of the Urinary System

Unit 18. Central Nervous System. CNS infections and Neurologic disorder

Unit 19. Diseases of muscle including poliomyelitis, myopathies

Unit 20. Diseases of Esophagus, Stomach and Intestine

Unit 21. Diseases of Liver and Pancreas.

Recommended text book

1. Text book of pathology by Harsh Mohan.

Reference Books

1. Practical Haematology by Dacie & Lewi"s.
2. Haematology practice by Dr. Tejendra Singh.
3. Histopathology Techniques by Bancraft.
4. Clinical Diagnosis and laboratory methods by Todd & Sanfort.

OBJECTIVES OF THE COURSE

To enable students to learn about

- Anaesthesia equipment- working, function and maintenance.
- Drugs used in anaesthesia – Basics pharmacology and drugs used in special situations.
- Monitoring of patients during peri-operative period.
- Assist the anaesthesiologist during procedures and resuscitation.
- Critical Event identification and management during anaesthesia.
- Peri-operative care of patients.
- Cardiopulmonary resuscitation.
- Data entry.
- Supply chain management.
- Sterilization of Equipment.
- Non-technical skills- team work and communication.

B.Sc. ANAESTHESIA TECHNOLOGY COURSE

2ND YEAR

TEACHING HOURS & EXAMINATION PATTERN:

Paper No	Paper	Teaching hours		Examination			
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)	Total Min Pass (50%)
1	History of Anesthesia, Applied Anatomy, Physiology and Pharmacology related to Anesthesia Technology	60	140	80	120	40	400
2	Basics Principles of Anaesthesia	60	140	80			
3	Anesthesia Techniques in Regional and General Anesthesia including complications	60	140	80			
	Total	180	420	240	120	40	

UE:UniversityExam

*Practical includes Oral, Spotters & Record

SECOND YEAR SYLLABUS

Total Teaching hours 600

PAPER – 1 HISTORY OF ANESTHESIA, APPLIED ANATOMY, PHYSIOLOGY, AND PHARMACOLOGY RELATED TO ANESTHESIA TECHNOLOGY.

Unit 1. History of Anaesthesia

First successful clinical demonstration, Pre-historic (ether) era, Inhalational anaesthetic era, Regional anaesthetic era, Intravenous anaesthetic era, Modern anaesthetic era.

Unit 2. Applied Anatomy and Physiology Related to Anaesthesia Technology

2a. Respiratory System

Structure and function of the respiratory tract in relation to anaesthesia, Nose: Role in humidification, Pharynx: Obstruction in airways, Larynx: Movement of vocal cords, cord palsies, trachea & bronchial, Tree – vessels, nerve supply, respiratory tract, reflexes, Bronchospasm, Alveoli- Layers, surfactants. Respiratory Physiology, Control of breathing, Respiratory muscles - diaphragm, intercostals, Lung volumes – dead space, vital capacity, FRC etc, Pleural cavity – intra pleural pressure, pneumothorax, Work of breathing – airway resistance, compliance, Respiratory movements under anaesthesia, Tracheal tug–signs, hiccup, Pulmonary Gas Exchange and acid base status, Pulmonary circulation - Pulmonary oedema, Pulmonary hypertension, Hypoxic pulmonary vasoconstriction, Pulmonary function tests, Transfer of gases – oxygen & carbon dioxide, Acid base status, definitions, acidosis types, alkalosis types, buffers in the body, Oxygen : Properties, storage, supply, hypoxia, Respiratory failure, type, clinical features, causes.

2b. Cardiovascular System

Anatomy – Chambers of the heart, major vasculature. Coronary supply, innervations. Conduction system, Cardiac output- determinants, heart rate, rhythms, preload, after load. Coronary blood flow & myocardial oxygen supply electrophysiology, ECG - arrhythmias cardiovascular response to anaesthetic & surgical procedures, Hypotension – causes, effects, management, Cardio pulmonary resuscitation, Myocardial infarction, hypertension.

2c. Fluid and Electrolytes

Body fluids – Composition, Osmolality, Water, sodium and potassium balance, I.V. Fluids – composition & administration, I.V. Cannulation.

2d. Blood Transfusion:

Blood grouping, Cross matching, Transfusion indications, hazards, Blood products – storage, administration, Plasma volume expanders.

2e. Nervous System

Cerebrospinal fluid – circulation, composition, raised intracranial pressure, methods of reduction. Anatomy of spinal cord and vertebrae.

2f. Reproductive System

Physiological changes in pregnancy and labour.

2g. Liver

Anatomy, portal circulation, functions of liver. Jaundice – types and clinical features.

2h. Kidney

Anatomy, functions, renal failure.

Unit 3. Pharmacology related To Anaesthesia Technology

1a. Antisialagogues, Sedatives / Anxiolytics, Narcotics, Antacids, H2 Blockers, Induction Agents, Muscle Relaxants :Depolarising and Non depolarising muscle relaxants, Inhalational Gases: 02, N20, Air, Inhalational Agents - Ether, Halothane, Isofluranes, Reversal Agents, Nalorphine, Naloxone, Flumazenil (Diazepam), Local Anaesthetics :Xylocaine, Preparation, Local – Bupivacaine – Topical, Prilocaine – Jelly, Emla – Ointment, Etidocaine.

1b.Emergency Drugs

Adrenaline: Mode of administration, dilution, dosage, effects, Isoprenaline. Atropine, bicarbonate, calcium, ephedrine, xylocard, other ionotropes: dopamine, dobutamine, amrinone. Aminophylline, hydrocortisone, antihistaminics, potassium.

1c. Cardiovascular drugs

Antihypertensives, Antiarrhythmics, Beta – Blockers, Ca – Channel blockers, Vasodilators: nitroglycerin & sodium nitroprusside.

1d. Respiratory system

Bronchodilators, respiratory stimulants, Bronchiolytic agents.

1e. Renal system

Diuretics, furosemide, mannitol.

1f. Obstetrics

Oxytocin, methergin.

1g. Miscellaneous

Antibiotics, pencillins, aminoglycosides, cephalosporins, Heparin, protamine, insulin analgesics, NSAIDS.

1h. IV fluids

Crystalloids and Colloids.

PAPER – 2

BASIC PRINCIPLES OF ANAESTHESIA

Unit 1. Basics of Anaesthesia administration

1a. Minimum standard of anaesthesia

Who should give anaesthesia ?Ten golden rules of anaesthesia, Pre anaesthetic assessment, History Past history – disease / surgery / anaesthesia, Personal history – smoking / alcohol, General physical assessment, Systemic examination – CVS, RS, CNS, PA, Local examination.

1b. Investigations

Haematological – their significance, Urine, E.C.G, Chest X-ray, Endocrine, hormonal assays, Echocardiography, Angiography.

1c. Anaesthesia risk standardization ASA grading – I, II, III, IV

1d. Pre-op preparation

Assess & prepare, starve, check the drugs and equipment suction, have a vein open, monitoring.

Unit 2. Medical Gas Supply

Compressed gas cylinders, Colour coding, Cylinder valves, pin index, Gas piping system, recommendations for piping system, Alarms & safety devices

Unit 3. Anaesthesia Machine

Hanger and yoke system, Cylinder pressure gauge, Pressure regulator, Flow meter assembly, Vapourizers-types, hazards, maintenance, filling & draining.

Unit 4. Face Masks & Airway Laryngoscopes

Types, sizes, Endotracheal tubes – Types, sizes, Cuff system, Fixing, removing and inflating cuff, checking tube position, complications.

Unit 5. Breathing System

General considerations: humidity & heat, Common components – connectors, adaptors, reservoir bags, Capnography; etco2, Pulse oximetry, Methods of humidification, Classification of breathing system, Mapleson system – A, B, C, D, E, F, Jackson Rees system, Bain circuit, Non-rebreathing valves – ambu valves, The circle system- Components, Soda lime, indicators

Unit 6. Monitoring

ECG, Temperature, Neuromuscular; Nerve stimulators; Invasive blood pressure and central venous pressure and cardiac output monitoring

Unit 7. Oxygen delivery devices, Suction, Ambu bag, Reservoir bag

Unit 8. Electrical safety in theatres

PAPER – 3
ANAESTHETIC TECHNIQUES IN REGIONAL & GENERAL ANAESTHESIA INCLUDING COMPLICATIONS

Unit 1. Pre-Anaesthetic Orders

1.Informed consent

2.NPO

3.Premedication – advantages, drugs used

4.Special instructions – if any

5.Checking the machine

6.02, N2O, suction apparatus

7.Laryngoscopes, et tubes, airways

8.Things for IV accessibility

9.Other monitoring systems

10.Emergency drugs

11.Anaesthetic drugs

Unit 2. Intra-operative Management

□1.Confirm the identification of the patient

□ 2. Monitoring – minimum (ISA standards)

□ 3. Non-invasive & Invasive monitoring

□ 4.Induction – drugs used

□5.Endotracheal intubation

□6.Maintenance of anaesthesia

□7.Positioning of the patient

□8.Blood/Fluid & electrolyte balance

□9.Reversal from anaesthesia

□10.Transferring the patient

□11.Recovery room

□12.Post-operative complications & management

Unit.3 Regional Anaesthesia

- 1.History
- 2.Introduction
- 3.Contraindication
- 4.Check list
- 5.Procedure
- 6.Complications
- 7.Subarachnoid block
- 8.Epidural block
- 9.Nerve blocks

PRACTICALS SYLLABUS FOR THE SECOND YEAR

Relevant to the theory syllabus

3RD YEAR:

TEACHING HOURS & EXAMINATION PATTERN:

Paper No	Paper	Teaching hours		Examination			
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)	Total Min Pass (50%)
1	Medical diseases influencing choice of Anesthesia, Complications in Anesthesia	60	140	80	120	40	400
2	Anaesthesia for specialties – I (Cardiac Anaesthesia, Thoracic Anaesthesia, Neuro-anaesthesia)	60	140	80			
3	Anaesthesia for specialties – II (Geriatric Anaesthesia, Obstetrics Anaesthesia & Paediatric anaesthesia, Day care and anaesthesia outside Operating room)	60	140	80			
	Total	180	420	240	120	40	

UE: Univeresity Exam

**Practical*

includes Oral, Spotters & Record

THIRD YEAR SYLLABUS

Total Teaching hours 600

PAPER – 1 MEDICAL DISEASES INFLUENCING CHOICE OF ANESTHESIA, COMPLICATIONS IN ANESTHESIA -

Unit 1. Medical Diseases influencing choice of Anaesthesia

Ischemic Heart Disease.

Valvular Heart Disease.

- Congenital Heart Disease.
- Hypertension.
- Pericardial Disease.
- Aneurysm Of Aorta; Types, Treatment.
- Chronic Obstructive Pulmonary Disease.
- Bronchiectasis.
- Acute Respiratory Failure.
- Diseases of CNS – Cerebral Oedema & Its Management, Ocular Trauma.
- Diseases of Liver And Biliary Tract.
- Diseases of GIT.
- Renal Disease.
- Water Electrolyte & Acid Base Disturbances.
- Endocrine Disease.
- Obesity.
- Anaemia.

Unit 2. Procedures and Complications in Anaesthesia

2a. Intensive Care

Monitoring and diagnostic procedures in ICU, Central venous access, ECG monitoring, Invasive hemodynamic monitoring.

2b .General care of patient in ICU

Eye, GI tract, Bladder, skin, Case of mechanically ventilated patient, Tracheostomy, humidification, Vascular lines – arterial, venous line, Radiography, Physiotherapy – chest physiotherapy.

2c. Anaesthetic consideration in

Endocrine disease: Pheochromocytoma, Renal disease: Urolithiasis, TURP.

2d. Minor Sequelae

- Nausea & vomiting.
- Sore throat.
- Laryngeal granuloma.
- Neurological complications.
- Awareness.
- Vascular complications. Trauma to teeth.
- Headache, Backache.
- Ocular complications.
- Auditory complications.

2e. Major Catastrophes

- Mortality.
- Causes of death.
- Cerebral damage.
- Prevention.

PAPER – 2

ANAESTHESIA FOR SPECIALITIES – I (CARDIAC ANAESTHESIA, THORACIC ANAESTHESIA, NEURO ANAESTHESIA(- Total teaching hours 200

Unit 1. Cardiac Anaesthesia

- NYHA classification
- Arrhythmias
- Angina
- Dyspnoea
- Special investigations-Echocardiography, Angiography
- Premedication
- Setting up of monitoring system
- Monitoring – invasive and non-invasive
- Getting ready for the case
- Induction of cardiac patient, precautions to be taken
- Cardiopulmonary bypass
- Weaning of EPB
- Transferring the patient to ICU
- ICU management

Unit 2. Thoracic Anaesthesia

- Pulmonary function tests: Bedside and Laboratory spirometry
- Preoperative preparation
- Premedication
- Pre anaesthetic evaluation Checklist
- Induction/intubation
- Double lumen tubes
- IOP-monitoring
- Pain management
- Extubation
- ICU management
- Chest tube management

Unit 3. Neuro Anaesthesia

- Glasgow coma scale
- Pre anaesthetic evaluation
- Premedication
- Special investigation – i. CT , ii. Angiography, iii. MRI
- Check list
- Induction of a patient armoured ETT
- Positioning in neuro surgery
- I.C.P monitoring
- Air embolism
- Reversal of the patient
- Transferring to I.C.U / ward

APER – 3

ANAESTHESIA FOR SPECIALITIES – I (GERIATRIC ANAESTHESIA, OBSTETRICS ANAESTHESIA, PAEDIATRIC A**NAESTHESIA, DAY CARE AND ANAESTHESIA OUTSIDE OPERATING ROOM) -** Total teaching hours 200

Unit 1. Geriatric Anaesthesia

- Physiological changes in ageing
- Diseases of aging
- Pre anaesthetic evaluation
- Nervous system
- Geriatric pharmacodynamics/pharmacokinetics
- Postoperative nervous system dysfunction
- Anaesthesia for Trauma & Shock
- Resuscitation
- Preop investigation/assessment
- Circulatory management
- Management of anaesthesia
- Rapid sequence induction
- IOP monitoring

Unit 2. Obstetric Anaesthesia

- Differences between a pregnant and a normal lady
- Risks for anaesthesia
- Precautions to be taken
- Check list
- Regional vs general anaesthesia
- Induction / maintenance
- Resuscitation of the new born, APGAR score
- Reversal and extubation
- Emergencies – Manual removal of placenta
- A.P.H and P.P.H
- Ruptured uterus
- Ectopic pregnancy

Unit 3. Pediatric Anaesthesia

- Theatre setting
- Check list
- PAC
- Premedication – modes
- Induction
- Intubations-securing the ETT
- IOP-management monitoring
- Reversal & extubation – problems
- Transferring/IC management
- Pain management

Unit 4. Day-care, Outside the OR

4a.Day Care Anaesthesia

- Special features
- Set up
- Advantages/Disadvantages
- Complications
- Future

4b.Anaesthesia Outside the O.R

- Situations
- Cath lab
- Radiology and Imaging Science Technology natural calamities
- E.C.T
- Features
- Shortcomings and Complications

PRACTICALS SYLLABUS FOR THE THIRD YEAR

Relevant to the theory syllabus

Recommended Text Book

1. Essentials of Anaesthesiology by A.K Paul.

Reference Books

1. Morgan and Mikhail's Clinical Anesthesiology.
2. Dorsch and Dorsch's Understanding Anesthesia Equipment.
3. Wylie Churchill-Davidson's A Practice of Anesthesia.
4. Drugs & Equipment in Anesthetic Practice by A.K Pau.
5. Step by Step Regional Anesthesia by A.K Paul
6. Dorsch and Dorsch's Understanding Anesthesia Equipment

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

PERIPHERAL POSTING

Anaesthesia Technology				
Academic Year	Duration	Specialty		
Second year	One week each	Biomedical Engineering	Microbiology	Radiology
Third year	One week each	Pulmonology	Obstetrics	Paediatrics

OPERATION THEATRE TECHNOLOGY
2ND YEAR

Distribution of Teaching Hours in Second Year Subjects

Main Subjects:

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Clinical posting	Total No. of Hours
1.	Medicine relevant to O.T. technology	50	--	--	50
2.	Section A Applied Pathology Section B Applied Microbiology	30 30	30 30	--	120
3.	Pharmacology	50	--	--	50
4.	Introduction to Operation Theatre Technology	80	100	650	830
	Total	240	160	650	1050

Subsidiary Subjects:

Sociology	20HRS
Constitution of India	20HRS
Environmental Science &Health	20HRS

Distribution of Subjects and marks for Second Year Examination

		Theory				Practicals			
Paper	Subject	Theory	Viva voca	IA	Sub Total	Univ. Practical	IA	Sub Total	Grand Total
i	Section A - Applied Pathology Section B - Applied Microbiology	40 40	-	10 10	100	40 40	10 10	100	200
ii	Introduction to Operation Technology	80	-	20	100	80	20	**100**	**200**
iii	Applied Pharmacology	80	--	20	100	No Practicals			100
iv	Medicine relevant to O. T. technology	**80**	--	20	**100**	No Practicals			**100**

Distribution of Subsidiary Subjects and marks for Second Year Examination

B	Subsidiary Subject**	Duration	Marks	I .A Theory Marks	Total Marks
1.	Sociology	3 hours	80	20	100
2.	Constitution of India	3 hours	80	20	100
3.	Environmental Science &Health	3 hours	80	20	100

Subsidiary subjects: Examination for Subsidiary Subjects shall be conducted by respective colleges

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

PATTERN OF THEORY EXAMINATION FOR EACH PART-A & PART B SEPERATELY

Theory Duration: 3 hours

PART-A

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	1 out of 2	10	10
Short answers	3 out of 4	5	15
Brief answers	5 out of 7	3	15
Total			40

PART-B

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	1 out of 2	10	10
Short answers	3 out of 4	5	15
Brief answers	5 out of 7	3	15
Total			40

SECOND YEAR

Main Subjects:

APPLIED PHARMACOLOGY

- General concepts about pharmacodynamic and Pharmacokinetics Principles involved in drug activity.

I. **Autonomic nerves system.**

- Anatomy & functional organisation.
- List of drugs acting on ANS including dose, route of administration, indications, contra indications and adverse effects.

II. **Cardiovascular drugs**-Enumerate the mode of action, side effects and therapeutic uses of the following drugs.

a. Antihypertensives
   - Beta Adrenergic antagonists
   - Alpha Adrenergic antagonists
   - Peripheral Vasodilators
   - Calcium channel blockers

b. Antiarrhythmic drugs
c. Cardiac glycosides
d. Sympathetic and nonsympathetic inotropic agents.
e. Coronary vasodilators.
f. Antianginal and anti failure agents
g. Lipid lowering & anti atherosclerotic drugs.

h. Drugs used in Haemostasis - anticoagulants Thrombolytics and antithrombolytics.

i. Cardioplegic drugs- History, Principles and types of cardioplagia.

j. Primary solutions - History, principles & types.

k. Drugs used in the treatment of shock.

III. **Anaesthetic agents.**

- Definition of general and local anaesthetics.
- Classification of general anaesthetics.
- Pharmacokinetics and Pharmacodynamics of inhaled anaesthetic agents.
- Intravenous general anaesthetic agents.
- Local anaesthetics - classification mechanism of action, duration of action and methods to prolong the duration of action. Preparation, dose and routes of administration.

IV. **Analgesics**

- Definition and classification
- Routes of administration, dose, frequency of administration, Side effects and management of non opioid and opiod analgesics

V. **Antihistamines and antiemetics-**

- Classification, Mechanism of action, adverse effects, Preparations, dose and routes and administration.

VI. **CNS stimulants and depressants**

- Alcohol
- Sedatives, hypnotics and narcotics
- CNS stimulants

- Neuromuscular blocking agents and muscle relaxants.

VII. Pharmacological protection of organs during CPB VIII.Inhalational gases and emergency drugs.

IX. Pharmacotherapy of respiratory disorders

- Introduction - Modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone
- Pharmacotherapy of bronchial asthma
- Pharmacotherapy of cough
- Mucokinetic and mucolytic agents
- Use of bland aerosols in respiratory care.
- Corticosteroids - Classification, mechanism of action, adverse effects and complications. Preparation, dose and routes of administration.
- Diuretics
- Renal physiology
- Side of action of diuretics
- Adverse effects
- Preparations, dose and routes of administrion.
- Chemotherapy of infections
- Definition
- Classification and mechanism of action of antimicrobial agents
- Combination of antimicrobial agents
- Chemoperophylaxis.
- Classification, spectrum of activity, dose, routes of administration and adverse effects of penicillin, cephalosporins, aminoglycosides, tetracyclines, chloramphenicol, antitubercular drugs.
- Miscellaneous.
- IV fluids- various preparations and their usage.

- Electrolyte supplements
- Immunosuppressive agents
- New drugs included in perfusion technology.
- Drugs used in metabolic and electrolyte imbalance.

PRACTICALS:

1. Preparation and prescription of drugs of relevance.
2. Experimental pharmacology directed to show the effects of commonly used drugs of relevance and interpretation of few charts.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Applied Pharmacology shall be as given under.

NO PRACTICAL EXAMINATION

Recommended Books.

R. S. Satoskar, S.D.
Bhandarkar, S. S.
Ainapure,
Pharmacology and
Pharmacotherapeutics,
18th

Edition, single Volume, M/S Popular Prakashan, 350, Madan Mohan Marg, Tardeo,Bombay - 400 034.

1. K.D. Tripathi, Essentials of Medical Pharmacology, V. Edition, M/s. Jaypee Brothers, Post Box, 7193, G-16, EMCA House, 23/23, Bansari Road, Daryaganj, New Delhi.
2. Laurence and Bennet, Clinical Pharmacology, ELBS Edition, 9th Edition.

APPLIED PATHOLOGY I

CARDIOVASCULAR SYSTEM

- Atherosclerosis- Definition, risk factors, briefly Pathogenesis & orphology, clinicalsignificance and prevention.
- Hypertension- Definition, types and briefly Pathogenesis and effects ofHypertension.
- Aneurysms - Definition, classification, Pathology and complications.
- Pathophysiology of Heart failure.
- Cardiac hypertrophy - causes, Patho physiology & Progression to Heart Failure.
- Ischaemic heart diseases- Definition, Types. Patho physiology, in brief Pathology &Complications of various types of IHD.
- Valvular Heart diseases- causes, Pathology & complication. Complications ofartificial valves.
- Cardiomyopathy - Definition, Types, causes and significance.
- Pericardial effusion- causes, effects and diagnosis.
- Congenital heart diseases - Basic defect and effects of important types ofcongenital heart diseases.

II. HAEMATOLOGY

- Anaemia - Definition, morphological types and diagnosis of anaemia. Brief concept about Haemolytic anaemia and polycythaemia.
- Leukocyte disorders- Briefly leukaemia, leukocytosis, agranulocytosis etc.,
- Bleeding disorders- Definition, classification, causes & effects of important types of bleeding disorders. Briefly various laboratory tests used to diagnose bleeding disorders.

III. RESPIRATORY SYSTEM

- Chronic obstructive airway diseases - Definition and types. causes, Pathology &complications of each type of COPD in brief.
- Briefly concept about obstructive versus restrictive pulmonary disease.
- Pneumoconiosis- Definition, types, Pathology and effects in brief.
- Pulmonary congestion and edema.
- Pleural effusion - causes, effects and diagnosis.

IV. RENAL SYSTEM

- Clinical manifestations of renal diseases. Briefly the causes, mechanism, effects and laboratory diagnosis of ARF & CRF. Briefly Glomerulonephritis and Pyelonephritis.
- End stage renal disease - Definition, causes, effects and role of dialysis and renaltransplantation in its management.
- Brief concept about obstructive Neuropathy.

PRACTICALS

1. Description & diagnosis of the following gross specimens.
   a. Atherosclerosis.
   b. Aortic aneurysm.
   c. Myocardial infraction.
   d. Emphysema
   e. Chronic glomerulonephritis.
   f. Chronic pyelonephritis.

2. Interpretation & diagnosis of the following charts.
   a. Hematology Chart - AML, CML, Hemophilia, neutrophilia, eosinophilia.
   b. Urine Chart - ARF, CRF, Acute glomerulonephritis.

3. Estimation of Hemoglobin.
4. Estimation Bleeding & Clotting time.

Scheme of Examination Theory

There shall be one theory paper with 2 section of three hours duration carrying 40 marks. each Distribution of type of questions and marks for Applied Pathology shall beas given under.

PRACTICAL EXAMINATION - 40 Marks.

There will be a Combined Practical examination for Applied Pathology & AppliedMicrobiology.

SL. NO.	TESTS	MARKS
01	Interpretation of Hematology Chart	10
02	Interpretation of Urine Chart	10
03	Estimation of Hemoglobin	10
04	Estimation of Bleeding time & Clottingtime	10
	Total	40

APPLIED MICROBIOLOGY

THEORY - 40 HOURS

1. Health care associated infections and Antimicrobial resistance: Infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting like Methicillin Resistant Staphylococcus aureus infections, Infections caused by Clostriduium difficle, Vancomycin resistant enterococci etc. Catheter related blood stream infections, Ventilator associated pneumonia, Catheter Related urinary tract infections, Surveillance of emerging resistance and changing flora. The impact and cost attributed to Hospital Associated infection.

   6 Hours

2. Disease communicable to Healthcare workers in hospital set up and its preventive measure: Occupationally acquired infections in healthcare professionals by respiratory route (tuberculosis, varicella-zoster, respiratory synctial virus etc), blood borne transmission (HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), oro faecal route (Salmonella, Hepatitis A etc), direct contact (Herpes Simplex Virus etc). Preventive measures to combat the spread of these infections by monitoring and control. 6 Hours

3. Microbiological surveillance and sampling: Required to determine the frequency of potential bacterial pathogens including Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis and also to assess the antimicrobial resistance.

   Sampling: rinse technique, direct surface agar plating technique. 6 Hours

4. Importance of sterilization:
    a. Disinfection of instruments used in patient care: Classification, different methods, advantages and disadvantages of the various methods.
    b. Disinfection of the patient care unit
    c. Infection control measures for ICU's 10 Hours
5. Sterilization:
    a. Rooms: Gaseous sterilization, One Atmosphere Uniform Glow Discharge Plasma (OAUGDP).
    b. Equipments: classification of the instruments and appropriate methods of sterilization.

    c.Central supply srenile department: the four areas and the floor plan for instrument cleaning, high-level disinfecting and sterilizing areas. 8hours
6. Preparation of materials for autoclaving: Packing of different types of materials, loading, holding time and unloading. 4 Hours

PRACTICALS- 30 HOURS

1. Principles of autoclaving & quality control of Sterilization.
2. Collection of specimen from outpatient units, inpatient units, minor operation theatre and major operation theatre for sterility testing.
3. The various methods employed for sterility testing.
4. Interpretation of results of sterility testing.
5. Disinfection of wards, OT and Laboratory.

There will be a Combined Practical examination for Applied Pathology & Applied Microbiology.

Sl. No.	Tests	Marks
1.	Dry heat / Moist heat: Temperature recording charts interpretation	10
2.	Dry heat / Moist heat: Color change indicators interpretation	10
3.	Air sampling culture plates interpretation of Colony forming units based on air flow rate and sampling time	10
4.	Interpretation of Sterility of Hemodialysis water/Distilled water /Deionised water based on growth of colonies in BHI agar to be reported as X CFU/mL	10
	Total	40

MEDICINE RELEVANT TO OPERATION THEATRE TECHNOLOGUY

Diabetes Mellitus Hypertension Ischaemic heart disease Obesity Elderly Patient Pregnancy Shock COPD Chronic renal failure Chronic liver disease/failure Anaemia Pediatric patient Infant/Neonate Epilepsy CVA

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Medicine relevant to Operation Theatre Technology.

NO PRACTICAL EXAMINATION

INTRODUCTION TO OPERATION THEATRE TECHNOLOGY

1. C.S.S.D, and logistics

   Cleaning and dusting - methods of cleaning, composition of dust.

   General care and testing of instruments- haemostatic forceps , needle, holders, Knife, blade, scissor, use/ abuse, care during surgery.

   Disinfectants of instruments and Sterilization- Definition, Methods cleaning agents detergents, Mechanical washing, ultrasonic cleaner, lubrication inspection and pitfalls Various methods of chemical treatment- formalin, glutaraldchyde etc, thermal. Hot Air oven- dry heat, Autoclave, steam Sterilization water etc,. UV treatment.Instrument's Etching, care of micro surgical and titanium instruments Sterilization of equipments - Arthroscope, Gastroscope, imago Lamp, Apparatus, suction Apparatus Anaesthetic equipments including endotracheal tubes -OT Sterilization including Laminar Air flow Trouble shooting - colored spots and corrosion, staining, dust deposit, recent amendment in EPA with reference to waste disposal.

2. Anaesthesia Service, History, pre-operative, Intra operative & post operative care
3. General Anaesthesia Techniques
4. Local Anaesthesia Techniques
5. Blood Transfusion
6. Monitoring in the Operation Theatre
7. Positioning of Patient

8. Instrument planning for various surgical procedure and Auxillary instrumentation.
9. O.T. Techniques

   O.T. environment, control of infection scrubbing, theatre cloths including leadapron and goggles.
10. Duties of Nurses - Ethics, behaviour during surgery, etc,.

PRACTICAL EXAMINATION - 80 Marks

Subsidiary Subjects

SOCIOLOGY

Teaching Hours : 20

Course Description

This course will introduce student to the basic sociology concepts, principles and social process, social institutions [in relation to the individual, family and community and the various social factors affecting the family in rural and urban communities in India will be studied.

Introduction :

Meaning - Definition and scope of sociology Its relation to Anthropology, Psychology, Social Psychology Methods of Sociological investigations - Case study, social survey, questionnaire, interview and opinion poll methods. Importance of its study with special reference to health care professionals

Social Factors in Health and Disease:

Meaning of social factors Role of social factors in health and disease

Socialization :

Meaning and nature of socialization Primary, Secondary and Anticipatory socialization Agencies of socialization

Social Groups:

1. Concepts of social groups, influence of formal and informal groups on health and sickness. The role of primary groups and secondary groups in the hospital and rehabilitation setup.

Family :

The family, meaning and definitions Functions of types of family Changing family patterns Influence of family on individual's health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy

Community :

Rural community: Meaning and features - Health hazards to rural communities, health hazards to tribal community.
Urban community - Meaning and features - Health hazards of urbanities

Culture and Health :

Concept of Health Concept of culture Culture and Health
Culture and Health Disorders

Social Change :

Meaning of social changes Factors of social changes
Human adaptation and social change Social change and stress Social change and deviance Social change and health programme The role of social planning in the improvement of health and rehabilitation

Social Problems of disabled :

Consequences of the following social problems in relation to sickness and disability remedies to prevent these problems Population explosion Poverty and unemployment Beggary Juvenile delinquency Prostitution Alcoholism Problems of women in employment

Social Security :

Social Security and social legislation in relation to the disabled

Social Work:

Meaning of Social Work
The role of a Medical Social Worker

INDIAN CONSTITUTION

Prescribed for the First Year students of all degree classes

Unit-I:

Meaning of the team 'Constitution' making of the Indian Constitution 1946-1940.

Unit-II:

The democratic institutions created by the constitution Bicameral system ofLegislature 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 withDirective Principles.

Unit - V:

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

Unit-VI:

Doctrine of Separation of Powers legislative, Executive and Judicial and theirfunctioning 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.

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.

Environment Sciences And Health

Introduction to Environment and Health Sources, health hazards and control of environmentalpollution Water The concept of safe and wholesome water. The requirements of sanitary sources of water.Understanding the methods of purification of water on small scale and large scale. Various biological standards, including WHO guidelines for third world countries. Concept and methods for assessing quality of water.Domestic refuse, sullage, human excreta and sewage their effects on environment and health, methods and issues related to their disposal.Awareness of standards of housing and the effect of poor housing on health.Role of arthropods in the causation of diseases, mode of transmission ofarthropods borne diseases, methods of control

Recommended Books.

1. Text Book of Environmental Studies for under gradute courses By Erach Bharucha Reprinted in 2006, Orient Longman Private Limited Universities Press India Pvt. Ltd.

3rd year

Distribution of Teaching Hours in Third Year Subjects Main Subjects

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Clinical posting	Total No. of Hours
1.	Operation Theatre Technology - Clinical	50	50	250	350
2.	Operation Theatre Technology - Applied	50	50	250	350
3.	Operation Theatre Technology - Advanced	50	50	250	350
	Total	150	150	750	1050

Subsidiary Subjects

Biostatistics	20 Hours
Computer application	10 Hours

Distribution of Subjects and marks for Third Year Examination

** Practicals-One common practical for all the three papers with equal weight age of marks i.e. 40 practical mark and 10 I.A. marks for each paper.

Paper	Subject	Theory	Vivavoca	IA	Sub Total	Univ. Practical	IA	Sub Total	TOTAL
i	Operation Technology - Clinical	80	-	20	100	120 (40 + 40 + 40)	30 (10 + 10 + 10)	150	450
ii	Operation Technology - Applied	80	-	20	100				
iii	Operation Technology - Advanced	80	-	20	100				

Distribution of Subsidiary Subjects and marks for Third Year Examination

B	Subsidiary Subject**	Duration	Marks	I .A Theory Marks	Total Marks
1.	Bio statistics	3 hours	80	20	100
2.	Computer application	3 hours	80	20	100

Subsidiary subjects: Examination for subsidiarysubjects shall be conducted by respective colleges

Third Year Main Subjects

Paper-I

OPERATION THEATRE TECHNOLOGY -CLINICAL

Physical Facility

Layout of Operation theatres Transition Peripheral Support areas Operating room ,Special procedure rooms, Potential sources of injury to the caregiver & patient.

Principles of aspects & sterile technologies Astilse, surgical scrub, gowning & gloving Decontamination & disinfections Sterilization Assembly & packing Thermal sterilization Chemical sterilization Radiation sterilization Surgical instrumentation Fabrication Classification Powered surgical instruments Handling instruments Specialized surgical equipment Electro catheter Laser Microsurgery Ultrasonography

Positioning prepping and draping the patient General surgery Breast procedures Abdominal surgery Liver Procedures Splenic procedures Pancreatic Procedures Oesophagial

PRACTICAL EXAMINATION

One common practical for all the three papers with equal weight age of marks i.e. 40 practical marks for each paper.

Paper-II

OPERATION THEATRE TECHNOLOGY -APPLIED

Preoperative preparation of the patient Diagnostic procedures Pathological examination Radiological examination MRI Nuclear medicine studies Ultrasonography Endoscopy

Anaesthesia techniques Historical background Types of Anaesthesia Choice of Anaesthesia General Anaesthesia Indication of general anaesthesia Endotracheal intubation Maintenance Monitoring Emergency Balanced Anaesthesia Core of Anaesthetized patient Local & regional anaesthesia Spinal and epidural anaesthesia Intravenous anaesthesia agents In halational anaesthetic agents Anaesthetic Adjuvant drugs Complication of general anaesthesia Complication of local/regional anaesthesia Blood transfusion Anaesthesia Machine & central gas supply Difficult intubation

PRACTICAL EXAMINATION

One common practical for all the three papers with equal weight age of marks i.e. 40 practical marks for each paper.

Paper-II
Operation Theatre Technology - Advanced

Operation Theatre Techniques for Speciality Surgery:-

Preparation, nursing requirement, equipments including instruments, Sutures & etc Anaesthesia techniques, patient positioning & recovery Gynecological /obstetric surgery Urologic surgery Orthopedic surgery Neurosurgery Ophthalmic surgery Plastic and reconstructive surgery Otorhinolaryngologic and head and neck surgery Thoracic surgrey Cardiac surgery Vascular surgery Organ procurement and transplantation Thyroid surgery

PRACTICAL EXAMINATION

One common practical for all the three papers with equal weight age of marks i.e. 40 practical marks for each paper

Subsidiary Subjects

BIO STATISTICS

Time Allotted: 20 Hours

Course Description:

Introduction to basic statistical concepts: methods of statistical analysis; and interpretation of data

Behavioural Objectives:

Understands statistical terms.

Possesses knowledge and skill in the use of basic statistical and research methodology.

Unit - I : Introduction

Meaning, definition, characteristics of statistics. Importance of the study of statistics.

Branches of statistics.

Statistics and health science including nursing. Parameters and estimates.

Descriptive and inferential statistics. Variables and their types.

Measurement scales

Unit - II: **Tabulation of Data**

Raw data, the array, frequency distribution. Basic principles of graphical representation.

Types of diagrams - histograms, frequency polygons, smooth frequency polygon, commulative frequency curve, ogive.

Normal probability curve.

Unit - III : **Measure of Central Tendency**

Need for measures of central tendency

Definition and calculaton of mean - ungrouped and grouped Meaning, interpretation and calculation of median ungrouped and grouped. Meaning and calculation of mode.

Comparison of the mean, and mode.

Guidelines for the use of various measures of central tendency.

Unit - IV : Measure of Variability

Need for measure of dispression.

The range, the average deviation. The variance and standard deviation.

Calculation of variance and standard deviation ungrouped and grouped. Properties and uses of variance and SO

Unit -V : Probability and Standard Distributions.

Meaning of probability of standard distribution.
The Binominal distribution. The normal distribution.
Divergen

Unit - VI : Samling Techniques

Need for sampling - Criteria for good samples.
Application of sampling in Community. Procedures of sampling and sampling designs errors.
Sampling variation and tests of significance.

Unit - VII : Health Indicator

Importance of health Indicator.
Indicators of population, morbidity, mortality, health services. Calculation of rates and rations of health.

Recommended Books.

B.K. Mahajan & M. Gupta (1995) Text Book of Preventive & Social Medicine, 2002, 17th Edition Jaypee Brothers.

BASICS IN COMPUTER APPLICATIONS

The course enables the students to understand the fundamentals of computer and its applications.

Introduction to Data processing :

Features of computers, Advantages of using computers. Getting data into / out of computers. Role of computers. What is Data processing? Application areas of computers involved in Data processing. Common activities in processing. Types of Data processing, Characteristics of information. What are Hardware and Software?

Hardware Concepts :

Architecture of computers, Classification of computers, Concept of damage. Types of storage devices. Characteristics of disks, tapes, Terminals, Printers, Network. Applications of networking concept of PC System care, Floppy care, Data care.

Concept of Software.

Classification of software : System software. Application of software. Operating system. Computer system. Computer virus. Precautions against viruses. Dealing with viruses. Computers in medical electronics Basic Anatomy of Computers Principles of programming Computer application - principles in scientific research ; work processing, medicine, libraries, museum , education, information system.

Data processing

Computers in physical therapy - principles in EMG, Exercise testing equipment, Laser. Scheme of Examination for MEDICAL ELECTRONICS including COMPUTER APPLICATIONS

One Written (Theory) paper: Maximum

Marks: -80marks. No Practical or Viva

voce examination

CLINICAL TRAINING

Content and purpose

The clinical component has been designed to complement the academic program and runs throughout the course. The placement have to be designed so that the students will be able to observe the practical application of the academic course wherever possible. Content can be tailored to meet either National or Local needs as is deemed to be most appropriate.

1st year : Introduction to the Hospital Setting The purpose of this phase is :

i. For the students to become familiar with some of the practical applications of the academic course ii. To introduce the wider hospital setting

iii. To help the students to identify the various disciplines within a hospital, their role and the importance of cooperation.

iv. To introduce patients in a clinical setting and begin to acquire basic communication skills.

2nd year : Skills Necessary to work in a Hospital

To be completed very early in the training. The following procedures will be demonstrated to the students who will be expected to observe or participate as appropriate.

General procedures to be observed when patients attend for appointment :

- Lifting and moving techniques.
- Administration of bedpans, vomit bowls, etc.,
- Care and management of drugs in the hospital setting.

Correct procedures when dealing with patients with infectious diseases

- University precautions.

Correct procedures when dealing with immuno-compromised patients :

- Hygiene practices
- Simple dressings
- Sterile procedures
- Oxygen administration

Care of patients with :

- Breathing difficulties
- Terminal illness
- Mental impairment
- Physical disability
- Special care of the geriatric and pediatric patient
- Stoma care
- Handling of patients with bone metastases
- Care of the patient following an anaesthetic
- Care of lines in the incubated patient
- Communication skills with patients and relatives
- Terminally ill and Hospice

2nd & 3rd year : Skills Related to working in a department

Introduction to the department. Time will be spent on each unit within the department. The purpose of this phase is to :

In the department :

i. Familiarize the students with the different units within the department and theprocedures carried out on each unit.
ii. Enable the student to recognize and relate to the basic terminology introduced inthe academic program.
iii. Help to establish a sense of identity within the student group and to understand the role of the Technology in the management of various cases. iv. Introduce the students to the staff of the department.
v. Help the student to understand team roles.
vi. Familiarize the students with written QA programs within the department.

Equipment's and Integration :

i. Begin to become competent in the manipulation of the equipment.
ii. Be able to communicate effectively with patients.
iii. Begin to integrate into thedepartment as part in specific and multidisciplinary teams.
iv. Begin to empathize with patients and to appreciate their own feelings in the clinical situation.
v. Being able to handle and achieve proficiency in mould room techniques.

Safety & Precautions in Practice :

i. Identifying the functions of various equipment and safe handling.
ii. Identifying the functions on a control panel, indicating their purpose and safely using these when appropriate.
iii. Safely using the accessory equipment in the correct context.
iv. Correctly and safely using equipment related to patient immobilization.
v. Demonstrating the correctprocedure for various techniques

To Achieve Clinical Competence

The purpose of this phase is for the students to :

i. Demonstrate competence in the manipulation of equipment.Demonstrate an ability to anticipate the physical and psychological needs of the patient and respondto them.

iii. Demonstrate the ability to communicate with ease with other staff involved in the multidisciplinary treatment of the patient.

iv. Increasingly participate as a team member in all aspects of the patient's management.

v. Demonstrate competence in simulator procedures.

vi. Acquire basic computer skills.

vii. Participate in the development / revision of formal written quality assurance procedures / programme.

viii.Set up a patient ontheir first visit.

To achieve final competency substantial time will be spent :

i. Setting up multi field techniques under supervision.
ii. Participating in the quality control procedures in the department in accordance with the protocols. iii. Simulating and localizing a target volume. iv. Discussing therole of local rules and outline those in place in the different departments.

Graded Responsibility (structured training schedule)

I year : Theory classes, observation in treatment planning and treatment execution.

II **year :** Theory classes, participation in OPD, mould room techniques, treatment planning, treatment execution under the supervision of consultant, senior technologist, project work.

III **year :** Theory classes, participation in OPD, Treatment planning and execution under supervision of consultant & Senior Technologist. Submission of Project Work, Mould Room Techniques, Quality Assurance.

Rotation posting

Students may be posted to other relevant departments or other centers with better and latest equipment's for a minimum period of 1 to 2 months, for completion of training in recent advance in the specialty. The student on completion of the training shall submit a report duly signed by the concerned department to the HOD.

Monitoring Learning Progress

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only also helps teachers to evaluate students but also students to evaluate themselves. The monitoring be done by the staff of the department based on participation of students in various teaching / learning activities. It may be structured and assessment be done using sample checklist provided (Assessment forms).

The learning out comes to be assessed should included :

i. Personal Attitudes
ii. Acquisition ofknowledge
iii. Clinical andoperative skills
iv. Teaching skills

Candidate should be encouraged to participate in teaching activities, seminars and literature reviews.

1. **Periodic tests :**

The departments may conductperiodic tests (Internal Assessment), the tests may include written papers, practical with viva voce.
Work diary / Log, Personal Atitudes.

The essential items are :

- Caring attitudes
- Initiative
- Organizational ability
- Potential to cope with stressful situations and undertake responsibility
- Trust worthiness and reliability
- To understand and communicate intelligibly with patients and other
- To behave in manner which establishes professional relationships with patients and colleagues

- Ability to work in team
- A critical enquiring approach to the acquisition of knowledge the methods used mainly consist of observation. It is appreciated that these items require a degree subjective assessment by the guide, supervisors and peers.

3. Acquisition of Knowledge :

The methods used comprise of 'Log Book' which records participation in various teaching / learning activities by the students. The number of activities attended and the number in which presentations are made are to be recorded. The log book should periodically be validated by the supervisors, some of the activities are listed. he list is not complete. Institutions may include additional activities, if so, desired.

4. Technical skills

Day to day work : Skills on the machines should be assessed periodically. The assessment should include the candidates' sincerity and punctuality, analytical ability and communication skills. Clinical and procedural skills : The candidate should be given graded responsibility to enable learning by apprenticeship. The performance is assessed by the guide by direct observation. Particulars are recorded by the student in the log book.

5. Teaching Skills :

Book :

Every candidate shall maintain a work diary and record his / her participation in the training programs conducted by the department such as practical, literature reviews, seminars, etc. Special mention may be made of the presentations, by the candidate as well as details of practical or laboratory procedures, if any conducted by the candidate.

6. Records :

Records, log books, project report and marks obtained in tests will be maintained by the Head of the Department and will be made available to the University as indicated. The record books maintained by the student should be submitted to the Head of the Department 6 months prior to completion of the

course and the head of the department makes a certification of the of the academic progress an assessment of student performance through out the said course shall be made by the HOD.

The log book is a record of the important activities of the candidates during his training internal assessment should be based on the evaluation of the log book collectively, log books are a tool for the evaluation of the training programme of the institution by external agencies. The record includes academic activities as well as the presentations and procedures carried out by the candidate.

SECOND YEAR

CARDIAC AND CARDIOVASCULAR TECHNOLOGY

OBJECTIVES OF THE COURSE

The objective of the course is to enable students to learn about

- Use of equipment in cardiac catheterisation laboratory- working, function and maintenance.
- Drugs used in cardiology– Basics of pharmacology, use in special situations.
- Assist the cardiologists during diagnostic and therapeutic procedures such as Echocardiaography, angiography and interventional radiology
- Critical event identification and management during the diagnostic and therapeutic procedures such as stress TMT, PTCA etc
- Periprocedural care of patients
- Cardiopulmonary resuscitation
- Data entry
- Supply chain management
- Sterilization of Equipment
- Non-technical skills- team work and communication.

TEACHING HOURS & EXAMINATION PATTERN:SECOND YEAR

Paper No	Paper	Teaching hours		Examination				
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)		Total Min Pass (50%)
						Theory	Practical	
1	Applied Anatomy, Physiology & Pharmacology related to Cardiovascular Technology	60	140	80	80	20	20	400
2	Electro cardiography, Exercise testing & Holter Analysis	60	140	80		20		
3	Echo Cardiography, Doppler Echo Cardiography, TEE, Contrast Echo	60	140	80		20		
	Total	180	420	240	80	60	20	

SECOND YEAR SYLLABUS

Total Teaching hours 600

PAPER – 1

APPLIED ANATOMY, PHYSIOLOGY & PHARMACOLOGY RELATED TO CARDIOVASCULAR TECHNOLOGY

Total teaching hours 200

Unit I. Anatomy

1. Anatomy of the Heart and great vessels.

a)Gross anatomy and structural features of cardiac chambers. Atrium**.**
Ventricle. AV junction. Heart valves.

b)Specialized conduction tissues.

Sinus node. Internodal tracts. Av node. Bundles.

2. Innervations of the Heart.

Sympathetic. Parasympathetic. Sensory.

3. Coronary vascular system.

Coronary arteries. Myocardial capillary bed. Venous drainage. Lymphatic drainage.

4. Pericardium.

5.Systemic Circulation.

Arterial system. Venous system. Lymphatic system. Tissue perfusion and microcirculation

6.Pulmonary circulation.

Pulmonary artery. Pulmonary veins. Bronchial artery.

7.Cerebral circulation

8.Renal Circulation

9.Anatomy of respiratory system.

Unit 2. Physiology

1.Over view of the cardiovascular system.

Function of CVS. Circulation of blood. Central control of cardio vascular system.

2.Cardiac cycle.

Mechanical events. Arterial cycle and central venous pressure cycle. Clinical aspects of human cardiac cycle.

3.Cardiac Excitation and contraction.

Mechanism of contraction. Pacemaker of conduction system. Nodal electricity. Nervous control of the heart rate

4. Basics of ECG.

5. Assessment of cardiac output.

Fick's principle. Thermal dilution and indicator dilution methods. Pulse Doppler method. Miscellaneous methods.

6. Control of stroke volume and cardiac output.

7. Hemodynamics.

Relationship between pressure, flow and resistance.

8. Solute transport between blood and tissues. Circulation of fluid between plasma, interstitium and lymph.

9. Vascular smooth muscle.

Mechanism of contraction. Pharmaco-mechanical coupling, automaticity.

10. Control of Blood vessels.

Local Control mechanism. Nervous control. Hormonal Control.

11. Specialization in individual circulation.

Coronary circulation. Cerebral circulation. Pulmonary circulation. Cutaneous circulation.

12. Cardiovascular receptors, reflexes and central control.

13. Coordinated cardiovascular responses. Posture.

Valsalva manoeuvre. Exercise. Diving reflex.

14. Cardiovascular responses in pathological situations.

Shock and hemorrhage. Syncope. Essential Hypertension. Chronic cardiac failure.

15. Respiratory Physiology.

Mechanics of respiration. Principles of gas exchange. Regulation of respiration.

16. Hematology and coagulation Physiology

Blood Components. Blood groups Blood transfusion. Hemostasis.

Unit 3. Applied Pharmacology

- Anti Anginal Agents
- Beta Blocking Agents
- Propranolol, Atenolol, Metoprolol, Labetolol, Pindolol.
- Nitrates-Nitroglycerine, Isosorbide dinitrate, Isosorbide mononitrate, Transdermal nitrate patches.
- Calcium channel blockers- Nifedipine, verapamil, diltiazem, new calcium channel blockers.
- Anti-Failure Agents
- Diuretics-Furosemide, Thiazide diuretics, other thiazide like agents, Potassium sparing diuretics, combination diuretics, special diuretic problems.
- Angiotensin converting enzyme (ACE) inhibitors-Types of ace inhibitors Captopril, Enalapril, ACE inhibitors for diabetics and hypertensive renal disease.
- Digitalis and acute ionotropes -Digoxin, Digitoxin, Doubutamine, Dopamine, Adrenaline, Nonadrenaline, Isoprenaline, Mixed ionotropic vasodilators Mibrinone.
- Anti-Hypertensive Drugs-Diuretics, Beta Blockers, Ace inhibitors, ARBS, Calcium antagonists, direct vasodilators, centrally active and peripherally active vasodilators.
- Anti-Arrhythmic Agents-Quinidine and related compounds, Procainamide, Lidocaine, Mexiletine, Phenytoin, Flecainide, Amiodarone, Bretylium, Combination therapy, Verapamil.
- Platelet inhibitors: Aspirin. Persantinem clopidogrel, Prasugrel
- Anticoagulants: Heparin, low molecular weight heparin, Warfarin c.
- Fibrinolytics: Streptokinase. Urokinase. Combination therapy.
- Lipid lowering and anti-atherosclerotic drugs.
- Miscellaneous drugs –Adenosine, Protamine, Emergency drugs, Narcotics, Sedatives, Steroids, Antihistamines, Antibiotics.

PAPER – 2

ELECTRO CARDIOGRAPHY, EXERCISE TESTING & HOLTER ANALYSIS

Total teaching hours 200

Unit1.Electrocardiography:

1. Basic Principles

- The electro cardio graphic paper.
- Electrocardiography.
- The electrical field of heart.
- The leads; standard limb leads; precordial leads.
- Augmented limb leads.
- Basic ECG deflections, basic action of electrocardiograph.

2. Normal ECG

- The P wave
- The QRS complex
- The genesis of the QRS complex
- T wave; the ST segment
- The Q wave
- Rate and rhythm
- Rotation of the heart
- The Q-T interval.

3. The Electrical Axis

4. Pre Cardial Pattern Of ECG

5. Chamber Enlargement

- Myocardial infarction.
- Coronary insufficiency
- Recognition of ECG pattern.

6. Bundle Branch Block

- General principles.
- Right bundle branch block.
- Left bundle branch block.
- The hemi blocks (fascicular blocks).

7. Coronary Artery Disease

- Myocardial infarction.
- Coronary insufficiency.
- Recognition of ECG pattern.

8. Pericarditis, Myocarditis, Congestive Cardiomyopathy.

9. Systemic Hypertension and Rheumatic Heart Disease.

10. Cor-pulmonale, Acute, Pulmonary Embolism Emphysema.

11. Drugs and Electrolytes.

12. Congenital and Hereditary Heart Disease

Wolf Parkinson white syndrome and related syndromes.

13. Sinus Rhythm

- Sinus arrhythmia
- Sinus tachycardia and Bradycardia

14. Ectopic Arterial Rhythm

- Atrial extra systoles.
- Paroxysmal atrial tachycardia
- Atrial fibrillation and flutter.

15. Atrio Ventricular (AV) Nodal Rhythm

16. Ventricular Rhythm

- Ventricular extra systoles.
- Ventricular tachycardia.
- Ventricular flutter / fibrillation.

17. Disorder of Impulse Conduction

- Sinotrial (SA) nodal block
- Atrioventricular (AV) nodal block
- First degree AV block
- Second degree AV block
- Third degree AV block

Unit 2. Exercise Testing & Holter Analysis

1.Exercise Stress Testing

- Exercise Physiology.
- Exercise protocols.
- Electrocardiograph measurements.
- Exercise testing.
- Indication & techniques.

2. Holter Analysis

PAPER – 3

ECHO CARDIOGRAPHY, DOPPLER ECHO CARDIOGRAPHY, TEE, CONTRAST ECHO - Total teaching hours 200

Unit 1.Echocardiography:

1.Principles of echo cardiography

- Basic principles of ultrasound.
- M-mode echo cardiography.
- Two-dimensional echo cardiography.

2.Instrumentation

- Basic pulse echo system.
- Transducers.
- Pulse generation.
- Echo detection Echo disc plays.
- A mode; B mode; m-mode Display and recording.

3.Echo Cardiographic examination.

- Selecting transducers.
- Position of the patient.
- Placement of the transducer.
- Setting controls.
- M-mode labelling.
- 2 D Echo.
- Normal variants.
- Terminology.
- Identification of segments.

4.Echo Measurements – ASE Recommendation

5.Acquired Valvular Heart Disease

- Mitral stenosis.
- Mitral regurgitation.
- Mitral valve prolapse.
- Aortic stenosis.
- Aortic regurgitation.
- Tricuspid stenosis and regurgitation.

6.Congenital Heart Disease

- Atrial septal defect.
- Ventricular septal defect.
- Patent ducts arteriosis.
- Tetralogy of Fallot.

- Transposition of great arteries.
- Tricuspid atresia.

7.Pericardial Disease- Constriction, Effusion, Tamponade.

8.Myocardial Disorders

- Ischaemia, Infarction, Aneurysms, L V Function assessment.
- Evaluation Of Cardiomyopathy
- Evaluation Of Tumors and Thrombi

Unit 2.

Doppler Echo Cardio graphy, TEE, Contrast Echo

1.Doppler Echocardiography

- The Doppler principle.
- Doppler ultra sound techniques
- Colour Doppler flow imaging.
- Clinical Application of Doppler echocardiography.
- Physical principles and instrumentation in spectral and colour Doppler flow imaging.

1. Physical principles of the Doppler effect, the Doppler echocardiography system
2. Blood flow pattern.
3. Non laminar flow.
4. Doppler echo cardiograph modes.
5. Continuous wave Doppler system.
6. Pulsed Doppler system.
7. High pulse repetition frequency.
8. Colour display.
9. Problems of colour imaging.

2. Trans-esophageal echocardiography

3. Contrast Echo

PRACTICALS SYLLABUS FOR THE SECOND YEAR

Relevant to the theory syllabus

THIRD YEAR

TEACHING HOURS & EXAMINATION PATTERN

3rd Year

Paper No	Paper	Teaching hours		Examination			
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)	Total Min Pass (50%)
1	Concepts of Cardiovascular Disease and outlines of clinical Evaluation related to cardiac technology, Invasive cardiology	60	140	80	120	40	400
2	Angiography, EP studies, Intensive Care, Cardiopulmonary Resuscitation	60	140	80			
3	Interventional Cardiology (Coronary, Congenital) (Non-Coronary, Electro Physiology)	60	140	80			
	Total	180	420	240	120	40	

THIRD YEAR SYLLABUS

Total Teaching hours 600

PAPER – 1

CONCEPTS OF CARDIOVASCULAR DISEASE AND OUTLINES OF CLINICAL EVALUATION RELATED TO CARDIAC TECHNOLOGY, INVASIVE CARDIOLOGY

Total teaching hours 200

Unit 1. Concepts Of Cardiovascular Disease and Outlines of Clinical Evaluation Related to Cardiac Technology:

1.Congenital Heart Disease in The Adult Anatomical Abnormalities

- Obstruction.
- Valvular regurgitation.
- Abnormal communication between chambers.
- Abnormal connection.
- Surgical treatment.

2.Valvular Heart Disease Anatomic Abnormalities

- Congenital valvular heart disease.
- Rheumatic valvulitis.
- Aortic Stenosis.
- Aortic regurgitation.
- Mitral stenosis.
- Mitral regurgitation.
- Mitral valve prolapse.
- Combined valvular disease.

3.Coronary Artery Disease

- Patho physiology and clinical recognition.
- Silent myocardial ischaemia
- Angina pectoris
- Symptomatic venous and asymptomatic myocardial ischaemia.
- Types and locations of myocardial infarction.
- Thrombolytic therapy.
- Medical treatment.
- Other treatment modalities.
- Surgical treatment.
- Cardiac rehabilitation services.

4.Myocardial Diseases

- Dilated cardiomyopathy.
- Hypertrophic cardiomyopathy.
- Restrictive cardiomyopathy.
- Myocarditis.
- Heart failure.
- Surgical and medical treatment.

5.Pericardial Disease

6.Electrical Disturbances of The Heart

- Sinus node dysfunction.
- Arrhythmias.
- Surgical treatment.

7.Pulmonary Hypertension

8.Tumours of The Heart

9.Congenital Heart Disease in Infancy And Childhood

- Cyanotic Congenital Heart Disease
    - Tetralogy of fallot.
    - Pulmonary stenosis with atrial septal defect.
    - Transposition of great arteries.
    - Double outlet right ventricle.
    - Pulmonary atresia.
    - Total anomalous pulmonary venous connection.
- Acyanotic Heart Disease Septal Defects
    - Atrial septal defects.
    - Ventricular septal defects.
    - Congenital valvular disease.
    - Patent ductus arteriosus.
    - Coarctation of aorta.

10.Hypertension

Unit 2. Invasive Cardiology

- Cine angiographic imagiology.
- Radiation hazards in Cath lab.
- Contrast media.
- Cardiac catheterization standard practice.
- Cardiac catheterization complications.
- Pressure recording.
- Oxymetry / shunt quantification.
- Vascular resistance.
- Calculation of cardiac output.
- Gorlins formula.
- Pressure wave forms – normal.
- Pulmonary arterial hypertension.

PAPER – 2

ANGIOGRAPHY, EP STUDIES, INTENSIVE CARE, CARDIOPULMONARY RESUSCITATION - Total teaching hours 200

Unit 1. Angiography, EP Studies

- Percutaneous approach in Cardiology.
- Cath findings in TOF.
- Cath findings in left to right shunt.
- Cath findings in HCM.
- Cath findings in valvular diseases.
- Hemodynamics of constrictive pericarditis and restrictive cardiomyopathy.
- Coronary angiography views.
- Classification of coronary artery stenosis.
- Peripheral angiography.
- IVUS.
- Sinus node function tests.
- AV node function tests.

Unit 2. Intensive Care, Cardiopulmonary Resuscitation

I. Intensive Care

Monitoring and diagnostic procedures in ICU.

- Central venous access.
- ECG monitoring.
- Invasive hemodynamic monitoring.
- Cardiac arrhythmia recognition.

General care of patient in ICU

- Eye, GI tract and bladder system
- Care of mechanically ventilated patient.
- Tracheostomy, Humidification
- Vascular line, arterial line, venous line.

Radiography.

Chest physiotherapy.

Intensive care management of myocardial infarction & unstable angina.

Fluid management and parenteral nutrition.

Infectious disease in ICU, antibiotics in ICU.

Respiratory failure

- Oxygen therapy
- Mechanical ventilation.

Acid base disorders electrolyte imbalance.

Cardio vascular failure

- Plan of management

- Inotropic support
- Vasodilator drugs.

Renal failure and liver failure.
Head injury.
Principles of transfusion therapy.

II. Cardio Pulmonary Resuscitation and First Aid Techniques

BLS (Basic Life Support)

- An Open Airway.
- Adequate Breathing.
- Sufficient Circulation.
- Adult One-Rescuer CPR.
- Adult - Two Rescuer CPR.
- CPR Equipment.
- Resuscitation For Children

ACLS (Advanced Cardiac Life Support).

PAPER – 3

INTERVENTIONAL CARDIOLOGY (CORONARY, CONGENITAL) (NON-CORONARY, ELECTRO PHYSIOLOGY) -Total teaching hours 200

Unit1. Interventional Cardiology (Coronary, Congenital)

- Primary PTCA.
- Coronary stents.
- Drug coated stents.
- Advanced coronary interventions.
- Peripheral interventions.
- Trans catheter ASD closure.
- Trans catheter VSA closure.
- Tran catheter PDA closure.
- Coil Embolisation.
- Diagnosis & Treatment of coarctation of aorta.
- Balloon arterial septostomy.

Unit 2. Interventional Cardiology (Non- Coronary& Electro Physiology)

- IABP.
- PCPS.
- End myocardial Biopsy.
- PBPV/PBAV.
- PTMC.
- Alcohol septal ablation.

- Electro Physiological studies.
- RF Ablation.
- TPI.
- PPI.
- CRT.
- ICD.

PRACTICALS FOR THE THIRD YEAR

Relevant to the theory syllabus

Recommended Books

1. Anatomy- BD Chaurasia
2. Physiology- Ganong
3. Pharmacolgy-KD Tripathi
4. ECG-Narasimhan's Indian Edition of Schamroth
5. Echo- Catherine Otto's text book of Echocardiography
6. TMT-Ellsted
7. Cath & Angio-Morton Kern / Topol's hand book/Grossman
8. Cardiology-Braunwald text book of cardiology / Hurst Textbook of Cardiology

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

PERIPHERAL POSTING

Cardiovascular Technology			
Academic Year	Duration	Specialty	
Second year	One week each	Medical laboratories	Radiology
Third year	One week each	Anaesthesia	Emergency Medicine

Renal Dialysis Technology

OBJECTIVES OF THE COURSE

The broad goal of the teaching of undergraduate students in dialysis technology aims at providing an in-depth knowledge of hemodialysis and peritoneal dialysis therapy.

- Comprehend the various modalities of renal replacement therapy with knowledge of merits and demerits of each.
- Comprehend the principles of hemodialysis and peritoneal dialysis.
- Learn how to offer dialytic therapy for renal failure patients.
- Learn the various forms of hemodialysis and when each is to be applied.
- Learn to manage complications of dialysis therapy.
- Learn dialysis therapy in various special groups of patients e.g., unstable patients in the intensive care unit, children, cardiac patients etc.
- Learn plasmapheresis, Continuous therapies.
- Manage anticoagulation on patients on dialysis.
- Measure the adequacy of dialysis.
- Administer various drugs in emergencies and as a routine.
- Use blood transfusion.
- Start and close hemodialysis sessions independently.
- Successfully cannulate arterio-venous fistulae for hemodialysis.
- Train patients and their caregivers in performing peritoneal dialysis.
- Do water maintenance for the hemodialysis room.
- Maintain hemodialysis machines with respect to regular disinfection.
- Operate hemodialysis machines, CAPD cyclers reuse machines independently.
- Participate in Conduct of renal transplant programme.
- Use pulse oximeters, pressure monitors, defibrillators correctly.

2ND YEAR

TEACHING HOURS & EXAMINATION PATTERN

2nd Year

Paper No	Paper	Teaching hours		Examination				
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)		Total Min Pass (50%)
						Theory	Practical	
1	Applied Anatomy, Physiology and Pharmacology Related to Dialysis Technology	60	140	80	80	20	20	400
2	Concepts of Disease and Outlines of Clinical Evaluation related to Dialysis Technology	60	140	80		20		
3	Applied Dialysis therapy Technology - Part I	60	140	80		20		
	Total	180	420	240	80	60	20	

SECOND YEAR SYLLABUS

Total Teaching hours 600.

PAPER – 1

APPLIED ANATOMY, PHYSIOLOGY, AND PHARMACOLOGY RELATED TO DIALYSIS TECHNOLOGY

Total teaching hours 200

Unit 1.Applied Anatomy And Physiology Related To Dialysis Technology

1a. Gross structures of excretory system

- Structure of Kidney.
- Structure of Ureter.
- Structure of Urinary bladder.
- Structure of Nephron, renal corpuscle, glomerular apparatus, proximal tubule, loop of Henle, distal tubule and collecting tubule.

1b. Vascular supply of kidney and Peritoneum

- Renal Artery.
- Renal vein.
- Veins used for dialysis (Jugular, Femoral and Subclavian vein).
- Artery and Veins used for AV fistula and Graft.
- Innervations of Kidney and Urinary bladder.
- Peritoneum in general.

1c. Physiology related to Dialysis technology- Mechanism of urine formation

- Glomerular filtration.
- Factors affecting GFR.
- Methods of estimating GFR.
- Tubular Reabsorption.
- Concentration.
- Dilution and acidification.

1d. Functions of excretory system

- Excretory and regulatory functions of kidney.
- Metabolic and Secretory functions of kidney.
- Physiology of bladder function.
- Renal function test.
- Micturition.
- Types of bladder dysfunction.

1e. Regulatory functions of excretory system

- Role of Kidney in blood pressure regulation in health and diseases.
- Role of peritoneum in peritoneal dialysis.
- Mechanism of blood formation and regulation.
- Role of kidney in bone formation.
- Other endocrine functions of the kidney.
- Body fluids and electrolytes and their regulation in health and disease.
- Disorders of metabolism (Water, Potassium, Sodium, Phosphate, Calcium).
- Role of kidney in acid-base balance.

Unit 2.Pharmacology Related To Dialysis Technology

2a.Common drugs used in renal medicine

- I.V Fluids in renal patient.
- Diuretics.
- Anti-hypertensive Drugs.
- Bicarbonate.
- Potassium.
- Magnesium, Calcium.
- Vitamin-D analogs.
- Erythropoiesis stimulating agents (ESA).
- Iron therapy in dialysis patients.
- Phosphate Binders including Sevelamer HCL, Lanthanum carbonate.
- Vaccines used in dialysis patients - Hepatitis B, Pneumococcal, Influenza etc
- Antibiotics.
- Antihistamines used in Dialysis unit.
- Chemicals used in the dialysis room including composition and mechanism of action.
- Hemodialysis concentrates.
- Replacement fluids for CRRT.
- Chemicals used for sterilization including formaldehyde, Hydrogen peroxide, Sodium Hypochlorite, Peroxyacetic acid , Citrate and its mechanism of action.
- Peritoneal Dialysis Solutions including Icodextrin .
- Vitamins used in Dialysis patients.
- Calcimimetic Agents.

2b.Cardio vascular drugs & inotropic drugs

- Digoxin.
- Betablockers.
- Dopamine.
- Dobutamine.
- Adrenaline.
- Isoprenaline.
- Lipid lowering Agents.

65 of**2c.Vasodilators**

- Nitro-glycerine.
- Nitroprusside.

2d.Drugs affecting coagulation

- Heparin.
- Low molecular weight heparin.
- Tri sodium citrate.
- Protamin sulphate.
- Heparinoids.
- Direct thrombin Inhibitors.
- Regional Citrate Anticoagulation.

2e.Immunosuppressive agents

- Calcineurin Inhibitors.
- mTOR Inhibitors.
- Steroids.
- Azathioprine.
- Cyclosphosphamide.
- Mycophenolate mofetil.
- Induction Immunosuppressive drugs.

PAPER – 2

CONCEPTS OF DISEASE AND OUTLINES OF CLINICAL EVALUATION RELATED TO DIALYSIS TECHNOLOGY

Total teaching hours 200

Unit1.Basic Renal disorders

- Glomerular Diseases.
- Post infectious glomerulonephritis.
- Acute Kidney Injury (AKI).
- Chronic kidney disease (CKD).

Unit 2.Acid-Base, Fluids and Electrolyte Disorders

- Metabolic Acidosis.
- Metabolic Alkalosis.
- Respiratory acidosis and alkalosis.
- Edema and the clinical use of diuretics.
- Disorders of sodium (Hyponatremia, Hypernatremia).
- Disorders of potassium metabolism.
- Disorders of calcium, and Phosphorous Homeostasis.

Unit 3.The Kidney in systemic disease

- Renal function in congestive heart failure.
- Renal function in liver disease.
- Renal involvement in systemic vasculitis.
- Renal manifestations in SLE and other rheumatic disorders.

Unit 4.Renal Biopsy

- Indications.
- Contraindications.
- Techniques of Renal Biopsy.
- Pre and post biopsy care.
- Complications of Renal Biopsy.

Unit 5. Infectious Diseases

- Renal diseases associated with HIV infection.
- UTI(Urinarytract infection).
- Opportunistic infections in dialysis patients.
- Viral infections in dialysis and transplantation.

Unit 6. Drugs and the kidney

- Analgesics and the kidney.
- Principles of drug therapy in kidney failure.

Unit 7. Renal hypertension

- Pathogenesis.
- Essential HTN.
- Renovascular HTN.
- Therapy of HTN.

PAPER – 3

APPLIED DIALYSIS THERAPY TECHNOLOGY -

PART I

Unit 1. Introduction to Hemo Dialysis

- Dialysis Team (Doctors, Technologist, Nurses, Technician, Renal Dietician- rights, responsibilities and relationship with patients).
- Basic chemistry of body fluids and Electrolytes.
- History of Hemodialysis.
- Principles of Hemodialysis.
- Indications for dialysis.
- Types of Hemodialysis.

Unit 2. Water Treatment

- Purpose of water treatment.
- Filtration.
- Softener and carbon filtration.
- Deioniser.
- RO system.
- UV radiation.
- Ultrafiltration.
- AAMI and European standards.
- Ultrapure water.

Unit 3. Hemo Dialysis Equipments and Assessment of dialysis

- Components and function HD equipment.
- Dialyser membranes – Types and biocompatibility.
- Types of dialyser.
- Hemodialysis adequacy.
- Dialyser reprocessing and reuse of dialyzers.

Unit 4. Vascular access

- History.
- Types of access.
- Access care.
- Access complications and management.
- Vascular access recirculation.

Unit 5. Current research in hemodialysis

- Hemodialysis therapies.
- Hemodialysis machines.

PRACTICALS SYLLABUS FOR THE SECOND YEAR

Relevant to the theory syllabus

THIRD YEAR

Paper No	Paper	Teaching hours		Examination			
		Theory	Practicals	UE Theory Min Pass (50%)	UE racticals Min Pass (50%)	Internal Assessment Min Pass (50%)	Total Min Pass (50%)
1	Applied Dialysis therapy	60	140	80	80	40	400
2	Applied Dialysis therapy	60	140	80			
3	Renal Transplantation &	60	140	80			
	Total	180	420	240	80	40	

3rd Year

UE: University Exam

Practical includes Oral, Spotters & Record

THIRD YEAR SYLLABUS

Total Teaching hours 600.

PAPER – 1

APPLIED DIALYSIS THERAPY TECHNOLOGY

PART II-Total teaching hours 200

Unit 1. Hybrid and continuous therapies

- Continuous hemofiltration.
- Continuous Hemodiafiltration.
- Continuous and Intermittent hemodialysis.
- Sustained low efficiency dialysis(SLED).
- Slow continuous ultrafiltration(SCUF).
- High flux and high efficiency dialysis.

Unit 2. Assessment of complications and its management in Hemodialysis patients

- Patient assessment, management and prevention– General, pre, intra and post dialysis.
- Lab data analysis.
- Machine monitoring during hemodialysis.
- Acute complications during hemodialysis.

Unit 3. Paediatric Hemodialysis

- Hemodialysis in infants and children.
- CRRT in infants and childrens.

Unit 4. Special procedures pertaining to dialysis technology

- Plasmapheresis.
- Hemoperfusion.
- MARS.

Unit 5. Role of dialysis technologist in hemodialysis unit

- Infection control and universal precautions.
- Psychosocial aspects of dialysis.
- Quality assurance in dialysis.
- Management of dialysis unit – supplies, equipment and accessories.

PAPER – 2

APPLIED DIALYSIS THERAPY TECHNOLOGY

PART III -Total teaching hours 200

Unit 1. Introduction to peritoneal dialysis

- History of peritoneal dialysis.
- Physiology of PD – Kinetics of PD.
- Acute peritoneal dialysis.
- Indications and contraindications for chronic PD.

Unit 2. PD apparatus

- Solution.
- Transfer set.
- Connectologies.
- Access for PD.
- Catheter and Exit site care.

Unit 3. PD process and evaluation of peritoneum

- PD therapies – intermittent & continuous.
- Assessment of peritoneal membrane permeability.
- Adequacy of peritoneal dialysis.

Unit 4. PD complications & management

- Non infectious complications of PD – Mechanical and metabolic.
- Infectious complications of PD.
- Patient Education.

Unit 5. Systemic diseases in dialysis patients

- Nutrition in dialysis patient.
- Diabetes in dialysis patient.
- Hypertension in dialysis patient.
- Serum enzyme levels.
- Hematologic abnormalities.

Unit 6. Infectious diseases in dialysis patients

- Infections in dialysis patients.
- Hepatitis B.
- Hepatitis C.
- HIV.
- Catheter related bacteraemia (CRBS).

Unit 7. Special problems

- Endocrine disturbances.
- Bone disease.
- Aluminium toxicity.
- Sleep disorders.
- Musculoskeletal & rheumatologic diseases in CRF patients.
- Special problems pertaining to Heart & circulatory system in CRF patient.
- Special problems pertaining to digestive tract in CRF patients.
- Special problems pertaining to genitourinary tract and male reproductive organs in CRF patient.
- Special problems pertaining to obstetrics & gynaecology in CRF patients.
- Special problems pertaining to nervous system in CRF patients.

Unit 8. Urosurgical procedures

- Common urosurgical procedures, instruments & their management.
- ESWL.

Unit 9. Principles of +ICU care

- Basics of ECG.
- Basics of ICU dialysis.

PAPER – 3
RENAL TRANSPLANTATION AND COORDINATION

Unit1. Basics of Kidney Transplantation

- History of Kidney Transplantation.
- Histocompatibility Testing , Cross matching Techniques in Renal Transplantation.
- Immunosuppressive drugs used in Renal Transplantation.
- Nutrition in Kidney transplant recipients.

Unit 2. Evaluation of Donor and Recipient

- Living Donor Kidney Transplantation and Donor Evaluation.
- Evaluation of Adult Kidney Transplant patients.
- Indication and Contraindications for Renal Transplantation.
- Indication and Contraindications for Kidney Donation.

Unit 3. Renal Transplantation Coordination

- Human Organ Transplant Act and its Amendments.
- Role of Transplant Coordinator in Organ Transplantation.
- Ethical Aspects in Renal Transplantation.
- Psychosocial aspects in Renal Transplantation.

Unit 4. Deceased Donor Transplantation

- Deceased Donor Organ Donation.
- Deceased Donor Maintenance.

Unit 5. Renal Transplant Surgery and Complications of Renal Transplantation

- Transplantation Surgery .
- Post-Transplant Management – Short and Long Term.
- Infectious Complications of Renal Transplantation.

PRACTICALS SYLLABUS FOR THE THIRD YEAR

Relevant to the theory syllabus

Recommended textbooks

1. Principle and Practice of Dialysis – Henrich.
2. Handbook of Kidney Transplantation – Gabriel Danovitch.

Reference Books

1. Primer on Kidney Disease – Arthur Greenburg .
2. Text book of Pathology - Harsh Mohan.
3. Basic pathology –Pocket Robbins.
4. Principles and practice of medicine – Davidson's.
5. Principle of Internal Medicine – Harrison.
6. Kidney diseases in primary care – K.Mandal ,Stanly.
7. Hand Book of Dialysis – J.T.Daugirdas.
8. Dialysis therapy – Allen R.Nissenson.
9. Text Book of Peritoneal Dialysis – Ram Gokul.
10. Kidney Transplantation Principle and Practice – Peter Morris.

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

PERIPHERAL POSTING

Dialysis Technology			
Academic Year	Duration	Specialty	
Second year	One week each	Medical laboratories	Anaesthesia
Third year	One week each	RICU	Emergency Medicine Department

OPTOMETRY

FIRST Year Examination

Subject	University Examination				Total
	Theory	Internal	Practicals	Viva Vice	
GENERAL ANATOMY(part-A) & GENERAL PHYSIOLOGY(Part-B)	40 40	10 10	-	-	**100**
BASIC BIOCHEMISTRY AND NUTRITION **OCULAR ANATOMY,OCULAR PHYSIOLOGY & BIOCHEMISTRY**	80 80	20 20			**100** 100
PHYSICAL & PRINCIPLES OF LIGHTING (Part-A) **GEOMETRIC OPTICS(Part-B)**	40 40	10 10	-	-	**100**

Non- University Examination (SUBSIDIARY)

Subject	Theory	Internal		Total
ENGLISH	80	20		**100**
COMMUNITY MNEDICINE & MEDICAL ETHICS	80	20		**100**
COMPUTER BASICS	80	20		**100**
MEDICAL RECORDS	80	20		**100**

Note: I A = Internal Assessment

*Main Subjects shall have University Examination.

**Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges

Note: I A= Internal Assessment

Main Subjects shall have University Examination.There shall be no University Practical Examination.

** subsidiary Subjects: Examination for Subsidiary subjects shall be conducted by respective college.

NOTE:

7. Classes will be scheduled Monday to Friday between 2 and 4 pm on all working days.
8. The students will be posted in their respective department from 9 am to 1 pm from Monday to Friday and from 9 am to 4 pm on Saturday.
9. Teaching of the above core subjects shall be completed one month before the final 1st yr university examination.
10. The Teaching hours and Exam pattern for second and third years are furnished separately under each speciality.
11. There shall be an internship during the fourth year which includes clinical work, maintenance of log-book and project work if any.
12. Workshop including basic life support, advanced cardiac life support and advanced trauma life support will be conducted during the internship.

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

PATTERN OF THEORY EXAMINATION FOR EACH PART-A & PART B SEPERATELY

Theory Duration: 3 hours

PART-A

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	1 out of 2	10	10
Short answers	3 out of 4	5	15
Brief answers	5 out of 7	3	15
Total			40

PART-B

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	1 out of 2	10	10
Short answers	3 out of 4	5	15
Brief answers	5 out of 7	3	15
Total			40

ENGLISH

Total Teaching hours: 25

Unit 1. Communication

Role of communication, Defining Communication Classification of communication, Purpose of communication, Major difficulties in communication, Barriers to communication, Characteristics of successful communication –The seven Cs Communication at the work place, Human needs and communication, "Mind mapping" Information communication.

Unit 2. Comprehension passage

Reading purposefully, Understanding what is read, Drawing conclusion, Finding and analysis.

Unit 3. Explaining

How to explain clearly, Defining and giving reasons, Explaining differences, Explaining procedures and Giving directions.

Unit 4. Writing business letters

How to construct correctly, Formal language, Address, Salutation, Body, Conclusion.

Unit 5. Report writing

Reporting an accident.

Reporting what happened at a session

Unit 6. Reporting what happened at a meeting

Unit 7. Language activity

Syllable division, Precis – Writing, Common errors, Expansion of proverbs, Resume writing, One-word substitutes

Unit 8. Grammar

Unit 9. Prose

- 1.After twenty years – O. Henry
- 2.Once more to the lake – E.B White
- 3.Playing the English gentle man – M.K. Gandhi
- 4.The Boy who Broke the bank – Ruskin Bond

Recommended text book

4. Paths to skills in English. Orient Blackswan. Sundaravalli, AS. Kamalakar et al.
5. English Grammar in use. Raymond Murphy. Cambridge University Press.
6. Practical English Usage by Michael Swan 20

COMMUNITY MEDICINE

Total teaching hours: 25

Unit 1. Concepts of health and disease

- Dimensions and determinants of health.
- Indicators of health.
- Health service philosophies.
- Concept of disease, its causation and natural history.
- Concept of disease control and prevention.
- Disease classification.

Unit 2. Principles of epidemiology and epidemiological methods

Unit 3. Infectious disease epidemiology, Dynamics and Model of transmission of disease.

Unit 4. Health programmes in India

- Malaria, TB, AIDS, Universal immunisation programme, minimum needs programme

Unit 5. Disinfection

- Common infections, Disinfection, Disinfestations and Sterilization at the health centre level.

Unit 6. Hospital Waste Management

- Hazards of health care waste
- Disposal of wastes in Hospital and Primary Health Centre

Unit 7. Health services

- Brief description of organization of health services at the centre and state levels.

Unit 8. Primary Health Care

- Definition, components and principles of primary health care.
- Millennium Development Goals.
- Primary Health Centre -The functions, staffing pattern and the role of paramedicals in primary Health Centre.

Unit 9. Nutritional Health

- Vitamins and Minerals protein Energy malnutrition obesity & Nutritional Assessment.

Unit 10. Epidemiology of Communicable and Non communicable disease polio, measles

Unit 11. Demography & Population control

- The factors influencing population growth, death rate, birth rate, Age pyramid and methods of contraception.
- Sources of Health information – Census, SRS

Unit 12. Environmental sanitation

- Water borne diseases, Methods of water purification and disinfection, collection of water samples, their transport and bacteriological analysis
- Air pollution
- Noise pollution

- Radiation and hazards
- Methods of excreta disposal and solid waste disposal.

Recommended text book

2. Park’s text book of Preventive and social Medicine – Latest edition

Reference books

4. Community Medicine with recent advances by A.H. Surya Kantha
5. Short text book of preventive and social medicine by G.N. Prabhakar
6. Text book of community medicine by Sunderlal.

MEDICAL ETHICS

Total teaching hours: 10

Unit 1. Introduction to medical ethics

- What's special about medicine?
- What's special about medical ethics?
- Who decides what is ethical?
- Does medical ethics change?
- Does medical ethics differ from one country to another?
- The role of the WMA
- How does the WMA decide what is ethical?
- How do individuals decide what is ethical?

Unit 2. Major principles of medical ethics.

Unit 3. Perspective of medical ethics

- The Hippocratic oath
- The Declaration of Helsinki
- The WHO Declaration of Geneva, International code of Medical Ethics (1993)
- Medical Council of India Code of Ethics (2002)

Unit 4. Ethics of the individual

- The rights of the patient
- Truth and confidentiality
- The concept of disease, health and healing
- The right to health and responsibilities of individuals

Unit 5. The ethics of human life

- Beginning-of-life issues
- Prenatal sex determination
- The family and society in medical ethics
- Euthanasia, cancer and terminal care. Death and dying. Use of life-support systems, the right to die with dignity
- Suicide – the ethical outlook.
- Communication and consent,
- Decision-making for incompetent patients
- Confidentiality

Unit 6. Ethics in relation to society, colleagues and research

- Contract and confidentiality, malpractice and negligence
- Increasing the awareness and knowledge of students of the value dimensions of interactions with the patients, colleagues, relations and public.
- Dual loyalty, Resource allocation.
- Professional Ethics. Respect and equal treatment
- Relationships with physician colleagues, teachers and students. Relationships with other health professionals. Cooperation. Conflict resolution
- Reporting unsafe or unethical practices.
- Duties and responsibilities of the technologists.

COMPUTER BASICS

SL NO	TOPICS	HOURS
1	Introduction to computers	30
2	Definition ✓ Input ✓ Output ✓ CPU	
3	Input output devices (types)	
4	Basis of computer system ✓ Switching computer on & off ✓ What is bias? ✓ Computer generations	
5	Keyboard practices	
6	Definitions of terms ✓ Desktop ✓ Software	
7	Computer systems: Hardware & software definitions	
8	Windows'98 ✓ Definition & Why ✓ Calculator - Word pad - Short cuts - Start menu - Media player - Note pad - Win amp – Paint - Control panel	
9	Microsoft word ✓ Opening, saving, deleting, typing, print , Page border, spelling, table, grammar, margin, Clip art, BIU, word art, Colour text &background, Picture drawing using word	
10	Excel ✓ Formulas - Design charts- Format tables	
11	PowerPoint ✓ Designing a presentation - Inserting some animation with sound	
12	Internet &its applications ✓ Interconnection to HTML ✓ E- mailing – Browsing - Chatting	

Medical Records Sciences:

Teaching hours 10

1. **Introduction to Medical Records Services**
2. **Standards for Medical Record Services**
3. **Medical Records**
    - Needs and Management of MRD
    - Hospital's General Rules and Regulations
    - Control and Movement of Medical Records
    - Rights and Responsibilities of a Patient
4. **Medical Record Systems**
    - Comprehensive Record System – Procedures followed at AIIMS
5. **Personal Health Records (PHR)**
6. **Hospital Statistics**
7. **International Classification of Diseases -10th Revision**
    - Introduction; What is Coding?
    - History of ICD
    - Hierarchical Structure
    - Differences between ICD-9 and ICD-10
    - Basic Coding Guidelines
    - Other ICD Classification Systems
    - No-shortcut for ICD
    - International Classification of Procedures in Medicine
    - Morbidity ICD codes for National Ayurveda, Siddha, and Unani.
8. **Hybrid from Manual to Electronic Records**
9. **Historical Background of Health Information Technology**
10. **How to Comupurerize the M.R. Management System (MRMS)**
11. **Electronic Health Records (E.H.R)**
12. **The Strategic E.H.R.Planning**
13. **Challenges of E.H.R Adoption**
14. **Electronic Health Record Limitations**
15. **E.H.R Functional Requirement Specifications**

16. **Check List for Assessing HIM Dept. Readiness and Planning for E.H.R.**
17. **Electronic Health Record Standards**
18. **Technology Infrastructure Assessment**
19. **E.H.R System Implementation and Maintenance**
20. **Introduction to Electronic Nursing Records**
21. **Medical Records Role in HCD in 21st Century**
22. **The Physician treats the Patient and the HIM treat the Hospital for controlling**
23. **Healthcare Cost**
24. **Role of HIM in the next 10 to 20 years**
25. **Transformation of HIM Status in the Developing Countries in the next 10 to 20 years**
26. **Health Information Manager (HIM) Education and Training in the next 10 to 20 years**
27. **Evolution of the International Federation of Health Information Management**
28. **Association (IFHIMA) from the 20th Century and What will grow in 21st Century**
29. **Medico-legal Aspects of Manual and Electronic Health Records**

GENERAL ANATOMY

SL NO	TOPICS	HOURS
1	Introduction- Anatomy and it's sub-division, planes of the body, terms in relation of structures, Regional Anatomy, organ system, osteology of orbital bones	45
2	Tissues of the body [Histology of the body tissues] 2.1 Epithelium 2.2 Connective tissue 2.3 Bone and cartilage 2.4 Muscles: Skeletal, smooth, cardiac 2.5 Blood vessels 2.6 Neuron, Neuroglia 2.7 Glands, exocrine and endocrine, lacrimal gland in detail 2.8 Skin and appendages 2.9 Lymphoid Tissues 2.10 Ganglian	
3	Organ systems: [General plan] 3.1 Locomotor system: Bones, muscles, joints 3.2 Cardiovascular systems: Heart, Regional blood vessels- arteries, veins 3.3 Lymphatic system including immune system 3.4. Digestive system 3.5. Respiratory system 3.6. Reproductory system 3.7. Endocrine system 3.8. Central nervous system- spinal and brain stem, cerebellum, cerebrum, spinal, cranial nerves 3.9 ganglia	

RECOMMENDED BOOKS

1. Human anatomy — B.D.Chourasia
2. Text book of human anatomy — H.Gray
3. Anatomy and Physiology of the eye — A.K.Khurana, Indu Khurana
4. Clinical anatomy of the eye — S.Snell, A.Lemp
5. Text book of Anatomy — Vishramsingh

GENERAL PHYSIOLOGY

SL NO	TOPICS	HOURS
1	1.1. Cell structure and organization 1.2 Gene action 1.3. Tissueorganization – Epithelium 1.1. Connective tissue - Collagen fibers- elastic fibers- areolar fibers- cartilage- bone 1.5. Contractile tissue- striated – skeletal –cardiac- non striated –plain myoepithelial 1.6. General principles of cell physiology 1.7. Electrophysiology of cells 1.8.Physiology of skeletal muscles	45
2	Blood 2.1 Composition 2.2 Volume measurement and variations 2.3 Plasma proteins- classification and functions 2.4 RBC's- development, morphology and measurement- functions and dysfunctions 2.5 WBC's- development – classifications - morphology–functions and dysfunctions 2.6. Platelets –morphology-development, functions and dysfunctions 2.7 Clotting- factors- mechanism- anticoagulants- dysfunctions 2.8. Blood grouping –classifications- importance in transfusion, Rh factor & incompatibility 2.9. Suspension stability 2.10. Osmotic fragility 2.11. Reticulo endothelial system Spleen – lymphatic tissue Thymus - Bone marrow Immune system - cellular - humoral- autoimmune	
3	Digestion 3.1. General arrangement 3.2. Salivary digestion – functions and regulations 3.3. Gastric digestion –functions and regulations 3.4. Pancreatic digestion- functions and regulations 3.5. Intestinal digestion – functions and regulations 3.6. Liver and Bile 3.7. Absorption 3.8. Motility-Deglutition-Gastric-Intestinal-Vomiting-Defecation 3.9. Functions of large intestine 3.10. Neurohumoral regulations of alimentary functions, summary	
4	Excretion 4.1. Body fluids – distribution, measurement and exchange 4.2. Kidney –structure of nephron – mechanism of urine formation-composition of urine and abnormal constituents- urinary bladder and micturition	
5	Endocrine system 5.1. Hormone mechanism – negative feedbacks- tropic action –Permissive action – cellular actions 5.2. Hypothalamic regulation 5.3. Hormones, Actions & Regulations of ✓ Hypophysis ✓ Thyroid ✓ Adrenal Cortex & medulla ✓ Parathyroid ✓ Islets of pancreas ✓ Miscellaneous 5.4. Common clinical disorders	

6	Reproduction 6.1. Male reproductive system- control and regulation-semen analysis 6.2. Female Reproductive system- Uterus -ovaries- menstrual cycle- Regulation -Pregnancy and delivery-breast – family planning	

7	Respiration 7.1. Mechanics of respiration 7.2. pulmonary function tests 7.3. Transport of respiratory gases 7.4. neural and chemical regulation of respiration 7.5.hypoxia cyanosis- dyspnoea- asphyxia	
8	Circulation 8.1. Heart: myocardium- innervation- transmission of cardiac Impulse-Events during cardiac cycle-cardiac output 8.2. Peripheral circulation: Peripheral resistance- Arterial blood pressure measurements- factors regulating variation – capillary circulation-venous circulation 8.3. Special circulation: coronary – cerebral 4.4.miscellaneous	
9	Nervous system 9.1. Neuron – conduction of impulse – synapse – receptor 9.2. Sensory organization- pathways and perception. Reflexes 9.3. cerebral cortex – functions 9.4. Thalamus- basal ganglia – Cerebellum – Hypothalamus 9.5. Autonomic nervous system- motor control of movements, posture and equilibrium-conditioned reflex, Eye hand co-ordination. Sleep, consciousness, behavior , memory	
10	Environmental Physiology 10.1. Body temperature regulation [including skin physiology] 10.2. Exposure to low and high atmospheric pressure	
11	Special senses [elementary] 11.1. Olfaction- Taste- Hearing- vision	
		45

GENERAL PHYSIOLOGY - DEMONSTRATION		
1	Microscope &Haemocytometer	
2	Blood 2.1. RBC count 2.2. Hb 2.3. WBC count 2.4. Differential count 2.5. Hct Demonstration 2.6.ESR 2.7. Blood group and Rh type 2.8.Bleeding time and clotting time	20
3	Digestion – Test salivary digestion	
4	Excretion 4.1. Examination of urine ✓ Specific Gravity ✓ Albumin ✓ Sugar ✓ Microscopic examination for cells and cyst	
5	Endocrinology & Reproduction 5.1. Dry experiments in the form of cases showing different endocrine Disorders	
6	Respiratory system 6.1. Clinical examination of respiratory system 6.2. Spirometry 6.3. Breath holding test 6.4.endurance test	
7	Cardiovascular system 7.1. Clinical examination of circulatory system ✓ Measurement of blood pressure and pulse rate ✓ Effect of exercise on blood pressure and pulse rate	
8	Central Nervous System 8.1. Sensory system 8.2. Motor system 8.3. Cranial system 8.4. Superficial and deep reflexes 8.5. Test for hearing	
		20

RECOMMENDED BOOKS

1. Text book if medical physiology — Guyton
2. Human physiology — AK Jain, Indu Khurana
3. Human physiology — Chatterjee
4. Adler's physiology of the eye — Robert.A.Moses, William.M.Hart.Jr
5. Text book ocular anatomy & physiology — AK Khurana

BASIC BIOCHEMISTRY& NUTRITION

SL NO	TOPICS	HOURS
1	Carbohydrate Chemistry; Definition, general classification with examples, composition, sources, properties and functions of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides. Glycosaminoglycans (mucopolysaccharides-in detail)	4
2	Lipid Chemistry ; Definition, general classification Definition, classification, and functions of Fatty acids, Cholesterol, Essential fatty acids , Phospholipids and their importance	3
3	Amino-acid Chemistry; Amino acid chemistry: Definition, Classification, Peptide bonds, Peptides: Definition, Biologically important peptides. Protein chemistry: Definition, Classification, Functions of proteins, Collagens, Plasma proteins, Muscle proteins	6
4	Enzymes; Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity, Mechanism of enzyme action. Diagnostic enzymology (clinical significance of enzymes)	5
5	Nucleotide and Nucleic Acid Chemistry; Nucleotide chemistry: Nucleotide composition, functions of free nucleotides in body. Nucleic acid (DNA and RNA) chemistry: Difference between DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA.	3
6	Digestion and Absorption; General characteristics of digestion and absorption, Digestion and absorption of carbohydrates, proteins and lipids. Disorders of digestion and absorption – Lactose intolerance,	3
7	Fundamentals of Biological oxidative reactions-ATP formation.	3
8	Carbohydrate Metabolism; Introduction, Glycolysis – Aerobic, Anaerobic, Citric acid cycle, HMP Shunt pathway,	4
9	Lipid Metabolism; Introduction to lipid metabolism, Lipolysis, β-oxidation of fatty acids, Ketone body metabolism: Ketone body formation (ketogenesis), utilization (ketolysis), ketosis, Rothera's test. Cholesterol metabolism: degradation, cholesterol transport Hypercholesterolemia and its effects (atherosclerosis and coronary heart diseases) Hypocholesterolemic agents,	5
10	Amino acid and Protein Metabolism; Catabolism of amino acids - Introduction, transamination, deamination, Fate of ammonia, transport of ammonia, Urea cycle Specialized products formed from amino acids - from glycine, arginine, methionine, phenylalanine and tyrosine.	3
11	Vitamins ; Definition, classification according to solubility, Individual vitamins(Water soluble & fat soluble) - Sources, Coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity	8
12	Mineral Metabolism;Definition, Sources, RDA, Digestion, absorption, transport, excretion, functions, disorder of Individual minerals - Calcium, phosphate, iron, Magnesium, fluoride, selenium, molybdenum, copper. Phosphate, calcium and iron in detail	5
13	Cell Biology;Introduction, Cell structure, Cell membrane structure and function, various types of absorption. Intracellular organelles and their functions, briefly on cytoskeleton	2

14	Nutrition; Introduction, Importance of nutrition Calorific values, Respiratory quotient – Definition, and its significance Energy requirement of a person - Basal metabolic rate: Definition, Normal values, factor affecting BMR Special dynamic action of food Physical activities - Energy expenditure for various activities. Calculation of energy requirement of a person Balanced Diet Recommended dietary allowances Role of carbohydrates in diet: Digestible carbohydrates and dietary fibers Role of lipids in diet Role of proteins in diet: Quality of proteins - Biological value, net protein utilization, Nutritional	**8**
	aspects of proteins-essential and non-essential amino acids. Nitrogen balance Nutritional disorders	
15	Acid-Base balance; Acids, bases and buffers, pH. Buffer systems of the body, blood buffers, mechanism of buffer action. H+ and pH measurements.	**3**
16	Measles and associated eye disorders, low birth weight	**2**
17	Free radicals – Biological Reactions-Oxidants- antioxidants, -diseases –Therapeutic uses of antioxidants	**3**
		70
GENERAL BIOCHEMISTRY – DEMONSTRATION		
1	1.Reaction of monosaccharides- disaccharides- qualitative 2.Estimation of Glucose 3.Estimation of proteins- ninhydrin reaction 4.Estimation of Vitamin C 5.Eatimation of Vitamin A	
		20

GENERAL BIOCHEMISTRY DEMONSTATION; -20 hours

1. Reactions of monosaccharide's-disaccharides- qualitative
2. Estimation of Glucose
3. Estimation of proteins- Ninhydrin
4. Estimation of Vitamin A
5. Estimation of Vitamin c

Total theory hours; 70
Practical- 20

Recommended Text books

1. Text book of Biochemistry Sathyanarayan
2. Text book of Biochemistry A.C Deb
3. Text book of Biochemistry S.K dasgupta
4. Biochemistry of the eye David. R. whilehart

OCULAR PHYSIOLOGY

SL NO	TOPICS	HOURS
1	1. Protective mechanisms in the eye. 2. Precorneal tear film and lacrimation 3. Extrinsic ocular muscles, their action and control of their movements. 4. Coats of the eyeball 5. Corneal physiology – Hydration, Metabolism, Corneal wound healing, Transparency, Permeability 6. Aqueous humour - Production, Circulation, Drainage and Intra ocular pressure 7. Vitreous Humour 8. Iris – pupil reaction 9. Crystalline lens and accommodation – Presbyopia 10. Retina – Physiology of RPE, Scotopic & Photopic vision, neural signal, retinal synapses, Photo transduction, Information processing, Retinal metabolism 11. Vision- general aspects of sensation 12. Pigments of the eye and photo chemistry 13. The visual stimulus, refractive errors 14. Visual acuity and its principle of measurments 15. Visual perception- binocular vision, stereoscopic vision, optical illusion 16. Visual pathway, central & cerebral connections, lesions of pathways & effects 17. Colour vision, colour vision defects and diagnostic tests	30
		30

RECOMMENDED BOOKS

1. Text book if medical physiology — Guyton
2. Human physiology — Choudhary
3. Human physiology — Chatterjee
4. Adler's physiology of the eye — Robert.A.Moses, William.M.Hart.Jr

OCULAR ANATOMY

1	**1.1 Introduction to anatomical terminologies**– cross section of eyeball **1.2Ocular Adnexa** a. Eye Brows b. Eyelids – Structure, Facial spaces, Arterial supply, nerve supply, venous & lymphatic drainage c. Conjunctiva – general arrangements, structure, glands, arteries, veins, caruncle, plica semilunaries **1.3 Lacrimal System** – Lacrimal Gland, Drainage, Tear film **1.4 Extraocular Muscles** - anatomy, innervations, actions	
2	**Cornea**: layers, cellular structures, refractive properties	
3	**Coats of eye ball** Sclera (Episclera& Sclera) Choroid, Ciliary body, Iris Retina (Detailed anatomy, cellular structure, blood supply and nerve supply)	
4	**Aqueous, anterior chamber, Intraocular pressure, vitreous body**	
5	**Pupil & Pupillary pathway and its lesions**	
6	**Crystalline lens** – structure, suspension, accommodation	
7	**Orbit** Orbital margin, Walls of orbital cavity Orbital structure & Foramen Surface anatomy, Relations of bony orbit, Orbital Muscles	
8	**Cranial Nerves** 1.Optic nerve 2. Oculomotor nerve 3. Trochlear Nerve 4. Abducent nerve 5. Facial Nerve (Nuclei, course, relationship with brain, ocular contribution in detail)	
9	**Visual Pathway** – Definition, anatomy of visual pathway, visual reflexes, Lesions of visual pathway	
10	**Ocular Embryology**	30
	Total	
3	Demonstration 3.1. Practical dissection of Bull's eye 3.2. Practical demonstration of orbital structures	

OCULAR BIOCHEMISTRY

SL NO	TOPICS	HOURS
1	Importance of ocular biochemistry in clinical optometric practice	30
2	Tear film ✓ Composition - Lipid layer - Aqueous layer - Mucoid layer - Tear Secretion Functions & dysfunction – Diagnostic tests – Tear substitutes – Recent development	
3	Cornea ✓ Biochemical composition of epithelium – bowman's layer-stroma- Descemet's layer-endothelium-functions- corneal metabolism –nutrient uptake- energy-transparency-barrier mechanism-pump action-irrigating solutions –aging and other anomalies-recent developments	
4	Lens ✓ Composition-metabolism-glucose utilization- sorbitol pathways- Glutathione and ascorbic acid transport- transparency- cataract formation- aging photo oxidation- sugar cataract- cataract and ascorbic acid – medical therapy- recent developments	
5	Aqueous humour ✓ Composition- function-Ciliary body-aqueous humour production-IOP- Glaucoma	
6	Vitreous humour ✓ Structure-composition functions- vitreous biochemical pathology- Intraocular gels-recent developments	
7	Retina ✓ Pigment epithelium-structure-composition-photoreceptor cells-rhodopsin – lipids renewal- inner segment – Pigment epithelium – choroid- metabolism and function-phagocytosis- vitamin A- retinal function and metabolism. Retinal neurochemistry Monoamines-acetyl choline- gaba-aminoacids- taurine- neuropeptides. Biochemical correlates of retinal diseases	
8	Free Radicals and Antioxidants Mechanism of Lipid Peroxidation- oxidative damage to the lens- vulnerability of the Retina to Free Radicals – Antioxidants in the Retina and RPE – Vitamin E – Ascorbate – Carotenoids	
		30

PHYSICAL OPTICS (THEORY)

SL NO	TOPICS	HOURS
1	Nature of light: An overview Corpuscular Theory, Wave Theory, quantum theory and dual nature	02
	Simple Harmonic Motion Definition, Mathematical representation, energy in SHM, combination of two SHMs (along a line and at right angles). Waves : Transverse and Longitudinal, mathematical representation of a wave, wave fronts, path differenceand phase difference, coherent waves, Numerical.	10
	Interference of light Theory of interference-Conditions for interference, Young's double slit experiment, Expression for fringe width, Intensity distribution of the double slit interference pattern, condition for good contrast.	10
	Interference in thin films: Reflection phase shifts, optical path length. Interference in thin parallel films of uniform thickness, variable thickness (air wedge, Newton's rings), their applications to antireflection coatings, optical flatness of reflecting surfaces, determination of : wavelength, refractive index, thickness of thin films, radius of curvature, Michelson interferometer, Numerical	10
2	Diffraction – Introduction, Fresnel and Fraunhofer diffraction. Fresnel diffraction: Rectilinear propagation of light, Zone plate, Theory of Fresnel's half period zone. Numerical. Fraunhofer Diffraction: Diffraction pattern from single slit, Double slit. Diffraction pattern due to N Slits-Theory of plane transmission grating. Resolving power of the diffraction grating. Numerical.	
3	Polarization – Review of light as a transverse wave. Polarization phenomenon due to reflection, refraction and scattering Brewster's and Malus' laws. Polaroids. Double refraction, retardation plates, Nicol prism as a device to produce polarized light, dichroism, equation to polarization ellipse, elliptical, circular and linear polarizations, their production and detection Optical activity, Lorentz half shade polarimeter, determination of specific rotation	10
4	Absorption and scattering:General and selective absorption,Distinction between absorption and scattering, absorption by solids, liquids and gases, scattering: Rayleigh, Mie and Raman scattering.	08
5	Radiometry and Photometry – Electromagnetic spectrum, Radiometry, Photometry, sources of optical radiation and detectors of radiation.	06
6	Laser basics:Introduction, Einstein quantum theory of radiation, Essentials of a laser, Ruby laser, Holography, Numerical.	08
7	FiberOptics: Structure,Optics of propagation, Attenuation, Distortion, Numerical.	6
8	The particle nature of radiation :Photoelectric effect, Compton effect(no derivation of Compton shift equation), Numerical	6
	TOTAL	**86**

PHYSICAL OPTICS - PRACTICAL

Any 10 of the following experiments

SL NO	TOPICS	HOURS
1	EXPERIMENTS 1. Air wedge 2. Newton's rings 3. Biprism 4. Michelson's interferometer 5. Refractive index of a liquid using a hollow prism 6. Refractive indices of an anisotropic crystal 7. Variation of refractive index with wavelength 8. Diffraction grating – minimum deviation/normal incidence method 9. Resolving power of a telescope 10. Polarimeter 11. Photo diode characteristics 12. Ultrasonic interferometer 13. Numerical aperture of optical fibres 14. Wave length of a laser light using grating. 15. Photoelectric effect. **16.** Planck's constant	35
		35

RECOMMENDED BOOKS

1. Fundamentals of Optics – 4th edition – Francis.A.Jenskins and Harvey.E.White.
2. A textbook of Optics – N.Subrahmanyam and Brij Lal.
3. Introduction to optics – Frank.L.Pedrotti and Leno.S.Pedrotti.
4. Physics for scientists and Engineers with modern Physics, Vol 2, 6th Edition, Serway and Jewett

GEOMETRICAL OPTICS – THEORY

SL NO	TOPICS	HOURS
1	Properties of light: Classification of optics based on the nature and properties of light. The rectilinear propagation of light, Umbra and Penumbra, Speed of light in vacuum and in a stationary media, Beam, pencil and ray of light, Laws of reflection and refraction, Refractive index, Optical path, Graphical construction for refraction, Principle of reversibility, Fermat's principle (only qualitative discussion), Colordispersion. Numerical	8
2	Plane surfaces and Prisms: Parallel beam, the critical angle and total reflection, Plane parallel plate, Refraction by a prism, Minimum deviation, Thin prisms, Graphical method of ray tracing, Direct vision prisms, Reflection of divergent rays, Refraction of divergent rays, Images formed by paraxial rays. ophthalmic prisms. Numerical.	08
3	Spherical surfaces: Introduction, Focal points and focal lengths, Image formation, Virtual images, conjugate points and planes, Convention of signs, Graphical constructions (parallel ray method only), Magnification, Vergence and reduced vergence, Gaussian formula. Numerical.	08
4	Spherical mirrors – focal points, focal lengths, image formation, mirrors and vergence, reflection matrix, aspheric mirrors	02
5	Thin lenses: Lenses, Focal points and focal lengths, Imageformation: graphical method (parallel ray and oblique ray methods) and derivation of lens formula,conjugate points and planes. Lateral magnification,Virtual images, Lens makers' formula,Power of a thin lens, Thin lenses in contact, without contact. Numerical.	06
6	Thick lenses: Imageformation: graphical method (both parallel ray and oblique ray methods), Focal points, principal points, nodal points and optical center, thick lens formulas (no derivation). Numerical	08
7	Matrix methods in paraxial optics: Introduction, Translation matrix, Refraction matrix, Reflection matrix and Thick lens and thin lens matrices. Numerical.	08
8	Aberration theory :Spherical (coma, astigmatism, curvature of field and distortion) and chromatic aberrations and their minimization including GRIN systems(qualitative description only).	08
9	Optics of the Eye: Biological structure of the eye, Optical representation of the eye, Functions of the eye, Errors of refraction and their correction, Laser therapy for ocular defects. Depth of focus	08
10	Aperture and stops :Field stop and Aperture stop, Entrance and exit pupils, chief ray, Front stop, stop between two lenses, two lenses with no stop, field of view	06
11	Optical Instruments – The Camera, eye and its refractive anomalies, simple magnifier, compound microscope and telescopes. 4 Hours	08
		78

GEOMETRIC OPTICS – PRACTICALS

Practical: 3 Hours/week

Any 10 of the following experiments

SL NO	TOPICS	HOURS
1	1. Law of reflection 2. Law of refraction 3. Critical angle of glass 4. Angle of minimum deviation using I-d curve 5. f & of convex lens 6. f & of concave lens 7. f of convex mirror 8. f of concave mirror 9. of solid 10. of liquid 11. Angle of the prism – using spectrometer 12. Determination of Cauchy's constant 13. of the material of the crown and flint glasses for Na light 14. Dispersive power of a prism 15. Verification of inverse square law of radiation using a photometer 16. Photometer - determination of transmission coefficient	45
		45Hrs

PRINCIPLES OF LIGHTING:

SL NO	TOPICS	HOURS
1	Visual tasks: factors affecting visual tasks	2
2	Modern theory on light &colour: synthesis of light	2
3	Additive & subtractive synthesis of colour	2
4	Light sources: Modern light sources – spectral energy distribution – luminous efficiency – colour temperature – colour rendering]	2
5	Illumination: Luminous flux, candela, solid angle, illumination, utilization factor, depreciation factors, illumination laws	2
6	Lighting installation: glare, luminaries, lighting fixtures, types of lighting	2
7	Photometry: measurement of illumination, photometers and filters	2
8	Eye care and lighting – special care with VDU.	2
		16

RECOMMENDED BOOKS

1. Fundamentals of Optics – 4th edition – Francis.A.Jenskins and Harvey.E.White.
2. A textbook of Optics – N.Subrahmanyam and Brij Lal.
3. Introduction to optics – Frank.L.Pedrotti and Leno.S.Pedrotti.
4. Physics for scientists and Engineers with modern Physics, Vol 2, 6th Edition, Serway and Jewett
5. Introductory lighting (Illuminating engineering society of North America)
6. Environmental vision (Pitts)

SECOND YEAR

B.Sc. OPTOMETRY SYLLABUS

- Optometric Optics& Dispensing Optics

- Visual Optics

- Optometric Instruments & Clinical Examination of Visual System

- Pathology &Microbiology (Sec A) Pharmacology (Sec B)

Distribution of Teaching Hours in Second Year Subjects

Subject	Method / Number of Hours	
	Theory	Practicals
Optometric Optics & Dispensing optometry	120	100
Clinical Examination Of Visual System & Optometric Instruments	120	100
Visual optics	90	60
Pharmacology, Microbiology & Pathology	60	40
Medical Psychology	20	-
Clinics	-	270

SECOND Year Examination

Subject	University Examination				Total
	Theory	Internal	Practicals	Viva Voce	
Optometric Optics & Dispensing Optometry	80	20	-	-	**100**
Visual Optics	80	20	-	-	**100**
CEVS & Optometric instruments	80	20	-	-	**100**
Microbiology, Pathology(sec A) Pharmacology(sec B)	40 40	10 10	-	-	**100**
Clinical practical examination	-		80	20	**100**

Non- University Examination (SUBSIDIARY SUBJECTS)

Subject	Theory	Internal		Total
Medical Psychology*	80	20		**100**
Communications & Public relations*	80	20		**100**

Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges

OPTOMETRIC OPTICS (THEORY)

S.NO	TOPICS	HOURS
1	Introduction – Light, Mirror, Reflection, Refraction and Absorption	1
2	Prisms – Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prism	5
3	Lenses – Definition, units, terminology used to describe, form of lenses	3
4	Vertex distance and vertex power, Effectivity calculations	3
5	Lens shape, size and types i.e. spherical, cylindrical, Sphero-cylindrical& Toric lenses Astigmatic lenses, Methods of writing prescriptions Axis Direction of astigmatic lenses Properties of crossed cylinders	2
6	Transpositions – Simple, Toric and Spherical equivalent	2
7	Prismatic effect, centration, decent ration and Prentice rule, Prismatic effect of Plano-cylinder and Spherocylinder lenses	6
8	Spherometer & Sag formula, Edge thickness calculations	4
9	Magnification in high plus lenses, Minification in high minus lenses	3
10	Tilt induced power in spectacles	2
11	Aberration in Ophthalmic Lenses	2
12	Raw materials – History and General Outline, Manufacturing of Ophthalmic Blanks – Glass & Plastics, Terminology used in Lens Workshops, Surfacing process from Blanks to lenses	6
13	Definition & Materials (Glass, Plastics, Polycarbonate, Triology) types and characteristics	5
14	Properties (Refractive index, specific gravity, UV cut off, impact resistance – include drop ball test, abbe value, Center thickness)	5
15	Best form of lenses & Safety standards for Ophthalmic lenses (FDA, ANSI, ISI, Others)	3
16	Design of High Powered Lenses Hi-index lenses, Calculation of Refractive index	3
17	Bifocal designs, their manufacturing & uses (Kryptok, Univis D, Executive, Invisible, Occupational)	7
18	Progressive Addition Lenses, modified near vision lenses (designs, advantages, limitations)	4

19	Lens enhancements (Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating	**5**
20	Lens defects – Description and Detection	**3**
21	Glazing & edging (manual & automatic)	**3**
22	Special lenses ➢ Lenticulars ➢ Aspherics ➢ Fresnel lenses & Prisms ➢ Aniseikonic lenses ➢ Photochromics ➢ Polaroids ➢ Tinted lenses – Tints, filters	**8**
23	Project to ensure awareness on lens availability in Indian market	
24	History of Spectacles, manufacturing overview, Definition, parts & measurements Classification of frames – Materials (cover in detail), Colours and Temple position (advantages & disadvantages, where to use)	**3** **5**
25	Special purpose frames (sports, kids, reading)	**2**
		95 Hrs

DISPENSING OPTICS

S.NO	TOPICS	HOURS
1	Components of spectacle prescription & interpretation, transposition, Add and near power relation	2
2	Frame selection – based on spectacle prescription, professional requirements, age group, face shape	4
3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height	2
4	Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments – facial wrap, pantoscopic tilt	2
5	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)	2
6	Neutralization – Hand &lensometer, axis marking, prism marking	4
7	Faults in spectacles (lens fitting, frame fitting, patient's complaints, description, detection and correction)	3
8	Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories – Bands, chains, boxes, slevets, cleaners, screwdriver kit	2
9	Spectacle repairs – tools, methods, soldering, riveting, frame adjustments	2
10	Special types of spectacle frames ➢ Monocles ➢ Ptosis crutches ➢ Industrial safety glasses ➢ Welding glasses	2
11	Frame availability in Indian market	
		25

RECOMMENDED BOOKS

1. Principles of Ophthalmic lenses M.O.Jalie – 2nd editionSystem for ophthalmic dispensing Clifford.W.Brooks, Irwin.M.Borish
2. Clinical Optics Troy Fannin, Theodore Grosvenor – 2nd edition
3. Ophthalmic lenses & Dispensing M.O.Jalie – 2nd edition
4. Practical aspects of ophthalmic optics MargeretDowaliby – 4th edition

VISUAL OPTICS (THEORY)

SL NO	TOPICS	HOURS
1	1. REVIEW OF GEOMETRIC OPTICS 1.1 Vergence and power 1.2 Conjugacy, Object space and image space 1.3 Sign convention 1.4 Spherical refracting surface 1.5 Spherical Mirror, catoptric power 1.6 Cardinal points 1.7 Magnification 1.8 Light and visual function , Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism 1.9 Aberration and application Spherical and Chromatin	5
2	OPTICS OF OCULAR STRUCTURES 2.1 Cornea and aqueous	
	6. Crystalline lens 7. Vitreous 8. Schematic and reduced eye	3
3	Basic Aspects of Vision. • Visual Acuity • Light and Dark Adaptation • Color Vision • Spatial and Temporal Resolution • Science of Measuring visual performance and Application to Clinical Optometry	5
4.	REFRACTIVE ANOMALIES AND THEIR CAUSES 4.1 Etiology of refractive anomalies 4.2 Contributing variabilities and their ranges 4.3 Populating distributions of anomalies 4.4 Optical component measurement 4.5 Growth of eye in relation to refractive errors	05
5	VISUAL ACUITY 5.1 Definition, specification, Conversion, measurement & Recording (Distance&Near) 5.2 Test types (Distance & Near) – standard, choice, types, construction 5.3 Illumination of consultation room 54 Contrast sensitivity– Definition, charts available, measurements and recordings 5.5 Trial set & Trial frame& Phoropter – advantages and disadvantages	5
6	REFRACTIVECONDITIONS Aetiology, optical condition, types, clinical features and management 1.1 Emmetropia/Ametropia 1.2 Myopia 1.3 Hyperopia 1.4 Astigmatism 1.5 Anisometropia And Aniseikonia 1.6 Presbyopia 1.7 Aphakia and pseudophakia, Biometry 1.8 Axial Vs Refractive Ametropia	18

7	ACCOMMODATION 7.1. Mechanism 7.2. Range & Amplitudes of accommodation 7.3. Anomalies of accommodation	03
8	CONVERGENCE 8.1. Types, measurement & Anomalies 8.2. Relation between accommodation & convergence	02
9	Retinoscopy (Static & Dynamic) 9.1. Principle, instrumentation & Types 9.2. Procedure & Interpretation of findings – Transposition & Spherical equivalent 9.3. Dynamic retinoscopy – various methods 9.4. Radical retinoscopy &Mohindra's near retinoscopy 9.5. Subjective refraction – Principle, astigmatic chart, binocular balancing & binocular refraction 9.6. Cycloplegic refraction	12
10	EFFECTIVE POWER & MAGNIFICATION 10.1. Ocular refraction Vs Spectacle refraction 10.2. Ocular accommodation Vs Spectacle accommodation 10.3. Spectacle magnification & Relative spectacle magnification 10.4. Retinal image blur – Depth of focus & Depth of field	02
		60Hrs

VISUAL OPTICS - PRACTICAL

SL NO	TOPICS	HOURS
Part I	1. Study of purkinje images I & II, III & IV 2. Mathematical models of the eye- Emmetropia, Hyperopia, & Myopia 3. Effect of trial lenses & accessories in front of the eye	
Part II	1. Visual acuity ✓ Measurement & recording (Distance & Near) 2.Retinoscopy – Practice of retinoscopy (Dry & wet) in ✓ Emmetropia, Myopia, Hypermetropia, Astigmatism, Anisometropia, Presbyopia, Aphakia, Pseudophakia, media opacities, strabismus & Eccentric fixation ✓ Interpretation of retinoscopic findings ✓ Subjective verification ✓ Prescription writing ✓ Methods of differentiating axial Vs Refractive ametropia ✓ Dynamic retinoscopy – Methods 3.Accommodation & Convergence ✓ Measurement of range & Amplitude of accommodation ✓ Measurement of Near point of Convergence	**60**
		60

RECOMMENDED BOOKS

1. Duke Elder's practice of refraction — David Abrams – 10th edition
2. Clinical refraction — Irwin.M.Borish
3. Primary care Optometry — Theodore Grosvenor – 4th edition
4. Clinical pearls in refractive care — D.Leonard Werner, Leonard.J.Press

OPTOMETRIC INSTRUMENTS

SL NO	TOPICS	HOURS
1	Pre examination history	02
2	Refractive Instruments 1.1 Visual acuity charts,Features, Advantages& disadvantages, newer developments 1.2 . Trial case lenses – best form lenses 1.3 . Trial frame design – Phoropter – Advantages & Difficulties 1.4 . Retinoscope – Optics, types, adjustments & special features 1.5 . Autorefractometer – Schenier's and other optical principles, Features, Advantages& disadvantages, newer developments 1.6 Vision analyzer 1.7 Potential Acuity Meter, 1.8 Pupilometer ,	10
3	Corneal Diagnostics Keratometer 1.1. Keratometric principle 1.2. Types – Bausch & Lomb, Javal-Schiotz models 1.3. Measurement, Documentation & Interpretation of data Corneal topography 2.1. Placido's disc 2.2. Photokeratoscope 2.3. Topography Modelling System 2.4. ORBSCAN & PENTACAM Aberrometer 3.1 Principle 3.2 Instrumentation, clinical procedure & Interpretation Pachymeter 4.1 Principle, Types 4.2 Instrumentation & Clinical procedure, Indications	18
4	Lens checking instruments 3.1. Optometer principle 3.2. Badal & non-badal principle – advantages & disadvantages 3.3. Lens gauge or clock 3.4. Hand neutralization	06
5	Slit Lamp 4.1. Slit-lamp systems 4.2. Mechanical design 4.3. Illumination techniques 4.4. Accessories 4.5. Scanning laser devices	09
6	Glaucoma Diagnostics Tonometer 1.1. Types, principle & standardization (Schiotz, Applanation & NCT) 1.2. Measurement, documentation & interpretation of results Field of Vision and Screening Devices 2.1. Introduction – Visual fields & boundaries of visual fields 2.2. Visual field screening devices – Central & Peripheral 2.3. Quantitative perimetry – Manual & Automated 2.4. Results & Analysis of visual field examination Gonioscope 3.1. Principle & Instrumentation 3.2. Direct Gonioscope 3.3. Indirect Gonioscope Optical Coherence Tomography	07 15 04 05

	4.1 Anterior and Posterior OCT 4.2 Principle & Instrumentation 4.3 Clinical Procedure & Interpretation Glaucoma imaging& newer developments	
7	Color vision testing devices 8.1. Color vision theories 8.2. Common color vision defects 8.3. Pseudoisochromatic test plates 8.4. Color arrangement tests 8.5. Interpretation & clinical significance of findings	09
8	Ophthalmoscopes 10.1. Optical principle & Types 10.2. Direct ophthalmoscope – Instrumentation, Characteristics clinical procedure& Uses 10.3. Indirect ophthalmoscope – Instrumentation, Characteristics, clinical procedure & Uses 10.4. Direct ophthalmoscope Vs Indirect ophthalmoscope\ 10.5 Fundus biomicroscope- Principle & Instrumentation, Characteristics clinical procedure& Uses	08
9	Ophthalmic Ultrasonography 14.1. Physics of Ultrasonography 14.2. A-scan – Procedure & clinical uses 14.3. B-Scan – Procedure & Clinical uses	
10	Electrophysiology – ERG, VEP & EOG Principle & Instrumentation, Characteristics clinical procedure&Uses,interpretation of report	06
11	Fundus camera &Flourescine angiography	03

CLINICAL EXAMINATION OF VISUAL SYSTEM

SL NO	TOPICS	HOURS
1	History of the ophthalmic subject 1.1. Ocular history 1.2. Medical history 1.3. Family history 1.4. Systemic history	
2	Assessment of visual acuity 2.1. Distance & Near visual acuity 2.2. Color vision & Contrast sensitivity	
3	Examination of Extra Ocular Muscle balance	
4	Assessment of accommodation & Convergence	
5	Pupil evaluation & Measurement of Inter pupillary distance (IPD)	100
6	Slit Lamp examination 6.1. Examination of eye lids, conjunctiva & sclera 6.2. Examination of cornea & lens 6.3. Examination of iris, Ciliary body & pupil	
7	Examination of Intra ocular pressure – Schiotz& Applanation	
8	Assessment of angle of anterior chamber	
9	Ophthalmoscopy – Direct & Indirect	
10	Optic disc evaluation	
11	Examination of Lacrimal system	
12	Examination of orbit	
13	Macular function tests	
14	Visual field charting – Central & Peripheral	

RECOMMENDED BOOKS

1. Optometric instrumentation — David.B.Henson
2. Clinical ophthalmology (VOL-I) — Thomas.D.Duane
3. Primary care Optometry — Theodore Grosvenor – 4th edition
4. Clinical Procedures in Optometry — J.BoydEskside, John.F.Amos, Jimmy.D.Bartlet – 1st edition
5. Automated static perimetry — Anderson & Patella – 2ns edition
6. Investigative techniques & Ocular examination — Sandip Doshi, William Harvey
7. Diagnosis of defective color vision — Jennifer birch – 2nd edition

Pharmacology

SL No.		TOPICS	HOURS
1		GENERAL PHARMACOLOGY	5
		1.1 Introductionand sources of drugs Routes of drug administration 1.2 PHARMACOKINETICS – Absorption and bioavailability Distribution Biotransformation Excretion 1.3 PHARMACODYNAMICS- Types and Mechanism of action Factors affecting Adverse drug reactions	1 2 2
2.		SYSTEMIC PHARMACOLOGY	24
	2.1 ANS	Introduction, neurotransmitters and mechanism of action	1
		Ophthalmic Uses and adverse effects of drugs affecting autonomic nervous system.	4
		Skeletal muscle relaxants	1
	2.2 CVS	ANTIHYPERTENSIVES	1
		ANTIANGINAL DRUGS	1
	2.3 RENAL	DIURETICS –EMPHASIS ON DRUGS USED IN OCCULAR DISORDER	1
	2.4CNS	SEDATIVE HYPNOTICS ALCOHOL	1
		GENERAL ANDLOCAL ANESTHETICS	1
		OPOIDS	1
		NON STEROIDAL ATIINFLAMMAOTRY AGENTS	1
		Antihistaminics mast cell stabilizers	
	2.5 CHEMOTHERAPY	General Chemotherapy Examples/classification, antibacterial activity uses and adverse effects of Sulphonamides and fluoroquinolones Beta lactam antibiotics Tetracyclines and chloramphenicol Macrolides Aminoglycosides Others: Polymyxin Bacitracin	5
		Specific chemotherapy- in brief	3

		Antifungal Antiviral Antitubercular Antileprotics	
	2.6 HORMONES	Corticosteroids Antidiabetics	2
	2.7 BLOOD	Coagulants	1
3		OCCULAR PHARMACOLOGY	4
		3.1 Ocular formulations and Ocular routes of administration drug delivery system and special ocular drug delivery system 3.2 Ocular pharmacokinetics Delivery methods of Ocular Medication: Residence in the conjunctival sac, drug vehicles affect drug delivery, advanced ocular delivery systems, 3.3 drugs induced Ocular toxicity	2 1 1
4		DIAGNOSTIC AND THERAPEUTIC APPLICATIONS OF DRUGS IN OPHTHALMOLOGY	11
		4.1 DRUGS USED TO ASSIST IN OCULAR DIAGNOSIS Anterior Segment and External Diagnostic Uses Posterior Segment Diagnostic Uses	1
		4.2 Drugs and biological agents used in ocular surgery Anesthetics used in ophthalmic procedures Presurgical Antiseptics Viscoelastic Substances Ophthalmic Glue Anterior Segment Gases Vitreous Substitutes Surgical Hemostasis and Thrombolytic Agents	2
		4.3 Drug s used in treatment of Glaucoma, Esotropia Ocular myasthenia	1
		4.3 Pharmacotherapy of ocular infections- Bacterial Viral Fungal and Chlamydial Protozoal	1
		4.4 Drugs used inallergic conditions, inflammatory disorders and degenerative disorders of the eye	1
		4.5 Immune modulators in ophthalmic practice	1
		4.6 Other agents used in ophthalmic practice Mydriatics and Miotics Enzymes Trcae elements Antioxidants Wetting Agents, Tear Substitutes, Osmotic Agents	2
		4.7 Miscellaneous Botulinum Toxin Type A in the Treatment of Strabismus, Blepharospasm, and Related Disorders Agents Used to Treat Blind and Painful Eye VITAMIN A	2

1. The pharmacological basis of therapeutics goodmanGilman 13th edition
2. Essentials of Medical Pharmacology KD tripathi
3. Bartlett and Jaanus: Clinical Ocular Pharmacology
4. T S MAUGER & E L CRAIG - MOSBY'S - OCULAR DRUG HANDBOOK

MICROBIOLOGY

SL NO	TOPICS	HOURS
I	1. Sterilization and Disinfection generally used in laboratory and hospital practice 2. Details of common bacteria, viruses and other organisms 3. Morphology and principles of cultivation of bacteria 4. Common bacterial infections of the eye 5. Common fungal infections of the eye 6. Common viral infections of the eye 7. Common parasitic infections of the eye	15

RECOMMENDED BOOKS

1. Text book of microbiology- Ananth Narayan
2. Text book of microbiology- C.P baveja
3. Ocular Microbilogy- pk Mukherjee, preetibandyopadya

PATHOLOGY

SL NO	TOPICS	HOURS
	1. General introduction 2. Inflammation and repair 3. Infections [Tuberculosis, Leprosy, Syphilis, Fungus, Virus, Chlamydiae] 4. Genetic abnormality 5. Hematology [Anemia, Leukemia, Bleeding disorders] 6. Circulatory disturbances [Shock, edema, Thrombosis, Infarction, Embolism] 7. Clinical pathology [Examination of urine and blood smears] 8. Ophthalmic wound healing 9. Eyelid [normal and pathology including inflammations and tumours] 10. Cornea [Normal and pathology in degeneration and dystrophies] 11. Lens [normal and pathology of cataract] 12. Retina [normal and pathology in inflammatory diseases, infections] 13. Intraocular tumours [Retinoblastoma and choroidal melanoma] 14. Orbit [inflammation and neoplasia] 15. Optic nerve [normal and tumours]	15

RECOMMENDED BOOKS

1. General pathology- Harsh Mohan
2. Text book of Pathology - N.C.Dey
3. Basic Pathology- Robbins

CLINICAL PSYCHOLOGY

SL NO	TOPICS	HOURS
	1. Introduction to psychology 2. Intelligence, Learning, Memory, Personality, Motivation 3. Body integrity- one's body image 4. Patient in his Milan 5. Self-concept of the therapist, Therapist patient relationship-some guidelines 6. Illness and its impact on the patients 7. Maladies of the age and their impact on the patient's own and others concept of his body image 8. Adapting changes in vision 9. Why Medical Psychology needs / demands commitment?	20

PUBLIC RELATIONS

SL NO	TOPICS	HOURS
	1. Media and public relations 2. Communication sensitivity - Oneway- twoway communication - Listening evaluation- Active listening 3. Persuasive communication - Barriers to communication 4. Interpersonal Relationship – conflict management 5. Group process - Case discussion 6. Creative problem solving 7. Public relation and education 8. PR relevance in Indian context- Discussions 9. Behaviour modification 10. Perception and personality 11. PR and hospitals 12. Leadership process 13. Conclusion- Relationship of these input to PR	15
		15 Hrs

HOSPITAL PROCEDURE

SL NO	TOPICS	HOURS
	1. General idea about the role, importance and procedures of the following within the hospital set up] 2. Medical records 3. Medical photography 4. Computer networking system 5. Laboratory technology	10
		10 Hrs

THIRD YEAR B.Sc. OPTOMETRY SYLLABUS

Contact Lens

- Systemic Diseases (SecA) and Ocular Diseases (Sec B)
- Low vision aids &Geriatric Optometry
- Research Methodology & Statistics
- Pediatric Optometry, Squint and Binocular Vision and advance in optometry
- Practice management, law in optometry (Sec A) & occupational optometry (Sec B)

III Distribution of Teaching Hours in Third Year Subjects

Main Subject	Method / Number of Hours	
	Theory	Practicals
Contact Lenses	60	60
Systemic & Ocular diseases	90	70
Low Vision Aids & Geriatric Optometry	30	30
Practice management, law in optometry & occupational optometry	50	30
,Research Methodology& Biostatistics	50	-
Pediatric Optometry, Advances In Optometry & Binocular Vision	90	80
Clinics & Special Clinics	-	270

8.1 THIRD Year Examination

Subject	University Examination				Total
	Theory	Internal	Practical	Viva Voce	
Low Vision Aids & Geriatric Optometry	80	20	-	-	**100**
Contact Lens	80	20	-	-	**100**
Research Methodology & Statistics	80	20			**100**
Systemic diseases (sec A) Ocular Diseases (sec B)	40 40	10 10	-	-	**100**
Practice Management & law in optometry (sec A) Occupational Optometry (sec B)	40 40	10 10	-	-	**100**
Pediatric Optometry, Binocular vision & Advances in Optometry	80	20	-	-	**100**
Clinics & Specialties	-		160	40	**200**

CONTACT LENS (THEORY)

SL NO	TOPICS	HOURS
1	1.1. Introduction to CL (Definition /Types) 1.2 History of Contact Lens 1.3 Review of Ocular Anatomy & Physiology A. Lids B.Tearfilm C. Lacrimal Apparatus D. Cornea E. Conjunctiva	6
2	2.1. Glossary of terms – Contact lenses 2.2. Optics of Contact Lens A. Magnification & Visual Field B. Accommodation & Convergence C. Back/Front Vertex Power (Vertex Distance Calculation) D. Axial & Refractive Ammetropia 2.3 Contact Lens materials A. Monomer/Polymer B. Properties of CL Material (RGP& SCL) 2.4 Manufacturing of CL (RGP, SCL& SOFT TORIC) 2.5.Indications & Contraindications	12
	3.1. Contact Lens Design & Parameters A. RGP contact lens design B. Soft Contact lens design 3.2 Preliminary Examination A. Instruments & Its use in Contact Lens Practice (Pachymeter/Specular Microscopy/ Keratometer/Placido Disc /Corneal Topography, Slit Lamp Biomicroscope) B. Steps of Preliminary Examination C. Significance of each steps 3.3 Parameter Selection (Base Curve/ Diameter) 3.4. Fitting philosophies	8
	4.1 Types of CL A. Soft Contact Lens(SCL) B. Soft toric Contact Lens (SOFT TORIC) C. Rigid gas Permeable Contact Lens(RGP) Indication, Parameter selection, Modification, Fitting assessment & Recording, Final Prescription, Dispensing & Follow up Visit with Examination for each type of CL 4.2 Fitting in astigmatism – Toric CL A. Stabilization Technique 4.3 Handling of Contact Lens (RGP/SCL/SOFT TORIC) A. Insertion& Removal (RGP/SCL/SOFT Toric) B..Do's& Don'ts	10

	5.1. Wearing Modalities/Replacement Schedule 5.2 Care & Maintenance (RGP/SCL) A. Cleaning Agent & Importance B. Rinsing agent & Importance C. Disinfecting Agent & Importance D. Lubricating & Enzymatic Action 5.2 Lens care and hygiene, instructions, compliance 5.3. Contact Lens solutions 5.4 Care of contact lenses	7
	6.1 Contact Lens Deposits (RGP/SCL) 6.2 Complication of contact lens (RGP /SCL)	6
	7.1 Speciality Contact Lens A. Therapuetic Contact Lens (Indication / Fitting Assessment) B. Peaditric Contact Lens Fitting (Aphakia& Pseudophakia) C. Post Refractive Surgery D. Fitting in irregular astigmatism – Keratoconus/PMD etc E. Contact lenses for special purposes – Swimming, sports, occupational etc F. Orthokeratology 7.2 Bifocal Contact Lens (Types/Indication/Fitting assessment)	7
	8.1. Modifications of finished CL 8.2. Inspection& Verification of finished contact lenses	2
	Review of Contact lenses & Solutions available in India	01
	10.1. Recent developments in contact lenses 10.2. Current contact lens research.	1
		60

CONTACT LENS PRACTICALS

SL NO	TOPICS	HOURS
1	1.1. Fitting& Dispensing of contact lenses in Myopia, Hyperopia, Astigmatism, Presbyopia, Anisometropia, Aphakia, Pseudophakia, Keratoconus, PMD etc 1.2. Paediatric contact lens fitting 1.3. CL fitting following ocular surgeries 1.4. Visit to factories manufacturing contact lenses	20

RECOMMENDED BOOKS

1. Contact Lenses — Antony.J.Philips, Janet Stone
2. Textbook of Contact Lenses — V.K.Dada – 4th Edition
3. Contact Lens Practice — Ruben &Guillon
4. Color Atlas of Contact Lens — Montague Rubem
5. Contact Lens – The CLAO guide — Peter.R.Castle
6. IACLE – Contact Lens modules — International Association of Contact Lens Educators, Sydney, Australia
7. Manual of Contact Lens prescribing & Fitting — Milton.M.Hom – 3rd edition
8. Manual of Gas Permeable contact Lens — Edward.S.Bennet, Milton.M.Hom – 2nd edition
9. Clinical manual of specialized CL prescribing — Terry.R.Scheid
10. Clinical Contact Lens Practice — Edward.s.Bennet, Barry.A.weissman
11. Cosmetic Contact Lens & Artificial eyes — Devendra Kumar & Gopal Krishnan
12. Common Contact Lens Complications — lyndon.W.Jones, Deborah.A.Jones
13. Anterior segment Complication of CL wear — Joel Silbert – 2nd edition
14. Contact lens practice — NatrhanEffron

OCULAR DISEASES

SL NO	TOPICS	HOURS
1	EYELIDS 1.1 Eye lid anatomy review 1.2 Congenital anomalies Blepharophimosis, Epicanthus, Cryptophthalmos, Coloboma, Hemangioma 1.3 Acquired disorders External and Internal hordeolum,Chalazion,Lidoedema, Blepharitis, Blepharospasm 1.4 Eyelid tumours Evaluation, Benign lesions, Malignant tumours 1.5 Malpositioning disorders Ectropion, Entropion, Trichiasis, Distichiasis, Symblepharon, Ankyloblepharon, Eyelid retraction, Lagophthalmos,Poliosis,Madarosis 1.6 Ptosis Classification, Clinical evaluation and Management 1.7 Eyelid trauma	5
2	LACRIMAL SYSTEM 2.1 Lacrimal anatomy review 2.2 Methods of Lacrimal evaluation 2.3 Congenital and developmental anomalies 2.4 Infections of lacrimal system	4

	2.5 Tumours of lacrimal system 2.6 Lacrimal trauma 2.7 Dry eye and Watering Etiology , Clinical evaluation and Management	
3	ORBIT 3.1 Orbital anatomy 3.2 Evaluation of orbital disordres 3.3 Congenital and developmental anomalies of orbit Anophthalmos, Microphthalmos,Nanophthalmos,Cryptophthalmos,Hypertelorism, Craniofacial anomalies,Craniosynostosis 3.4 Orbital tumours Dermoids, Hemangiomas, Rhabdmyosarcoma, Optic nerve glioma, Meningiomas, 3.5 Orbital inflammations Preseptalcellulitis,Orbitalcellulitis,Orbitalperiostitis,Cavernous sinus thrombosis, Sinus related disorders 3.7 Orbital trauma Blow out fractures 3.8 Proptosis Etiology, Classifications, clinical evaluation and Management 3.9 Graves Ophthalmopathy Etiology, Examination, and Management 3.10 Enophthalmos Etiology, Evaluation and Management	4
4	SCLERA 4.1 Sclera anatomy review 4.2 Blue sclera 4.3 Scleral Degenerations Ectasia and staphyloma 4.4 Scleral Inflammations Scleritis and episcleritis 4.5 Toxic and traumatic injuries of sclera	2
5	CONJUNCTIVA and CORNEA 5.1 Anatomy review <u>A) Conjunctiva</u> 5.2 Examination techniques 5.3 Inflammations of Conjunctiva Conjunctivitis (classification, etiology, evaluation and management) 5.4 Degenerative conditions Pinguecula, Pterygium, Concretions 5.5 Symptomatic conditions Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration, Papillae, Follicles, Hemorrhage 5.6 Cysts and tumours <u>B) Cornea</u> 5.7 Congenital anomalies Megalocornea, Microcormea,Cornea plana, Cloudy cornea 5.8 Corneal Dystrophies Classifications, evaluation and management 5.9 Corneal degenerations Arcus senilis, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid Marginal Degeneration,Cornealguttatta 5.10 Keratoconus and Keratoglobus (Etiology, Classifications, Clinical evaluation and Management) 5.11 Corneal inflammations ✓ Keratitis/Ulcer (Etiology, Classifications, Evaluation and Management)	6

	✓ Corneal oedema ✓ Corneal opacity and neovascularization 5.12 Miscellaneous ocular surface disorders ✓ Keratoconjunctivitis Sicca ✓ Steven Johnson Syndrome ✓ Benign Mucosal Pemphigoid- ocular pemphigoid ✓ Vitamin A deficiency ✓ Trauma and burns ✓ Metabolic diseases associated with corneal changes 5.13 Corneal surgeries 5.14 Slit lamp colour coding	
6	LENS 6.1 Normal lens anatomy, physiology and aging process 6.2 Congenital and Developmental defects Aphakia, Lenticonus, Lentiglobus, Coloboma,Peters anomaly, Microspherophakia, Cataract 6.3 Acquired lenticular defects Morphological cataract Drug induced cataract Traumatic cataract Metabolic cataract Complicated cataract Association with other ocular disorders and syndromes 6.4 Cataract Management Surgical and non-surgical management Pre-operative evaluation Complications of cataract surgery 6.5 Lens displacement Lens subluxation and dislocation	5
	UVEA AND PUPIL 7.1 Congenital anomalies Heterochromia, Aniridia, Coloboma, Correctopia, Polycoria, Pupillary membrane 7.2 Inflammations of Uvea Classification of uveitis Etiology and pathogenesis Clinical approach to uveitis Endophthalmitis and panophthalmitis Complications of uveitis Ocular involvement in AIDS 7.3 Tumours of uvea 7.4 Anomalies of pupillary reactions	6
	VITREOUS 8.1 Developmental abnormalities Hereditary hyaloidoretinopathies Persistent hyperplastic primary vitreous 8.2 Vitreous opacities Asteroid hyalosis Cholesterolosis Pigment granules in vitreous Vitreous haemorrhage 8.3 Posterior vitreous detachment Etiology, Clinical features and Management 8.4 Trauma and vitreous 8.5 Inflammations and vitreous 8.6 Parasitic infestations 8.7 Vitreous complications secondary to surgery	2

	RETINA 9.1 Applied anatomy 9.2 Congenital and developmental anomalies Optic disc coloboma, Drusen, Hypoplasia, Medullated nerve fibers 9.3 Retinopathy of prematurity Etiology, Stages, Clinical features and Management 9.4 Retinal vascular diseases Diabetic retinopathy Associated with cardiovascular disease ✓ Hypertensive retinopathy ✓ Retinal artery and vein occlusions 9.5 Retinal Inflammations Retinitis, Retinal vasculitis 9.6 Retinal degenerations Retinitis pigmentosa, Lattice degenerations 9.7 Macular disorders Hereditory diseases Central serous retinopathy Cystoid macular oedema Solar retinopathy Albinism Age related macular degeneration Macular holes 9.8 Retinal detachment and Retinoschisis Etiology, Classifications, Clinical features and management 9.9 Retinal tumours ✓ Retinoblastoma ✓ Retinal and optic nerve head astrocytomas ✓ Lymphoid tumour 9.11 Miscellaneous disorders Epiretinal membranes Intraocular foreign bodies Other metabolic disorders of retina Diseases of choroidal vasculature and Bruch's membrane Diseases of retinal pigment epithelium 9.11 Fundus Drawing –colour coding	6
	NEURO OPHTHALMOLOGY 10.1 Applied anatomy review 10.2 Neuro ophthalmic examination ✓ History ✓ Visual acuity ✓ Colour vision ✓ Pupillary evaluation ✓ Ocular motility ✓ Fundus examination ✓ Visual field examination ✓ Adjunctive tests 10.3 Visual pathway and systems ✓ Vascular supply to anterior and posterior visual systems ✓ Visual pathway defects ✓ Disorders of visual integration ✓ Disorders of higher cortical functions ✓ Disorders with ocular motility anomalies/diplopia 10.4 Nystagmus Etiology, classifications, clinical evaluations and management	5

	10.5 Miscellaneous disorders ✓ Systemic disorders with neuro ophthalmologic signs ✓ Optic neuropathy ✓ Papilledema ✓ Papillitis	
	GLAUCOMA 11.1 Optic nerve, Anterior chamber and Aqueous Dynamics Review 11.2 Overview of glaucoma Diagnostic instruments 11.3 Evaluation of optic nerve head 11.4 Classification of glaucoma 11.5 Primary open angle glaucoma Etiology, clinical features, diagnosis and management 11.6 Primary angle closure glaucoma Etiology, clinical classification, clinical features, diagnosis and management 11.7 Developmental glaucoma Congenital glaucoma, Infantile glaucoma and juvenile glaucoma Syndromes with glaucoma 11.8 Secondary glaucoma Pseudoexfoliation glaucoma, pigmentary glaucoma, Inflammation induced, Neovascular glaucoma, Lens induced glaucoma, Traumatic glaucoma 11.9 Glaucoma management Pharmacological and surgical management 11.10 Glaucoma screening	5
	SYSTEMIC DISEASES	
1	ARTERIAL HYPERTENSION 1.1. Pathophysiology, classification, clinical examination, Diagnosis 1.2. Complications, management 1.3.Hypertension and the eye	30
2	DIABETES MELLITUS 2.1. Pathology, classifications, clinical features 2.2. Diagnosis, complications, management 2.3. Diabetes mellitus and the eye	
3	ACQUIRED HEART DISEASES- EMBOLISM 3.1. Rheumatic fever- Pathophysiology, classifications, diagnosis complications and management 3.2. embolism 3.3. Subacute bacterial endocarditis	
4	CANCER –INTRODUCTION 4.1. Definition, nomenclature, characteristics of benign and malignant 4.2. Grading of staging of cancer, diagnosis, principles of treatment 4.3.Neoplasia and the eye	
5	CONNECTIVE TISSUE DISEASES 5.1. Anatomy and pathophysiology: arthritis 5.2. Eye and connective tissue diseases	
6	THYROID DISEASE 6.1. Anatomy and physiology of thyroid gland 6.2. Classification of thyroid disease 6.3. Diagnosis, complications, clinical features, management 6.4.Thyroid disease and the eye	

7	TUBERCULOSIS 7.1. Etiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complication, treatment 7.2. Tuberculosis and the eye	
8	8.1 Herpes virus (Herpes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus) 8.2 Herpes and the eye	
9	Hepatitis (Hepatitis A, B, C) 2	
10	Myasthenia Gravis	
11	HELMINTHIASIS 8.1. Classification of helminthic diseases, - schistosomiasis, 8.2. principles of diagnosis and management 8.3. Helminthic disease and the eye[Taenia., echinococcus, larva migrans	
12	COMMON TROPICAL MEDICAL AILMENTS 9.1. Introduction to tropical diseases: malaria 9.2. Tropical diseases and the eye- leprosy, toxoplasmosis, syphilis, Trachoma	
13	MALNUTRITION 10.1. Etiology & nutritional disorders of the eye	
14	INTRODUCTION TO IMMUNOLOGY 11.1. Introduction& components of immune system 11.2. Principles of immunity in health 11.3. Immunology in disease 11.4.Immunology and the eye	
15	GENETICS 12.1. Introduction to genetics 12.2. Organisation of the cell 12.3. Chromosome structure and cell division 12.4. Gene structure and basic principles of genetics 12.5. Genetic disorders and their diagnosis 12.6. Genes and the eye 12.7. Genetic counseling and genetic engineering	
		80 Hrs

RECOMMENDED BOOKS

1. Clinical Ophthalmology — Jack.J.Kanski – 4th edition
2. Textbook of Ophthalmology — A.K.Khurana
3. Parson's diseases of the eye — Revised by RamanjithSihota& Radhika Tandon
4. Glaucoma Handbook — Anthony.B.Litwak

LOW VISION AIDS (THEORY)

SL NO	TOPICS	HOURS
1	Introduction 1.1. Definition & Classification 1.2. Causes of Low Vision 1.3. Optometrist's role in Low Vision management	02
2	Examination of a Patient with Low vision 2.1. Case history 2.2. Visual acuity ✓ Distant vision – Charts, measurement & Documentation ✓ Near vision - Charts, measurement & Documentation ✓ Refraction – Significance & Technique ✓ Diagnostic procedures in low vision examination Screening for vision disability • A collaborative model of service delivery • Teaching other staff how to screen for vision disability and refer to you • Six sensory impairments, realistic simulations and performance signs Impaired acuity Impaired contrast sensitivity Central field loss Peripheral field loss Oculomotor problems Perceptual impairment • Normal age related vision loss • Pathogenesis • Sighted guide instructional video	15
3	Optics & Characteristics of Low vision aids 3.1. Magnification 3.2. Galilean telescope Vs Keplarian Telescopes 3.3. Spectacle magnifiers 3.4. Hand Magnifiers 3.5. Stand Magnifiers 3.6. CCTV 3.7. Bioptic telescopes 3.8.Accessory low vision aids	5
4	Selection of Low vision aids for distance, intermediate & Near	02
5	Guidelines & training to use various aids	02
6	Choices of tests & Aids in various pathological conditions 6.1. Conditions causes overall blurring of the visual field 6.2. Condions causes central field defects 6.3.Conditions causes peripheral field defects	05
7	Light, glare & Contrast in Low vision care & Rehabilitation	01
8	Children with low vision	01
9	Genetics	01
10	Rehabilitation of visually handicapped	01
11	Definitions and eligibility for services in India	02
12	Description of advanced low vision devices and their practice	03
		40

LOW VISION AIDS - PRACTICAL		
1	Demonstration followed by evaluation of a low vision patient by students ▪ Low vision case history ▪ Visual acuity measurement & Documentation ▪ Refraction ▪ Needed diagnostic tests for each pathological condition ▪ Selection, trial & dispensing of visual aids ▪ Rehabilitation methods	10

RECOMMENDED BOOKS

1. Low vision care- E.B.Mehr, Allen.N.Fried
2. Clinical Low vision- Eleanor.E.Fay

GERIATRIC OPTOMETRY

SL NO	TOPICS	HOURS
1	1.1. Introduction 1.2. structural& physiological changes in the eye associated with ageing ✓ Structural changes to lid & adnexa ✓ Physiological changes to cornea, lens & Uvea ✓ Degenerative & Physiological changes in vitreous, choroid & retina	2
2	2.1. Optical& refractive changes ✓ Refractive changes in cornea, lens & vitreous ✓ Refractive changes due to diabetes ✓ Refractive changes due to uveitis	03
3	✓ Cataract ✓ Glaucoma ✓ Macular disorders ✓ Vascular disorders	03
4	Optical correction of refractive conditions	02
5	Dispensing in geriatric age groups ✓ Spectacle ✓ Contact lenses	03
		15Hrs

RECOMMENDED BOOKS

1. vision of the ageing patient Hirsch Wick
2. Vision &Aeing – General & Clinical perspective Alfred Rosenboom, Meredith.W.Morgan
3. Clinical refraction Borish

PEDIATRIC OPTOMETRY

SL NO	TOPICS	HOURS
1	Introduction 1.1. Review of ocular anatomy & Physiology 1.2. Visual development-– visual system, visual acuity, refractive error, contrast sensitivity function, eye movements, accommodation, binocular vision, color vision	03
2	Pediatric case history 2.1. Genetic factors 2.2. Prenatal factors 2.3. Perinatal factors 2.4.Postnatal factors	04
3	Normal Appearance, pathology and structural anomalies of ✓ Orbit ✓ Eyelids ✓ Lacrimal system ✓ Conjunctiva ✓ Cornea ✓ Sclera ✓ Anterior chamber, Uveal tract, pupils ✓ Lens ✓ Vitreous, Fundus ✓ Oculomotor system	03
4	Ocular Examination 4.1. Measurement of visual acuity ✓ Various visual acuity charts for different age groups ✓ Teller acuity chart & VEP 4.2. Measurement of refractive status ✓ Dry & Cycloplegic refraction ✓ Interpretation of results 4.3. 4.3. Assessment of oculomotor function 4.4. Measurement of fusion and stereopsis, color vision 4.5. Assessment of accommodation & Convergence	06
5	Post examination processes 5.1. Compensatory treatment & remedial therapy for ✓ Myopia ✓ Pseudomyopia ✓ Hyperopia ✓ Astigmatism ✓ Anisometropia ✓ Strabismus ✓ Nystagmus	04
6	Pediatric dispensing ✓ Spectacles ✓ Contact Lenses	04
		20 Hrs

RECOMMENDED BOOKS

1. Principles & Practice of pediatric optometry — Alfred Rosenboom, M.W.Morgan
2. Pediatric Optometry — Jerome Rosner
3. Clinical pediatric optometry — Leonard.J.Press – 1st edition
4. Visual Development, Diagnosis, Treatment of the Pediatric Patients — Robert H Duckman

BINOCULAR VISION & ADVANCES IN OPTOMETRY (THEORY)

SL NO	TOPICS	HOURS
1	Binocular Vision and Space perception. ➢ Relative subjective visual direction. ➢ Retino motor value ➢ Grades of BSV ➢ SMP and Cyclopean Eye ➢ Correspondence, ➢ Fusion, Diplopia, Retinal rivalry ➢ Horopter ➢ Physiological Diplopia and ➢ Suppression ➢ Stereopsis, Panum's area, BSV. ➢ Stereopsis and monocular clues -significance. ➢ Egocentric location, clinical applications. ➢ Theories of Binocular vision.	
2	Anatomy of Extra Ocular Muscles. ➢ Rectii and Obliques, LPS. ➢ Innervation & Blood Supply. Physiology of Ocular movements. ➢ Center of rotation, Axes of Fick. ➢ Action of individual muscle. Laws of ocular motility ➢ Donder's and Listing's law ➢ Sherrington's law ➢ Hering's law Uniocular & Binocular movements - fixation, saccadic & pursuits. ➢ Version & Vergence. ➢ Fixation & field of fixation	06
3	Near Vision Complex Accommodation ➢ Definition and mechanism (process). ➢ Methods of measurement. ➢ Stimulus and innervation. ➢ Types of accommodation. ➢ Anomalies of accommodation – aetiology and management.	04
4	Convergence ➢ Definition and mechanism. ➢ Methods of measurement. ➢ Types and components of convergence - Tonic, accommodative, fusional, proximal. ➢ Anomalies of Convergence – aetiology and management.	06
5	Sensory adaptations Confusion	02

6	Suppression Investigations Management Blind spot syndrome	04
7	Abnormal Retinal Correspondence Investigation and management Blind spot syndromeSurgical	02
8	Eccentric Fixation Investigation and management	02
9	Amblyopia Classification Aeitiology Investigation Management	04
10	Neuro-muscular anomalies Classification and etiological factors	02
11	History – recording and significance.	02
12	Convergent strabismus ➢ Accommodative convergent squint ➢ Classification ➢ Investigation and Management ➢ Non accommodative Convergent squint ➢ Classification ➢ Investigation and Management	06
13	Divergent Strabismus Classification A& V phenomenon Investigation and Management	04
14	Vertical strabismus Classification Investigation and Management	02
15	Paralytic Strabismus Acquired and Congenital Clinical Characteristics Distinction from comitant and restrictive Squint	04
16	Investigations ➢ History and symptoms ➢ Head Posture ➢ Diplopia Charting ➢ Hess chart ➢ PBCT ➢ Nine directions ➢ Binocular field of vision	12
17	Non-surgical Management of Squint	02
18	Restrictive Strabismus Features ➢ Musculofascical anomalies ➢ Duane's Retraction syndrome ➢ Clinical features and management ➢ Brown's Superior oblique sheath syndrome ➢ Strabismus fixus ➢ Congenital muscle fibrosis	06

BINOCUALR VISION ADVANCES IN OPTOMETRY – PRACTICALS

SL NO	TOPICS	HOURS
1	Strabismus assessment ✓ Cover test, Krimsky, Synaptophore, Sterioacuity test, Diplopia charting Examination procedures of different types of strabismus and its non-surgical management.	**20**
		20 Hrs

RECOMMENDED BOOKS

1. Binocular vision & Ocular motility	Von Noorden – 6th edition
2. Clinical management of binocular vision	M.Scheimann, Bruce Wick – 2nd edition
3. Binocular anomalies	John.R.Griffin, J.David Grisham – 4th edition
4. Practical binocular vision assessment	Frank Eperjesi, Michelle.M.Rundstorm
5. Binocular vision & Orthoptics	Bruce Evans, Sandip Doshi

PRACTICE MANAGEMENT

1. Basics of book keeping
2. Data management
3. Record keeping
4. Clinic management
5. Staff management
6. Inventory control
7. Public relations.
   - Definitions.
   - PR- its disfunction from publicity, propaganda & advertising.
   - Internal and external aspects of PR
   - Phases of PR: analysis building, promotion of product or services, better employee, government and
   - community relation.

8. Methods of public relations:
   - Press relations: Press release, Press conference, and Letter to editor.
   - Printed work: Style, colour & design.

9. Basic Accountancy and Public relations
   - Introduction.
   - Terms used in accounts, Principles of accountancy.
   - Journal & ledger
   - Trial Balance
   - Subsidiary books, petty cash book, sales register, purchase register, stock register
   - Bank reconciliation and Banking procedures.
   - Depreciation.
   - Balance sheet and profit & loss accounts.

- General ideas about Income tax and sales tax.
- Project report and financial inability.
- Costing in practice (Buying, stock-keeping,assesment of fees and costing of appliance).

LAW AND OPTOMETRY

SL NO	TOPICS	HOURS
	1. Legal environment and techniques- History – law and equity 2. History and theory of licensure 3. Licensure as a means of internal and external discipline- unprofessional conduct- incompetence- gross immorality 4. International optometry- important foreign optometry law 5. Optometrist in court 6. Malpractice- theory of liability- damages –minimizing malpractice claims 7. Insurance 8. Negligence 9. Ethics – professional ethics 10. Laws governing practice of medical and paramedical profession in India 11. Registered medical practitioner- laws against practice of medicine of those unregistered- medical council of India- dental council- nursing council 12. Present rules and regulations – laws regarding optical product Manufacturers- dispensing in India 13. Opticians- are they registered? Dispensing opticians- rules in UK	10

OCCUPATIONAL OPTOMETRY

SL NO	TOPICS	HOURS
1	Public Health & Community Optometry 1. Public health &Community optometry- concepts and implementation 2. Global medicine and evolution of public health in India 3. Health care delivery systems in India and determinants of health 4. Quality assessment in health delivery programmes 5. Natural history of disease, transmission of disease 6. Levels of prevention – optometrist's role in community 7. Concepts of national health programme 8. Screening in population (Screening for eye disease) 9. Epidemiology of blindness- cataract, glaucoma, deficiency disorders 10. Eye care in Primary Health care 11. Community Eye Care Programs 12. Community based Rehabilitation Program 13. Vision 2020: The Right to Sight 14. Scope of geriatric ophthalmology in preventive and rehabilitation care 15. Basics in research methodology in populations 16. Demography and vital statistics (This can be a part of Research Methadology) 17. National and international agencies in health care 18. Fundamentals of health economics, health plan 19. Evaluation &Assesment of Health Programmes 20. Role of Optometrist in Public Health & Community Optometry 21. Role of Optometrist in school eye screening Program 22. Community outreach-camps and school screening programmes	20

2	1.1. Introduction to occupational health, hygiene and safety 1.2. International bodies like ILO, WHO, national bodies like labour institutes, National institutes of occupational health, national safety council etc	
3	Acts and rules, 2.1. Factories act and rules 2.2. Workmen's compensation act, ESI act etc	
4	4.1 Light / Illumination (Defination, Units ,Sources,advantages,disadvantages) 4.2 Color (Defination,Color defects, Color vision tests) 4.3 Introduction to Different Occupation Occupation where Illumination and Color vision is Important	
5	5.1 Occupational Hazards A. Physical Hazards B. Biological Hazards C. Ergonomic Hazards D. Air-Borne Hazards E. Chemical Hazards Example of Occupation related to each Hazards 5.2 Radiation (Electromagnetic radiation, Ionizing& Non ionizing, Infrared, Ultraviolet, Microwave & laser) 5.3 Pesticides – General & Ocular defects 5.3 Occupational hygiene & ergonomics A. Environmental monitoring B. Recognition, evaluation and control of hazards	20
6	6.1 Occupational diseases A. Occupation related diseases caused by (Physical agents, Chemical agents Biological agents) 6.2 Common Systemic Disease Associated with Various Occupation 6.3 Common Ocular Disease in Various Occupation 6.4 Visual Problems in various Occupation 6.4 Occupational safety A. Prevention & Protective Methods B. Personal protective equipment ✓ Goggles, Face shields etc Selection, use & Testing for standards 6.5 Occupational Accidents 5.1. Causes of accidents 5.2. Accident analysis, accident prevention	
7	7.1 Task Analysis of Occupation 7.2 Vision Standards for Occupation like Railways, Roadways, Airlines etc	
8	Prevention of occupational diseases ✓ Medical examination / medical monitoring ✓ Pre-employment/pre- placement examinations	
9	Visual Display Unit (Computer ,Laptop, Digital Devices)	
10	Contact lens & work	
11	11.1 Role of optometrist – promotion of general and visual health and safety of people at Work 11.2 Industrial visits & Industrial Vision Screening	
		50 Hrs

RECOMMENDED BOOKS

1. Public health and community Optometry	Robert.D.Newcomb, Jerry.L.Jolly
2. Industrial & Occupational ophthalmology	Samuel.L.Fox
3. Guide to occupational and other visual needs	Holmes
4. Work and the eye	Raechel.V.North
5. Diagnosing and treating computer related vision problems	Sheedy, Shaw-McMinn
6. Principles of Ophthalmic lenses	M.O.Jalie – 2nd edition
7. System for ophthalmic dispensing	Clifford.W.Brooks, Irwin.M.Borish
8. Clinical Optics	Troy Fannin, Theodore Grosvenor – 2nd edition
9. Ophthalmic lenses & Dispensing	M.O.Jalie – 2nd edition
10. Practical aspects of ophthalmic optics	MargeretDowaliby – 4th edition

RESEARCH METHODOLOGY & STATISTICS

SL NO	TOPICS	HOURS
1	**Introduction I: Biostatistics** ✓ Definition ✓ role of statistics in health science and health care delivery system	60
2	**Introduction II: Research Methodology** ✓ Research process ✓ Steps involved in research process ✓ Research methods and methodology	
3	**Variables and scales of measurements** ✓ Definitions and examples of qualitative, quantitative, continuous discrete, dependent and independent variables. ✓ Definitions, properties and examples of nominal, ordinal, interval and ratio scales of measurements.	
4	Sampling ✓ Population, sample, sampling, reasons for sampling, probability and non-probability sampling. ✓ Methods of probability sampling – simple random, stratified, systematic- procedure ✓ Merits and demerits. ✓ Use of random number table.	
5	**Organization of data** ✓ Frequency table, histogram, frequency polygon, frequency curve, bar diagram, pie chart	
6	**Measures of location** ✓ Arithmetic mean, median, mode, quartiles and percentiles – definition ✓ Computation (for raw data), merits, demerits and applications	
7	**Measures of variation** ✓ Range, inter-quartile range, variance, standard deviation, coefficient of variation- definition ✓ Computation (for raw data), merits, demerits and applications	
8	**Normal distribution** ✓ Concept, graphical form, properties, examples ✓ Concept of Skewnes and Kurtosis	

9	**Correlation** ✓ Scatter diagram ✓ concept and properties of correlation coefficient, examples [No computation]	
10	**Health Information System** ✓ Definition, requirement, component and uses of health information system. ✓ Sources of health information system- Census, Registration of vital events, Sample registration system (SRS), Notification of diseases, Hospital records, Disease registries, Record linkage, Epidemiological surveillance, Population survey	
11	**Vital statistics and hospital statistics** ✓ Rate, ratio, proportion, Incidence, Prevalence. Common morbidity, mortality and Fertility statistics – Definition and computation.	
12	**Hypothesis** ✓ What is hypothesis ✓ Formulation of hypothesis ✓ Characteristics of good hypothesis.	
13	**Epidemiology** ✓ Concept of health and disease ✓ Definition and aims of Epidemiology, ✓ Descriptive Epidemiology- methods and uses.	
14	Concept of reliability & validity	
		60 Hrs

RECOMMENDED BOOKS

1. Methods in Biostatistics for medical students & Research workers — Mahajan B.K.- 6th edition
2. Research methodology – Methods & techniques — Kothari.C.R
3. Introduction to Biostatistics: A manual for students in health sciences — Sundar Rao PSS, Richard.J
4. Text book of Preventive and social medicine — Park.E.Park

CLINICS AND SPECIAL CLINICS

No. of practical hrs. : 270

1. Case sheet
2. History taking
3. Lensometry
4. Visual acuity
5. Tests for phorias and tropias
6. External examination
7. Slit lamp examination
8. Drugs and method of application
9. Do's and don'ts – Pupillary dilatation
10. Direct ophthalmoscopy
11. Indirect ophthalmoscopy
12. Instrumentation
13. Patients selection
14. Keratometry reading
15. Refraction
16. Fluorescein pattern
17. Overrefraction
18. Fitting of hard lenses
19. Rigid gas permeable lenses and soft lenses in refractive errors and in specialized condition

The students are made to observe the internees initially, then gradually they are encouraged to work up a patient and perform various examination techniques.

INTERNSHIP

COMPULSORY ROTATORY INTERNSHIP FOR B.Sc. OPTOMETRY

Twelve-month compulsory rotational postings during which students have to work in the following areas:

1. General Optometry department and General Ophthalmology department – 1 month
2. Speciality refraction with Retina and Cornea Ophthalmology department– 1 month
3. Paediatric refraction with Paediatric ophthalmology – 1 month
4. LASIK investigation – 1 month
5. Cataract investigation – 1 month
6. HFA and Glaucoma ophthalmology department – 1 month
7. Contact lens – 1 month
8. Low vision and Rehabilitation department – 1 month
9. Vision therapy – 1 month
10. Ocularistry and Electrodiagnostics – 1 month
11. Opticals – 1month
12. Community Refraction – 1month

Students must be able to assist independently the following procedures at the end of their internship postings;-

1. General Optometry department, Community refraction and General Ophthalmology department:

Students should get well versed in handling refraction cases like

- General Refraction
- Aphakia
- Emergency cases like redness/trauma
- Refract all kinds of refractive error
- Refract ectatic conditions of cornea
- Post-Operative refraction
- Follow up cases of any infection – Chalazion/Stye/Conjunctivitis
- Differential diagnosis and diagnosis of anterior chamber infections
- Troubleshoot
- Appropriate referral

2. Speciality refraction with Retina and Cornea Ophthalmology department
   - Complete speciality refraction work-up
   - Differential diagnosis and diagnosis of retinal conditions
   - Differential diagnosis and diagnosis of corneal conditions
   - Refraction for all post-operative retinal and corneal conditions
   - To know the management for retinal and corneal condition
   - To understand and decide the prognosis of every condition
   - Appropriate referral

3. Paediatric refraction with Paediatric ophthalmology
   - Complete paediatric work-up
   - All syndromes
   - Aphakia
   - Hereditary conditions
   - Pedigree charting
   - Cycloplegic refraction
   - Decide about prescription for paediatric age groups

4. LASIK investigation and Cataract investigation
   - Appropriate history taking
   - Able to perform the investigation using appropriate diagnostic tool
   - Able to interpret the reports post investigation
   - To decide if the patient can undergo LASIK or cataract surgery

5. HFA and Glaucoma ophthalmology department
   - Able to perform the HFA for all kinds of patients with any HFA strategy
   - Able to interpret the HFA reports and understand the prognosis of Glaucoma
   - To diagnose the type of Glaucoma
   - To know the management of all types of Glaucoma
   - Appropriate referral

6. Contact lens
   - Soft lens/Soft toric
   - RGP CL
   - ROSE K
   - Miniscleral CL
   - Cosmetic CL
   - Bandage CL
   - Troubleshoot
   - Steven Johnson's syndrome
   - Sjogren syndrome
   - Aphakia
   - Post-surgery
   - High astigmatism – Keratoconus/PMD
   - Patient care and maintenance

7. Low vision and Rehabilitation
   - Complete low vision work-up
   - Distance and Near magnification trial

- Prescribe appropriate devices according to the condition
- Appropriate referral
- To understand and know to rehabilitate a low vision patient according to their needs

8. Vision therapy
   - Complete Binocular vision work up
   - To diagnose every condition appropriately
   - To decide about the appropriate therapy for every condition
   - Diplopia charting and Hess charting
   - DMR and Prism trial for diplopia
   - Perceptual skill assessment
   - To work on defective perceptual skill appropriately

9. Ocularistry and Electrodiagnostics
   - Orbital diseases
   - Evisceration, Enucleation and Exenteration
   - Fitting and Removal of customised eye – Fitting assessment
   - Materials used
   - Processing and Fabrication techniques
   - Patient care and hygiene

10. Opticals
    - To decide and choose the appropriate spectacle lens and frame according to the power
    - Ocular measurements
    - Lens coatings
    - Frame fitting and adjustments
    - Dispensing

NOTE: AT THE END OF INTERNSHIP THERE WILL BE A PRACTICAL EXAM.

(EXIT EXAM)

FOURTH year

Subject	**University Examination**				**Total**
	Theory	Internal	Practical	Viva Voce	
Project			80	20	100
Clinical Examination- **"EXIT EXAMINATION'**			160	40	200

FOURTH YEAR

- **PROJECT WORK**
- **CLINICAL POSTING & SECIALITY POSTING**

LEANING AND TEACHING STRATEGY

The curriculum of Optometry is designed in such a way that it ensures the development of professional skills as well as behaviors of an individual that helps them to deliver a comprehensive primary eye care to the needy.

The curriculum incorporates 4 Major phases Phase - I

(First year Optometry)

The emphasis of learning is understanding & analysis of the basic sciences, philosophies, theories & skills required to develop professionally and academically. This theory oriented first year ensures a sound scientific foundation for the upcoming years.

Phase - II (Second year Optometry)

The curriculum arranged in this part allows the students to apply the basic science knowledge procured from Phase-I in the Optometry topics. The introductory clinical posting in the ophthalmic outpatient department helps them to understand and learn the primary eye care procedures.

Phase – III (Third year Optometry)

As the curriculum concentrates more on optometric patient evaluation and management, the focus is to refine the student's clinical and application skills to make him/her an Optometrist. The student will learn about the diagnostic approaches and management of various ocular disorders, binocular vision anomalies, assessment and dispensing of contact lenses and Low vision aids.

Phase – IV (Fourth year Optometry)

This one year compulsory course work program is designed to facilitate the transition from student hood to a competent optometrist.

The learning and teaching process includes;

- Lectures
- Practical demonstration
- Projects & Assignments
- Seminars
- Case discussions
- Journal clubs
- Clinical teaching
- Industrial visits
- Community outreach

CLINICAL POSTINGS

Aim: To enable the students to learn the Optometric examination procedures, clinical assessment skills and management techniques which helps them to become a competent clinician.

Description: The students will be posted in different specialities of eye care on a rotatory basis under the supervision of experienced clinical supervisors.

Clinical Posting – IInd Year:

At the end of second year clinical postings, the students will be performing History recording (Ocular and systemic – of relevance), Visual acuity assessment and documentation (Adults & Infants), Objective and subjective refraction, Spectacle prescription, Dispensing of various types of lenses and frames, Lensometry, Keratometry, demonstrating the slit lamp illumination techniques, color vision assessment, Do's and Don'ts of pupillary dilatation, Gross ophthalmic examination etc. under experienced clinical supervisors.

TOTAL CLINICAL HOURS (IIND YEAR): **200 HOURS/YEAR**

Clinical Posting – IIIrd year:

By the completion of IIIrd year clinical posting, the students will be able to perform the following under experienced clinical supervisors.

- Optometric workup to detect the ocular disorders (Ocular & relevant systemic history, Visual acuity assessment and refraction, Slit lamp examination, applanation Tonometry, fundus evaluation)
- Contact lens workup
- Low vision workup
- Orthoptic workup

TOTAL CLINICAL HOURS (IIIRD YEAR): **575 HOURS/YEAR.**

Clinical Postings – IV th year:

Successful completion of the course work program will facilitate the students to become competent independent Optometrist. The student will be proficient in

- Complete Optometric workup including diagnosis and management
- Contact lens workup including dispensing
- Low vision workup, dispensing of aids and counseling
- Orthoptic workup and non-surgical management
- Detection of ocular diseases and referral to specialists at the appropriate stage
- Managing an optical outlet/clinic of his/her own.
- Screening of Ocular disorders in community outreach programmes like Camps, School screening etc.
- Utilizing the latest technology in the diagnosis of ocular anomalies including visual field devices, Gonioscopy, imaging technology including ultrasound and retinal imaging techniques, corneal topography including ORBSCAN, Electrophysiology, etc

SUPERVISED CLINICAL HOURS DURING COURSE WORK: 1800 HRS

PROJECT:

No. of practical hrs: 144

Each student is encouraged to take up a research project in the area of his/her liking. The project should be original and should have considerable clinical relevance. The concerned faculty members guide the student in his/her project. After completing the project, each student has to submit a complete report of their respective projects

PROJECT GUIDELINES

All Bsc.optometry degree students enrolled in the Rajiv Gandhi University of Health Sciences should complete a scholarly project as partial fulfillment of requirements for the award of Bscoptometry (OPTOMETRY) degree.

What is a project?

A Project is a preliminary form of research. It is an independent investigation. It is very largely the students's own work and is to be pursued by them from the inception till completion. A master's project (non-thesis) will be completed during the third year and involves the student in a hands- on project led by a research supervisor/ faculty advisor who will choose, develop and guide the project from its inception to completion.

Purpose of a project work

The purpose of the Project Work is to enable the student to gain practical experience. It enables the student to meet program objectives through development of an appreciation of the interrelations between theory research and practice. A project forms an introduction to scientific thinking and working.

Project suggestions

Prior to the practical work, students work out a concept with their supervisor that could include any of the following points:

- Scientific question
- Educational objectives (which methods have to be mastered and understood)
- Recent trends in the respective fields
- Case study
- Prospective studies
- Retrospective studies

This scholarly project provides the student with the opportunity to participate in a mentored research experience. The student will actively participate in a research project throughout all current applicable phases of the project such as the problem statement development, review of the literature, hypotheses formation, proposal writing, study design, data collection, data analysis, and result reporting. This may be done as a group project. A portfolio, paper, or poster is a presentation of those outcomes.

Project supervision

The supervisor schedules the project work together with the student and provides an introduction to all laboratory skills that are needed. She or he is then the contact person for all questions and problems during the project. If required, she or he may also ask for a progress report and preliminary results while the project is still ongoing.

The eligibility academic qualification and teaching experience required for recognition as research supervisor and faculty advisor by the RGUHS are:

a. Eligibility to be a research supervisor and faculty advisor
   Shall be a full time teacher in the college or institution where he or she is working.
b. Academic qualification and teaching/professional experience for each branch
   - Research supervisor (RS)- five years of teaching/ professional experience after the postgraduate qualification in a teaching institution or laboratory approved by RGUHS
   - Faculty advisor (FA)- three years of teaching/ professional experience after the postgraduate qualification in a teaching institution or laboratory approved by RGUHS
c. Age:
   The age of the RS/ FA shall not exceed 65 years.

Assessment

Four copies of the project report should be submitted to the Principal along with a soft copy (CD), three months before the final examinations. Projects are assessed with a written report and a seminar. The written report and the presentation, as well as the practical work in the laboratory are to be included in the internal assessment. The Project report will carry 10 marks which would be assessed and awarded during the viva voce examination and added along with the viva voce marks.

GUIDELINES FOR THE PREPARATION OF PROJECT REPORTS

1. The project report should be typed in Times New Roman. The size of the titles should be 14 and Bold and the size of the subtitles should be 12 and bold.
2. The matter should have double spacing except for long quotations, footnotes and endnotes, which are single spaced. The left hand margin must be 1.5", other margins should be 1.0".
3. The project report should be hardbound.
4. The project report should be organized in the following subdivisions:
    a. Title page
    b. Certificate
    c. Acknowledgement
    d. List of abbreviations used
    e. Table of contents
    f. Introduction
    g. Main project
    h. Summary of the project work
    i. List of references
    j. Annexures

a. Title page

<----------Title ---------->
<----------Subtitle ---------- >
by
Name of the Candidate
Project Report

In partial fulfillment
of the requirements for the degree of
Degree Name
in
Subject Name
Under the guidance of
Name of the RS and FA
Name of the Department
Name of the College
Place
Year

b. Certificate

CERTIFICATE BY THE RESEARCH SUPERVISOR

This is to certify that the project report entitled "<----------Title ----------" is a bonafide research work done by Name of the Candidate in partial fulfillment of the requirement for the degree of Degree Name.

Signature of the Research Supervisor
Name
Designation & Department

Date:

Place:

ENDORSEMENT BY THE HOD, PRINCIPAL/HEAD OF THE INSTITUTION

This is to certify that the project report entitled "<----------Title ---------- >" is a bonafide research work done by Name of the Candidate under the guidance of Name & designation of the Guide.

Seal & Signature of the HOD **Seal & Signature of the Principal**

Name **Name**

Date:
Place:

Acknowledgement

The inclusion of a paper of Acknowledgment is a traditional practice in the write up of the Project Work. This permits the candidate to write a brief perface and acknowledge the help received from persons and organizations.

c. List of abbreviations used

d. Table of Contents

e. Introduction

This section includes a brief write up about the topic, its scope and importance as well as relation to any previous studies done in the particular topic. It should also mention any present developments.

f. The main project

The main project should be divided into various sections as per the demand of the topic.

g. Summary of the project work

h. List of References (Vancouver Style)

References should be numbered consecutively in the order in which they are first mentioned in the text; they should not be listed alphabetically by author or title or put in date order.

i. Annexures

POINTS TO KEEP IN MIND

- The project work should be an original document and in the candidates own language.
- The candidate should not copy or reproduce anyone else's published or unpublished project.
- Any arguments that are put forward in the project should be supported with appropriate data.
- Proper documentation of the information is very important.
- The methodology to be used should be very clearly stated in the beginning of the work.
- Plagiarism should be avoided.

WHAT IS PLAGIARISM?

Plagiarism means using another's work without giving

CLINICAL POSTING:

A student after having successfully completed the final year university examination is qualified to commence the Compulsory Rotatory Internship. The completion of Internship is mandatory to enable a student to obtain the bachelor degree in OPTOMETRY

GUIDELINES

- Interns should complete postings in all specialities as decided by the department
- The interns should conduct themselves in a manner befitting the profession.
- The intern should dress appropriately in the clinical areas
- It is mandatory for the intern to wear the white apron with nametag while attending clinics
- A total of12 days' leaves can be availed for a period of one year. He/she is permitted to avail 1day's casual leave in each posting/month or six days of casual leave at a stretch with prior permission from staff in-charge
- If the student takes more leaves than that can be availed, they have to extend the internship equal to the period of leaves taken

- Students are allowed to do externship only in institutions decided by the department and college on rotation basis. At least 3 months' compulsory internship has to be done in the parent institution
- Working hours in the parent institution is from 8.30am to 5.00pm. He/she should sign the attendance register before 8.30am
- Each intern should maintain a logbook wherever he/she is posted. The intern has to get signature from the supervising staff at the end of each posting
- Log book should be submitted to the Head of the department at the end of each posting of internship after the period of posting
- Accommodation for externship will be the sole responsibility of interns. Neither the department nor the college is responsible for providing accommodation
- Feedback of interns from the respective institutions during externship is mandatory
- Assignments/presentations given during the period of internship has to be duly undertaken and performed.
- Internship completion certificate will be issued from the College office only after obtaining satisfactory completion certificate from the Head of the Department

- The intern will be allowed to attend the National Conference, leave will be granted only for the days of conference and travel days. Any other leave declared by the University for the students will not apply to the interns

Respiratory Therapy Technology

RESPIRATORY THERAPY (RT)

OBJECTIVES OF THE COURSE

The objective of the course will be to have well informed reliable personnel who are trained to conduct the following activities:

- Clinical assessment of patients with respiratory disorders.
- Administration of medical gases including oxygen, helium and nitric oxide.
- Provision of humidification of respired gases.
- Administration of respiratory drugs such as bronchodilators, mucolytics, mucokinetics.
- Chest physiotherapy, postural drainage and clearance of secretions.
- Performing and interpreting pulmonary function tests and ABG.
- Initiation, maintenance and weaning patients off mechanical ventilation.
- Perform and assist for emergency cardiac life support in hospital or elsewhere.

2nd Year

TEACHING HOURS & EXAMINATION PATTERN

S. NO	Paper	Teaching hours		Examination				
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)		Total Min Pass (50%)
						Theory	Practical	
1	Clinical Anatomy, Physiology, Introduction to Respiratory therapy.	60	140	80	80	20	20	400
2	Clinical Biochemistry, Medical Terminology, Respiratory care equipment	60	140	80		20		
3	Pathophysiology of Respiratory diseases, Clinical Microbiology, Respiratory Care Equipment, Biostatistics and Research Methodology	60	140	80		20		
	Total	180	420	240	80	60	20	

SECOND YEAR SYLLABUS

Total Teaching hours 600.

PAPER-1

CLINICAL ANATOMY, PHYSIOLOGY, INTRODUCTION TO RESPIRATORY THERAPY- Total teaching hours 200

Unit 1. Clinical Anatomy

Skeleto- muscular system of Thorax and upper limb including nerve plexuses, Head Neck and Face, Respiratory system, Cardiovascular system including major arteries and Veins, central nervous system and vertebral column, histology of the respiratory tract.

Unit 2. Physiology

Respiratory System physiology, cardiovascular physiology, cellular physiology.

Unit 3. Introduction to Respiratory therapy

Record keeping in ICU, sterilization of equipment, Tracheo-bronchial tree toileting and asepsis.

PAPER-2

CLINICAL BIOCHEMISTRY, MEDICAL TERMINOLOGY, RESPIRATORY CARE EQUIPMENT - Total teaching hours 200

Unit 1. Clinical Biochemistry

Acid-base balance, protein metabolism, glucose metabolism, urea cycle.

Unit 2. Medical Terminology

Use of terminology related to critical care, definitions

Unit 3. Respiratory care equipment

Basics- Airway equipment, oxygen therapy equipment, nebulizers, equipment to establish vascular access, Monitors. Parts, types, uses, troubleshooting and maintenance of equipment.

PAPER-3

PATHOPHYSIOLOGY OF RESPIRATORY DISEASES, CLINICAL MICROBIOLOGY, RESPIRATORY CARE EQUIPMENT, BIOSTATISTICS AND RESEARCH METHODOLOGY

Total teaching hours 200

Unit 1. Pathophysiology of Respiratory diseases

Chronic obstructive lung disease, acute respiratory distress syndrome, lung abscess, pneumonia-bacterial/viral, pleural effusion, pneumothorax, interstitial lung disease, neuromuscular diseases, lung cancer- epidemiology, causes, clinical features, diagnosis.

Unit 2. Clinical Microbiology

Gram positive, gram negative, anaerobic, acid fast bacilli, viruses, parasites- identification of organism, culture, antibiotic sensitivity and resistance, multi drug resistance and judicious use of antibiotics.

Unit 3. Respiratory Care Equipment

Oxygen cylinders, Oxygen delivery devices, mechanical ventilator, Tracheostomy equipment, chest drain, Spirometry - Parts, types, uses, troubleshooting and maintenance of equipment.

Unit 4. Biostatistics and Research Methodology

PRACTICALS SYLLABUS FOR THE SECOND YEAR

Relevant to the theory syllabus

THIRD YEAR

TEACHING HOURS & EXAMINATION PATTERN:

Paper No	Paper	Teaching hours		Examination				
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)		Total Min Pass (50%)
1	Clinical Pharmacology, Polysomnography, Pulmonary Diagnostics	60	140	80	80	20	20	400
2	Pulmonary medicine, Principles of Mechanical ventilation	60	140	80		20		
3	Neonatal and Paediatric Pulmonary Medicine, Advanced cardiac Life Support, Leadership Management, End of Life Issues and Bioethics	60	140	80		20		
	Total	180	420	240	80	60	20	

UE: University Exam ***Practical includes Oral, Spotters & Record***

THIRD YEAR SYLLABUS

Total teaching hours 600

PAPER-1

CLINICAL PHARMACOLOGY, POLYSOMNOGRAPHY, PULMONARY DIAGNOSTICS.

Total teaching hours 200

Unit 1. Clinical Pharmacology

Resuscitation drugs, bronchodilators, Vasoactive drugs, Antibiotic therapy, antifungal agents, sedatives, neuromuscular relaxants, induction agents.

Unit 2. Polysomnography

Indications, types of graph, diagnosis**,** management.

Unit 3. Pulmonary Diagnostics

Roentgenogram, computed tomography, pulmonary function tests, arterial blood gas analysis.

PAPER-2

PULMONARY MEDICINE, PRINCIPLES OF MECHANICAL VENTILATION -

Total teaching hours 200

Unit 1. Pulmonary medicine

Diagnosis, prevention and management of major respiratory conditions.

Unit 2. Principles of Mechanical ventilation

Types and modes of ventilation, indications of every mode, care during chronic ventilation, alarms and troubleshooting, indications of weaning, weaning methods.

PAPER-3

NEONATAL AND PAEDIATRIC PULMONARY MEDICINE, ADVANCED CARDIAC LIFE SUPPORT, LEADERSHIP MANAGEMENT, END OF LIFE ISSUES AND BIOETHICS

-Total teaching hours 200

Unit 1. Neonatal and Paediatric Pulmonary Medicine

Differences in anatomy, differences in clinical presentation from adults, respiratory diseases specific to pediatric age group, specific management, modes of ventilation, specific equipment, fluid requirement, nutrition, monitoring.

Unit 2. Advanced cardiac Life Support

Diagnosis of cause of arrest, recent guidelines, drug cart, airway equipment, cardiac massage, defibrillator, monitoring, vasoactive drugs, post resuscitation care, diagnosis of end of life, legal issues related to death declaration.

Unit 3. Leadership Management

Skill based training of juniors inside the ICU, audit, maintenance of records, formation and execution of resuscitation team, division of labor, alarm raising and informing seniors/ consultant for consultation or help.

Unit 4. End of Life Issues and Bioethics

Do not resuscitate orders, euthanasia**,** death declaration, diagnosis of end of life, organ donation, preservation of organs for donation, legality of consent, legal and ethical protocol/guidelines for death declaration and organ donation.

PRACTICALS SYLLABUS

Relevant to the theory syllabus

Recommended text book

1. Egan’s Fundamentals of Respiratory care.

Reference books

1. Human Anatomy: B D Chaurasia.
2. Guyton’s Physiology.
3. Comprehensive respiratory therapy exam preparation: Edition 4: Heuer, Rodriguez.
4. Mechanical Ventilation: Clinical Application: Prof. Vijay Deshpande.

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

PERIPHERAL POSTING

Respiratory Therapy Technology			
Academic Year	Duration	Specialty	
Second year	One week each	Biomedical Engineering	Microbiology
Third year	One week each	Radiology	Emergency Medicine

NEURO SCIENCE TECHNOLOGY

SECOND YEAR

OBJECTIVES OF THE COURSE

- Technical skills needed to conduct the various diagnostic procedures and their interpretation
- Technical expertise in Electroencephalography (EEG) (including Neonatal and long term monitoring)
- To perform an interpret Nerve conduction studies (NCS)
- Theoretical, technical knowledge of procedures like Visual Evoked Potential (VEP), Somatosensory Evoked Potential (SSEP), Brainstem Auditory Evoked Response (BAER).
- ICU EEG Monitoring
- Presurgical evaluation of epilepsy
- Know about and perform other advanced Neurophysiological Techniques (AFT, PSG, IOM, etc)
- Basic Knowledge of Computers, Hospital Networking Systems
- Trouble shooting Minor problems, Maintenance and Sterilization of Equipment
- Non Technical Skills - Able to deal with the psychological incompetence of the patient and able to explain the procedures and decrease their level of anxiety
- Team work and Professional communication skills

TEACHING HOURS & EXAMINATION PATTERN

2nd Year

<table>
<tr><td rowspan="3">Paper No</td><td rowspan="3">Paper</td><td colspan="2">Teaching hours</td><td colspan="4">Examination</td></tr>
<tr><td rowspan="2">Theory</td><td rowspan="2">Practicals</td><td rowspan="2">UE Theory Min Pass (50%)</td><td rowspan="2">UE Practicals Min Pass (50%)</td><td colspan="2">Internal Assessment Min Pass (50%)</td><td rowspan="2">Total Min Pass (50%)</td></tr>
<tr><td>Theory</td><td>practical</td></tr>
<tr><td>1</td><td>Electronics and Instrumentation</td><td>60</td><td>140</td><td>80</td><td rowspan="3">80</td><td>20</td><td rowspan="3">20</td><td rowspan="4">400</td></tr>
<tr><td>2</td><td>Applied Anatomy & Physiology Related to Neuro technology</td><td>60</td><td>140</td><td>80</td><td>20</td></tr>
<tr><td>3</td><td>Basic EEG and Nerve Conduction Techniques</td><td>60</td><td>140</td><td>80</td><td>20</td></tr>
<tr><td></td><td>Total</td><td>180</td><td>420</td><td>240</td><td>80</td><td>60</td><td>20</td></tr>
</table>

SECOND YEAR SYLLABUS

Total Teaching hours 600

PAPER-1ELECTRONICS AND INSTRUMENTATION - Total teaching hours 200

- Electric Current - Ohm's Law, Resistivity/Resistance, Capacitance, Inductance & transformers, Decibel, dB, Transformer basics, Basics of electrical power
- Resistors, Capacitors, transistor, Bio electric potentials, electrodes, Transducers, Filters (Hi-pass, lowpass, band-pass), Analog to digital convertor, recording devices – CRO, PMMC.
- Voltage - RLC circuit, Basics of voltage, Semiconductors, Q, quality factor, Bandwidth, wavelength, frequency, amplitude
- Characteristics – Calibration, Damping, Low frequency, Filter, Sensitivity, Amplitude Linearity
- Noise - Introduction, Types, Technique for noise removal, Grounding
- Introduction, block diagram of EEG, EMNG and EP systems, Basic instrumentation of EEG, NCV & EMG equipment
- Basics of Electronics
- Filters, Analog – Digital Converter, Sampling Rate, Amplifiers, Differential amplification, Simple Circuits, Impedance, Electrical Safety, Transducers
- **Overview of Medical Electronic Equipment**

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

PAPER 2

APPLIED ANATOMY AND PHYSIOLOGY RELATED TO NEUROTECHNOLOGY - Total teaching hours 200

Unit.1 Anatomy

Sub divisions of anatomy, Terms of location and positions, Fundamental planes, Vertebrate structure of man, Organization of body cells and tissues, Muscles: Classification of muscle

Anatomy of nervous system

Introduction and divisions of nervous system, Central nervous system: Spinal cord, Anatomy, and functions, Reflex arc

The Brain

Location, gross features, parts, functional areas, Hindbrain, Midbrain, fore brain, Coverings of brain and peripheral nervous system, anatomy of cerebral blood supply & coverings, Lobes and lobe functions

Thalamus

1. Introduction
2. Division of diencephalon
3. External features parts of thalamus
4. Nuclei of thalamus
5. Connections of thalamic nuclei
6. Uses/ functions

Hypothalamus

1. Introduction
2. Division and boundaries of hypothalamus
3. Hypothalamic nuclei
4. Connections of hypothalamic
5. Functions/uses

Ventricular system

1. Introduction
2. Review of skull
3. Classification
4. Functions

Cerebrospinal fluid

1. Introduction
2. Production
3. Circulation and absorption Function

Skull

1. Introduction
2. Bones of the skull
3. Joints of the skull
4. Anatomical position of skull
5. Features of the skull- exterior and interior

Cerebellum

1. Introduction
2. Arterial supply of the cerebellum
3. External features
4. Divisions of cerebellum
5. Internal structure (In brief), Boundaries and functions

Brain vascular supply

1. Introduction
2. Blood brain barrier
3. Characteristics of artery and veins
4. Supply in different areas in brain

Cranial nerves

1. Introduction
2. Types – Motor, special sensory, mixed cranial nerves
3. Functions

Cerebrum

1. Introduction and structure of cerebrum
2. Cerebral cortex
3. Gyri, sulci, cortical areas - demonstration
4. Lobes of the cerebellum
5. Association commissural areas, Basal nuclei

Limbic system

1. Functions
2. Dissection hall
3. Meninges
4. Introduction
5. Meninges of brain

Subdural and Subarachnoid Space

Brain stem

1. Introduction
2. External features
3. Structure
4. Arterial supply
5. Development of functional column and nuclei

Reticular formation

Medulla

1. Introduction
2. External features
3. Structure
4. Arterial supply

Spinal cord

1. Introduction
2. Blood supply
3. External features
4. Fissures and sulci
5. Attachment of spinal nerve roots
6. Internal structure
7. Injuries to Spinal Cord and Brain

Enlargement of spinal cord

Spinal nerves

Formation of plexus

Peripheral nervous system

1. Organization & structure of a typical spinal nerve
2. Motor and sensory tracts
3. Sensory receptors
4. Sensory and motor pathways
5. Pyramidal system
6. Upper and lower motor neuron
7. Types of Nerves
8. Course of nerves – Median, ulnar etc commonly tested for NCS
9. Brachial and Lumbar Plexus
10. Nerve Injuries

Muscles

1. Origin
2. Insertion nerve supply
3. Motor units and electromyography

Autonomic nervous system

1. Organization of nervous system
2. Anatomy of autonomic motor pathway
3. Structure and function of sympathetic and parasympathetic divisions
4. Neuro transmitters and receptors

Unit.2 Physiology

- Knowledge of general physiology, nerve-muscle physiology
- Knowledge of basic human physiology of CNS.
- Knowledge of basic human physiology of special senses and endocrine system.
- Neurons and glial cells - Structure, function, Types, electrical property, degeneration and regeneration.
- Muscle- Structure & Functions of skeletal muscle & smooth muscle
- Neuromuscular transmission – Functional anatomy, Transmission & Clinical importance.

Central Nervous System

1. Organization of Nervous system.
2. Synapse, Properties & Function
3. Reflexes, Reflex action, Property, Function.
4. Sensory system – Receptor, Ascending sensory pathway (basics only), Thalamus, sensory cortex
5. Motor System – Spinal control of Motor activity, Motor areas in Cerebral Cortex,
6. Pyramidal & extra pyramidal tracts (basics only),
7. Basal ganglia & Cerebellum.
8. Hypothalamus
9. Autonomous nervous system
10. Cerebro spinal fluid- formation and functions.

Special Senses

1. Vision: rods and cones, retina and its function, visual pathway
2. Hearing: organ of Corti, auditory pathway
3. Olfaction
4. Taste: taste buds

Nerve Muscle Physiology

1. Action Potential, generation and propagation
2. Changes during disease process eg. Demyelination etc
3. Functional anatomy, biological activities, electrical and physiological properties of nerve fibre, types of nerve fibre, degeneration and regeneration of neurons. Structure and function of neuromuscular junction, neuromuscular transmission
4. Introduction of skeletal muscle, functional anatomy and organization, process and characteristics of muscle excitability and contractility, characteristics of skeletal muscles in intact body, EMG, and common muscle disorders, source of energy and metabolic phenomenon during muscle contraction, drugs affecting and disorders of neuromuscular junction, factors promoting neuronal growth

Cranial nerves

1. Introduction, function of cranial nerve
2. Clinical significance

Membrane potential

1. Introduction, genesis of membrane potential, recording of membrane potential
2. Evolution of patients receiving oxygen therapy
3. Hazards of oxygen therapy
4. Pathways
5. Synapses
6. Definition and its types
7. Chemical synapse, neurotransmitters
8. Introduction, Saltatory propagation, plexus and roots, afferent and efferent pathways, peripheral nerves of limbs

Cerebellum

Introduction, stimulus, sensors and receptors and its types, sensory cortex and its types, neural circuits and neuronal activity, functions

Brain stem

Introduction, physiological structure, development, blood supply,
clinical significance, functions.

Nervous system

Physiological structure of human brain, properties and function

Cerebrum

Introduction, physiological anatomy, cerebral cortex, cerebral hemisphere, functions

Motor system

Introduction, types of motor system, functions and application areas

Reflexes

Introduction, types, reflexes involving cranial nerves.

Functions of cranial nerves

Sensory system

Introduction, stimulus, sensors and receptors and its types, sensory cortex and its types

Basic neurological examination

Introduction, absence and presence of disease in nervous system,
aspects of neurological examination

Unit.3 Physiological Basis Of EEG

1. Anatomy of neural generation
2. Mechanisms of EEG generation
3. Pathophysiology of abnormal waveforms
4. Basic mechanisms of epileptogenesis

Unit.4 Neuropharmacology

1. General pharmacology: definitions, routes of drug administration,
2. Pharmacokinetics, pharmacodynamics
3. Drugs acting on the autonomic nervous system
4. General and local anesthetics, skeletal muscle relaxants
5. Sedative hypnotics, ethyl alcohol
6. Antiepileptic drugs
7. Antiparkinsonian drugs
8. Drugs used in mental illness
9. CNS stimulants and cerebro active drugs
10. Drugs affecting coagulation, bleeding and thrombosis
11. Antiseptics, disinfectants
12. Effect of drugs on EEG

PAPER - 3

BASIC EEG AND NERVE CONDUCTION TECHNIQUES

Total teaching hours 200.

Basic knowledge in Principles of EEG, Recording techniques

Electrode Placement

- 10 – 20 system
- 10 – 20 system – Neonatal, ICU

Head measurement and marking

- Patient Preparation
- Electrode position nomenclature (International 10-20 & 10-10 System)
- Electrodes: Types, properties and application techniques
- Impedance measurements
- Electrode paste

Principles of EEG recording

Instrumentation, Polarity and Localization

Basic electricity and electronics, Signal Processing

- Amplifiers and their characteristics, CMRR
- Calibration
- Filters, High and low frequency, filters, time constant, sensitivity and frequency response curves
- Electrical safety
- Waveform measurements (voltage, frequency, and duration)

Principles of EEG digitalization

- Analog-to-digital conversion (vertical and horizontal resolution)
- Sampling rate (aliasing and Nyquist frequency)
- Screen or monitor display (sensitivity scale and pixel resolution), etc

Localization and polarity

- Recording reference (electrode site, average reference and Laplacian reference)
- Montages and reformatting

Data acquisition and storage

Artifacts – Identification and Elimination

All physiological and non-physiological artefacts including artefacts caused by chewing, sweating, eye movements, ECG, pulse motion, movement of head/body, electrode pops or movements, electrical fields from electrical devices (TV, telephones), respirator-induced movements, intravenous drips/drip pumps, etc

Activation procedures

Hyperventilation, sleep deprivation, photic stimulation and others as required

Video EEG

Normal EEG in Adult & Elderly

Normal awake and normal sleep patterns including alpha, beta, theta, delta waves, mu, lambda waves, POST, Vertex sharp transients, spindles, K-complex

Normal responses to hyperventilation and photic stimulation

Changes in EEG in the elderly

Normal EEG in Infants and Children

Normal patterns of various ages from neonates up to adolescents

Normal Variants & Uncommon Patterns of Doubtful Significance

Small sharp spike / benign epileptiform transients of sleep, Wicket spikes, Psychomotor variants

14&6 positive spike, Breech rhythm, Sub-clinical rhythmic EEG discharges in adults (SREDA), Alpha variants, Phantom spike-waves, others

Basic Principles, Recording Techniques

Nerve conduction Study

1. Electro diagnostic signals and their measurements
2. Principles of motor nerve conduction
3. Principles of sensory nerve conduction
4. Basic components of electromyography instruments
5. Nerve conduction techniques
6. Anatomical guide and normative data for common nerve conduction studies
7. Brachial plexus and branches
8. Lumbar plexus and branches
9. Sacral plexus and branches
10. Artefacts in NCS
11. Physiological and non physiological factors affecting NCS
12. Anomalous innervations of extremities
13. Late responses

Evoked Potentials

1. Principles of Evoked Potentials
2. Averaging
3. Triggering – Principles and applications
4. Signal delay
5. Power transformers
6. Voltage divider

Visual Evoked Potentials (VEP)

1. Anatomical basis of VEP
2. Method of recording VEP
3. Normal VEP and waveforms
4. Variables influencing VEP
5. Clinical applications of VEP

Patient care and management

1. Maintain patient, lab record
2. Proper labelling of patient investigation
3. History taking

4. Investigations
5. Patient preparation for procedure
6. Pre procedure
7. Neurology procedure
8. Post procedure care
9. Observation
10. Examination, Physical examination, Nursing care, Ward management
11. Patient care during seizure
12. Differential diagnosis, provisional diagnosis
13. Medication
14. Receiving patient in procedure room (EEG and EMG room)

PRACTICAL

1. Electrodes Identification
2. Electrode Application
3. EEG Electrode Placement (10-20 system) – Adult/ICU
4. EEG Electrode Placement (10-20 system) –Paediatric & Neonatal
5. Technical aspects of EEG/EMNG Machines
6. Equipment and study parameters for EEG/EMNG
7. Basic Nerve Conduction Study (Motor, Sensory, F wave)
8. Care and Maintenance of Electrodes and EEG /ENNG machinery
9. Visual Evoked Potentials

THIRD YEAR

TEACHING HOURS & EXAMINATION PATTERN:

Paper No	Paper	Teaching hours		Examination				
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)		Total Min Pass (50%)
						Theory	Practical	
1	EEG – Clinical Applications and Advanced Techniques	60	140	80	80	20	20	400
2	EMNG - Clinical Applications and Advanced Techniques	60	140	80		20		
3	Other Electrophysiological Techniques, Research Methodology & Biostatistics	60	140	80		20		
	Total	180	420	240	80	60	20	

THIRD YEAR SYLLABUS

Total Teaching hours 600.

Paper-1

EEG – CLINICAL APPLICATIONS AND ADVANCED TECHNIQUES

Total teaching hours 200

Electroencephalography

1. Paediatric EEG, Neonatal EEG
2. EEG maturation
3. ILAE Classification
4. 10-10 system, Sphenoidal electrodes
5. Polarity and Electrical Field Mapping

Epileptiform Patterns and Epilepsies

1. Definition of epileptiform patterns
2. Types & recognition of various inter-ictal epileptiform patterns such as sharp waves, spikes,
3. polyspikes, 3Hz spike & wave complexes, 4-6Hz spike & wave complexes, slow spike &
4. wave complexes, photo-paroxysmal responses, hypsarrhythmia etc…
5. EEG patterns in specific epilepsy syndrome such as focal (e.g. Benign Rolandic Epilepsy,
6. Benign Epilepsy of Childhood with Occipital Paroxysms)
7. Generalized (West Syndrome, Lennox-Gastaut Syndrome, Absence Epilepsy, Juvenile Myoclonic Epilepsy, etc) epilepsy syndromes

- Generalised Epilepsies - Generalised tonic clonic
    - Absence
    - Myoclonic
- Partial / Focal epilepsies
    - Simple partial seizures
    - Complex partial seizures
    - Partial with secondary generalised seizures
- EEG in status epilepticus
- EEG in metabolic disease of cerebrum, EEG changes in CNS infections
- EEG in head trauma, strokes, tumours
- Polarity and electrical field mapping.

Non-Epileptiform Patterns

1. Slow waves
2. Triphasic waves
3. Generalized periodic complexes/patterns
4. Periodic lateralized epileptiform discharges (PLEDs)
5. Coma and stupor patterns

Ictal patterns

1. Classification and identification of seizures
2. How to differentiate interictal from ictal patterns

EEG Interpretation and Reporting

1. Principles of interpretation
2. General classification of abnormal EEGs
3. Elements of EEG reports
4. Writing a Factual EEG Report

Long-term EEG Monitoring

1. Types of long-term EEG recording
2. Indications and limitation of ambulatory and video-EEG monitoring
3. Evaluation of refractory epilepsy
4. General principles of Pre surgical evaluation of Epilepsy
5. Long term VEEG monitoring and identification of abnormal patterns
6. Response Testing during Seizure
7. Invasive EEG
8. Strip and grid implantation
9. SEEG
10. General principles of cortical mapping by electrical stimulation

Introduction to Neurology

1. Episodic impairment of consciousness
2. Delirium and altered sensorium
3. Stupor and Coma
4. Memory Impairment
5. Child with developmental delay
6. Behavioral disorders
7. The Epilepsies

PAPER-2

EMNG – CLINICAL APPLICATIONS AND ADVANCED TECHNIQUES

Total teaching hours 200

Nerve Conduction Techniques

1. Nerve Conduction Techniques, Special nerves
2. Required Protocols for specific problems like CTS, GBS, etc…
3. Complex Nerve Conduction Studies
4. Nerve Conductions in pathological states
5. Inching Technique
6. Assessment of Anomalous innervations
7. Plexus Studies
8. Nerve conduction of non limb nerves – techniques and normal values
9. Demyelination
10. Axonopathy
11. Entrapment
12. Plexopathy
13. Radiculopathy

Repetitive Nerve Stimulation, SFEMG

1. H- Reflex and R – Response
2. Blink Reflex

Electromyography

1. Qualitative EMG
2. Quantitative EMG
3. EMG in Neurogenic, Myogenic and other conditions
4. Macro EMG
5. Turns amplitude ratio
6. Pattern recognition – Spontaneous Activity, MUP Analysis in normal and Disease states

Tremerogram, Silent Period, MUNIX, etc… Techniques

Evoked Potentials

Brainstem auditory evoked potentials (BAEP)

1. Anatomical basis of BAEP
2. Method of recording BAEP
3. Variables influencing BAEP
4. Normal BAEP, potential field distribution, waveforms
5. Clinical applications of BAEP

Somatosensory evoked potentials (SSEP)

1. Anatomical basis of SEP
2. Stimulation and recording procedures
3. Median somatosensory evoked potential
4. Tibial somatosensory evoked potential
5. Clinical applications of SEP

6. Dermatomal SSEP

- Evoked potentials in CNS disorders, PNS disorders
- Event-related potentials (ERP): general aspects and quantification

Interpretation of Nerve conduction Study

Factual reporting of Nerve Conduction studies and Evoked Potentials

Introduction to Neurology

1. Neurological diseases – a basic approach
2. Clinical examination basics
3. Disorders of vision
4. Hearing impairment and vertigo
5. Cranial and facial pain
6. Brainstem syndromes
7. Movement disorders
8. Hemiplegia and monoplegia
9. Paraplegia
10. Proximal and distal weakness
11. Floppy infant
12. Sensory abnormalities of face, trunk and limbs
13. Neurological causes of bladder, bowel and sexual dysfunction
14. Peripheral Nerve Disorders
15. Myopathies
16. Neuro Muscular Junction Disorders
17. Multiple Sclerosis

PAPER-3

OTHER ELECTROPHYSIOLOGY TECHNIQUES, BIOSTATISTICS, PATIENT CARE AND MANAGEMENT -

Total teaching hours 200.

AUTONOMIC FUNCTION STUDIES

Autonomics function test

1. Symptomatic skin response
2. R – R analysis
3. Valsalva maneuver
4. Tilt table
5. Heart rate variability
6. Knowledge of Other techniques (QSART, etc…)

Intra Operative Monitoring

1. Electrocorticography (ECoG)
2. Evoked Potentials IOM
3. Facial / Trigeminal Nerve Monitoring
4. Direct Cortical stimulation and mapping
5. Central sulcus mapping
6. MER in Movement Disorders
7. DBS in Movement Disorders and Epilepsy
8. Other IOM modalities as available in the Institute

Polysomnography

1. Neurobiology of sleep including various stages of Rapid Eye Movement and Non-Rapid Eye Movement sleep
2. Classification of sleep disorders
3. Parasomnias
4. Sleep disordered breathing
5. OSA detection and management
6. CPAP titration
7. BIPAP titration
8. Servo ventilation
9. Excessive day time somnolence
   MSLT, MWT, TMS,

Nerve Ultrasound

Trans Cranial Doppler

PRACTICALS

1. Recording of EEG
2. Normal EEG – Awake, Sleep, Activation Procedures
3. Performing and Interpretation of Nerve Conductions studies including special nerves
4. Brainstem Auditory Evoked Potential (BAEP)
5. Somato-Sensory Evoked Potential (SSEP)
6. Repetitive Nerve Stimulation
7. Response Testing During Seizure
8. Nerve Conduction techniques – Special nerves
9. Advanced/Special EEG techniques

RESEARCH METHODOLOGY AND BIOSTATISTICS

Introduction

Meaning, definitions, and types of statistics. Statistics as a singular and plural noun Branches of statistics. Application of statistics in medicine.

Unit – II: Presentation of data

Definition and types of data Raw data, the array, frequency distribution. Basic definitions and principles of tabular presentation iv.Basic principles of graphical representation. Types of diagrams: Bar, pie, line, histograms, pictogram.

Unit - III: Measure of central tendency

Need for measures of central tendency. Definition and calculation of mean: ungrouped and grouped. Meaning, interpretation and calculation of median ungrouped and grouped. iv.Meaning and calculation of mode ungrouped and grouped. Selection of an appropriate measure of central tendency.

Unit - IV: Measure of variability

Need for measure of variation. Range and mean deviation. Variance and standard deviation. Calculation of variance and standard deviation ungrouped and grouped. Properties and uses of variance and SD.

Unit -V: Probability and standard distributions.

Meaning of probability and standard distributions. Priori and posteriori probabilities The Binominal and Poisson distributions.The normal distribution. Divergence from normality: skewness, kurtosis.

Unit - VI: Sampling techniques

Population, sample and sampling. iMethods and types of sampling. Random and non-random sampling Parameter and statistic. Basic concepts and terms related to test of significance.

Unit - VII: Introduction to research methodology

Definition and characteristics of research. Levels and types of research. Experimental and non-experimental study designs. Definitions of case report, case series, case-control and cohort studies.

Recommended Textbooks

1. Biomedical Instrumentation – Dr. M. Arumugam
2. Electronic Devices & Circuits Jacob Milman
3. Electronic Devices & Circuits Mahesh B Patil
4. Medical Physics Hasan Maridi
5. Anatomy & Physiology in health and Illness- Ross & Wilson
6. Clinical Neurophysiology: U.K Misra & J. Kalitha
7. Electromyography and Neuromuscular Disorders: Clinical-electrophysiologic Correlations - David Preston & *Barbara Shapiro*
8. Clinical Electroencephalography - U.K Misra & J. Kalitha
9. Electroencephalography - Basic principles, Clinical Applications & Related Fields - Ernst Niedermeyer
10. Current practice of Clinical Electroencephalography –John S Ebersole
11. EEG in Clinical Practice K Radhakrishnan, JMK Murthy, C Rathore

Reference Books

1. Bio medical Instrumentation and measurements - Leslie Corniwell, Fred J, Weibell, Erich A Pfeiffer
2. Medical Devices – use and safety – Bertil Jacobson and Alan Murray
3. Hand book of Biomedical Instrumentation –R.S. Khadpur
4. Human Anatomy- Regional and Applied Volume B.D Chaurasia
5. Clinical Anatomy For Medical Students Richard S.Snell
6. Essentials of Medical Physiology Anil Baran Singha Mahapatra
7. Anatomical guide for the Electroencephalographer – Phyllis.B.Hammeond
8. Atlas of EEG Patterns John M Stern
9. Rowan's Primer of EEG
10. A Clinical Guide to Epileptic Syndromes and their Treatment Panayiotopoulos CP
11. Manual of Nerve Conduction Velocity and Somatosensory Evoked potentials: Joel A Delisa
12. Electrodiagnosis in Clinical Neurology Michael J Aminoff
13. Principles of clinical EMG- Case studies; Shin J Oh
14. Clinical Electromyography Shin J Oh
15. Electrodiagnosis in diseases of Nerves & Muscle: Jun Kimura
16. Anatomical Guide for the Electromyographer Aldo Perotto, Edward F Delagi
17. Neurology in clinical practice –Walter. G.Bradley
18. Principles of Neurology –Alan.H.Rapper & Robert Brown
19. Treatment of epilepsy; Principles & practice; Wylie
20. Sleep Disorders – Chokroverthy
21. Clinical Autonomic Disorders Phillip Low, Eduardo E Benarroch

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	5 out of 6	6	30
Brief answers	10 out of 10	3	30
Total			80

PERIPHERAL POSTING

Neuro Science Technology			
Academic Year	Duration	Specialty	
Second year	One week each	Medical laboratories	Biomedical Engineering
Third year	One week each	Radiology	Nuclear Medicine Medicine

CRITICAL CARE TECHNOLOGY

II YEAR SUBJECTS

Applied anatomy & physiology

Microbiology

ICU Monitoring I (Basic)

Biomedical engineering

Pathology

Pharmacology

2ND YEAR

TEACHING HOURS & EXAMINATION PATTERN:

Paper No	Paper	Teaching hours		Examination			
		Theory	Practicals	UE Theory Min Pass (50%)	UE Practicals Min Pass (50%)	Internal Assessment for theory and practical Min Pass (50%)	Total Min Pass (50%)
1	Applied Anatomy and physiology Total -240hrs	200hrs	40hrs	80		20	100
2	Microbiology Total-120hrs	40hrs	80hrs	80	80	20+20=40	200
3	ICU Monitoring(Basic)	Clinical postings 700hrs		80	Only ICU Monitoring 80	20+20=40	200
	Biomedical Engineering(40hrs) & Basic physics(10hrs)	50hrs					
4	Pathology,psychophysiology 120hrs	40hrs	80hrs	80	80	20+20=40	200
	pharmacology Total-120hrs&	40hrs	80hrs				

2ND YEAR

APPLIED ANATOMY & PHYSIOLOGY

COURSE DESCRIPTION

This course is designed to assist students in developing an in depth knowledge in the field of applied anatomy and physiology.

OBJECTIVES

At the end of the course the students will be able to acquire knowledge and develop proficiency in the anatomical and physiological aspects of patients with medical and surgical disorders in various health care settings.

COURSE CONTENT

Block 1: Applied Anatomy Related To Critical Care

Unit 1: Introduction to anatomy

Section 1: Anatomical terms, planes, and relations etc.

Unit 2: Respiratory system

Section 1: Anatomy of thoracic cage bones-

- Ribs, spine,
- Diaphragm, intercostal muscles,
- Blood supply and nerve supply
- Nose, nasopharynx
- Oral cavity, tongue, oropharynx

- Laryngopharynx
- Blood and nerve supply
- Lungs with bronchopulmonary segments
- Pleura
- Blood and nerve supply

Unit 3: Cardiovascular System

Section 1: Heart, Pericardium, Myocardium, endocardium, valves
Section 2: Major vessels of circulatory system –

- Aorta
- IVC
- Pulmonary vessels and all major branches

Section 3: Coronary circulation

Unit 4: Central Nervous System

Section 1: Basic organization of the nervous system

- Central –Brain, Spinal cord
- Peripheral
- Autonomic nervous system
  - Sympathetic nervous system
  - Parasympathetic nervous system

Section 2: Cerebral circulation

- Circle of Willis
- Blood supply of spinal cord

Section 3: Pain pathway

UNIT 5: Excretory System

Section 1: Kidney, Ureter, and Bladder, Blood, nerve supply

Unit 6: Abdomen

Section 1: Liver, pancreas, islet cells Section 2: Thyroid, parathyroid, adrenals.

Block II: Applied Physiology

Unit 1: Respiratory System

Section 1: Homeostasis
Section 2: Physiology of Breathing

7. Regulation of respiration
8. Respiratory movements
9. Chest wall mechanics- pressure, volumes, resistance, compliance
10. Lung volume and capacities
11. Work of breathing
12. Oxygen transport
13. Carbon di oxide transport
14. Factors affecting oxygen transport

15. Mechanism of hypoxia
16. V/Q mismatch.
17. Indications For Artificial Airways
    a. Relieving airway obstruction
    b. Secretion removal
    c. Protecting the airway
    d. Positive pressure
    e. Ventilation
18. Selecting &Establishing An Artificial Airway
    a. Nasal airways
    b. Pharyngeal airways
    c. Tracheal airways
19. Airway Clearance Techniques
    a. Airway suctioning
    b. Bronchoscopy
20. Airway Maintenance
    a. Securing the airway & confirming placement
    b. Providing adequate humidification
    c. Minimizing nosocomial infections
    d. Providing cuff care
    e. Facilitating clearance of secretion
    f. Trouble shooting airway emergencies
21. Extubation
    a. Indication
    b. Procedure
    c. Post extubation – care and complication

Section 6: Oxygen Therapy

22. Sources of Oxygen for therapy
23. Storage of Oxygen
24. Oxygen delivery system
25. Hazards of Oxygen

Section 7: Chest X-Ray

26. Normal Chest X-Ray
    6. Normal anatomy
    7. Basic physics of X –ray and assessment of film quality
    8. Cardiac configuration
    9. Lung fields and airway
    10. Optimum position of –Endotracheal tubes, Nasogastric tubes, Central lines
11. Abnormal Chest X-Ray
    1. Trauma
        - Pneumothorax
        - Hemothorax
    11. Lung contusion
    12. Pulmonary edema o ARDS
    13. Pneumonia
    14. Broncho pneumonia
    o Lobar pneumonia
    15. Aspiration pneumonia

Unit 2: Cardiovascular System

Section 1: Cardiac cycle

12. Cardiac output - Factors affecting cardiac output
13. Preload, afterload, stroke volume, contractility
14. Cardiac conduction system - Regulation of rate, basic arrhythmias
15. Principles of ECG, Normal ECG

Section 2: O_2 delivery, uptake in tissues Section 3: Blood pressure

4. Maintenance of normal BP and factors affecting it
5. Systolic, diastolic, pulse pressure, mean arterial pressure

Unit 3: Central Nervous System

Section 1: Cerebral auto regulation, cerebral oxygen consumption, Coma

Section 2: Cerebrospinal fluid, intracranial pressure Section 3: Cranial nerves

6. III, IV, VI
7. IX, X, Cough reflex, gag reflex
8. Pupils: accommodation reflex, light reflex

Section 4: Sedation and analgesia

Section 5: Brain death

PRACTICAL:

v. Clinical Evaluation

vi. Case Study/ Case Book

vii. Practical Record

viii. Observational/ Field Visit

ix. Each student should be given planned healthcare teaching by conducting clinical teachings and case presentations.

METHODS OF TEACHING

iv. Lecture cum discussion

v. Demonstration

vi. Lab visit

vii. Practical work record

METHODS OF EVALUATION

vii. Written Test

viii. Record Book

ix. Assignments

x. Oral Presentations

Reference Books

iii. Cohen, Memmler: Structure & Function of Human Body, Lippincott Williams & Wilkins; Tenth edition (2012).

iv. Waugh: Ross & Wilson Anatomy & Physiology in health and illness Penguin Books Ltd (2010)

v. Tortora: Anatomy & Physiology, John Wiley & Sons (2012)

vi. Chaurasia: Human Anatomy CBS Publishers (2012)

vii. Standring: Gray's Anatomy Penguin Books Ltd (2008)

viii. Venkatesh D: Basics of Medical Physiology for Nursing, LWW (2009).

ix. Hall J: Guyton Textbook of Medical Physiology. Elsevier (2012).

x. Tandon: Best & Taylor's Physiologic Basis of Medical Practice (2011).

MICRO BIOLOGY

COURSE DESCRIPTION

The course is designed to assist students to acquire understanding of fundamentals of microbiology and identification of microorganisms. It also provides opportunities for practicing infection control measures in hospital settings

OBJECTIVES

At the end of the course, the student will be able to:

- Identify common disease producing microorganisms
- Explain the basic principles of microbiology and their significance in health and disease.
- Demonstrate skill in handling specimens
- Explain various methods of disinfection and sterilization
- Identify the role of the nurse in hospital infection control system

COURSE CONTENT

Block 1: Introduction to microorganisms

Unit 1: Microbiological terms
Unit 2: History of microbiology Hypersensitivity reactions

Block 2: Major groups of microorganisms

Unit 1: Structure and classification of microbes

Unit 2: Identification methods of microorganisms

Block 3: Infection control

Unit 1: Introduction to infection, spread and transmission of infection

Unit 2: Sterilization and disinfection

Unit 3: Cleaning and sterilizing equipment

Unit 4: Disposal of waste
Unit 5: Surveillance, quality control
Unit 6: Control of organisms with antibiotics
Unit 7: Vaccines, toxoids – bacterial, viral, immunization schedule

Unit 8: Barrier nursing, universal precautions

Block 4: Specific infections

Unit 1: Nosocomial infections – VAP, CRBSI, UTI, SSI, NSI

Unit 2: Bacterial – Gram Positives & Negatives, infections caused

Unit 3: Viral – HIV, Hep B, HCV, other common viral infections

Unit 4: Fungal

Unit 5: Parasitic

Unit 6: Tropical infections - Tb, malaria, leptospirosis, dengue, rickettsia, amoebiasis

Unit 7: Applied Microbiology : RTI, UTI, Sepsis

PRACTICALS

iii. Collection and handling of clinical specimens-urine, sputum, blood and pus.
iv. Demonstration and handling of microscope
v. Staining-gram staining, Zeihl Neelsen
vi. Common examination: stained smears, Fungus-Yeasts and Molds
vii. Sterilization-incineration and Autoclaving
viii. Each student will practice aseptic procedures in the wards and maintain personal and Environmental hygiene.
ix. Observation visit to incinerator, posting in CSSD and infection control department

METHODS OF TEACHING

IV Lecture cum discussion
V Demonstration
VI Lab visit
VII Practical work record

METHODS OF EVALUATION

2. Written Test
3. Record Book
4. Assignments
5. Oral Presentations

Reference Books

7. Ananthnarayan R: Textbook of Microbiology. (2017)

8. Pommerville J. C: Fundamentals of Microbiology. Jones and Bartlett learning (2013)
9. Apurba Sastry, Sandhya Bhat. Essentials of Microbiology.

BIOMEDICAL ENGINEERING

COURSE DESCRIPTION

The course is designed to assist students to acquire the knowledge of basics of electricity and electronics. It is also designed to assist students in understanding the basics of the equipment used in the ICU.

OBJECTIVES

At the end of the course, the student will be able to:

- Describe fundamentals of Electricity and Electronics.
- Describe the types and uses of medical equipment

COURSE CONTENT

Block 1: Fundamentals of Electricity & electronics

Unit 1: Resistance

Unit 2: Capacitance
Unit 3: Inductance and transformers
Unit 4: Parameters of electricity – voltage, current, power

Unit 5: Difference between AC and DC current, phase, neutral, earth, color coding

Unit 6: Ohm's law, Kirchhoff's law – electrical circuits Unit 7:

Classification of medical equipment

Section 1: According to type of protection: B, C, and F etc.

Section 2: According to mode of protection: Class I - III

ICU MONITORING I (BASIC)

COURSE DESCRIPTION

This course is designed to enable students to understand the principles of monitoring of respiratory, cardiovascular and other systems of the patients in ICU.

OBJECTIVES

At the end of the course the students will be able to:

1. To describe the basic principles of monitoring of respiratory system, cardiovascular system, CNS, nutritional status, renal function and liver function of patient in ICU
2. To identify the benefits and risks of ICU monitoring techniques.
3. To describe monitoring techniques used in ICU for a mechanically ventilated patients.
4. To describe monitoring techniques used in ICU for patients in shock.
5. To describe monitoring techniques used in ICU to monitor neurological status, renal function and liver function.

COURSE CONTENT

Block 1: General monitoring

Unit 1: Temperature monitoring

Section 1: Principles of temperature monitoring Section 2: Hypothermia and hyperthermia

Unit 2: Pulse
Unit 3: Positioning of patient
Unit 4: Monitoring for pressure sores

Block 2: Respiratory System

Unit 1: Airway monitoring- Intubation

- Securing ET tube
- Cuff pressure

Unit 2: Monitoring Gas Exchange

Section 1: Oxygenation

- ABG
- Pulse Oximetry
- Oxygen delivery and consumption

Section 2: Ventilation

- ABG
- Capnography

Section 3: Calculations

- Oxygen consumption
- Alveolar gas equations
- Dead space

Unit 3: Monitoring muscle strength, work of breathing

Unit 4: PFT - Recognize the methods & significance of measuring the following lung volume and flow in the ICU.

- Tidal volume
- Vital capacity
- Peak flow rate
- Negative inspiratory pressure

Block 3: Cardiovascular System

Unit 1: ECG
Unit 2: NIBP
Unit 3: Invasive arterial blood pressure- Cardiac Input Monitoring
Unit 4: CVP monitoring

Unit 5: Zeroing, calibration, trouble shooting of pressure transducers.

Block 4:Nervous system

Unit 1: Neurological history and examination, pupils, Muscle strength

Unit 2: Glasgow Coma Scale

Unit 3: ICP Monitoring

Unit4: BIS Monitoring

Block 5: Abdomen / Renal

Unit 1: Intra-abdominal pressure monitoring

Unit 2: Monitoring renal function:

- Clinical – Urine output
- Laboratory- creatinine, creatinine clearance

PRACTICALS

1. Assignments
2. Clinical audit to be started in 2nd year and completed by 3rd year
3. Observation of equipment handling & maintainance

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

Reference Books

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller, Craig L Scalan (Mosby)
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
3. Practical Methods for Respiratory Care – Raymond Sibberson (Mosby)
4. Respiratory Physiology – The Essentials l John B West (Williams & Wilkins)
5. Ventilation / Blood Flow & Gas Exchange – John B West (Blackwell Scientific Publications)
6. Techniques in Bedside haemodynamic Monitoring – Elaine Kiess Daily & Johnspeer Schroeder (Mosby)

7. All you really need to know to interpret arterial blood gases – Lawrence Martin (Lea & Febiger)
8. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
9. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
10. Washington Manual of Critical Care

PHARMACOLOGY

COURSE DESCRIPTION

The course is designed to assist students to acquire understanding of fundamentals of drugs and their mode of action. It also provides opportunities for practicing infection control measures in hospital settings. It also helps to assist the students to use knowledge of pharmacology in practice of critical care technology.

OBJECTIVES

At the end of the course, the student will be able to:

1. To identify drugs used in ICU and describe their pharmacology, administration, uses and adverse effects.
2. To describe pharmacology of vasopressors and inotropes.

COURSE CONTENT

Block 1: Introduction to pharmacology

Unit 1: Pharmaco kinetics
Unit 2: Pharmaco dynamics Drug dose calculation – Dilution, infusion rate

Unit 3: Pharmaco vigilance – should be able to identify & report adverse drug reactions.

Block 2: Medical gases: O2, N2O, compressed Air

Block 3: Anaesthetic agents

Unit 1: Sedatives: barbiturates, benzodiazepines, propofol, and ketamine

Unit 2: Analgesics: NSAID's, Aspirin, opioids

Unit 3: Neuromuscular blockers

Unit 4 : Local Anaesthetics

Block 4: Drugs affecting the autonomic nervous system

Unit 1: Adrenergic drugs

Section 1: Inotropic agents, chronotropic agents

Section 2: Vasopressors & Vasodilators

Section 3: Anti-hypertensive

Section 4: Bronchodilators- OHA & Insulin - Antidiabetic

Unit 2: Cholinergic drugs

Section 1: Atropine, glycopyrrolate

Section 2: Ipratropium

Block 5: Mucokinetic agents:

Unit 1: Expectorant

Unit 2: Mucolytics

Unit 3: Mucokinetics

Unit 4: Mucoregulatory agents

Unit 5: Others e.g. Bromohexine, ambroxol, saline, soda bicarbonate

Block 6: Cough suppressants

Unit 1: Peripheral antitussives

Unit 2: Central antitussives

Unit 3: Peripheral and central antitussives

Block 7: Respiratory stimulants

Unit 1: Specific e.g. Naloxone, flumazenil

Unit 2: Non-specific e.g. xanthines, nicotine, doxapram

Block 8: Antihistamines

Block 9: Steroids

Block 10: Antimicrobial drugs

Unit 1: Antibacterial, antiviral and anti-fungal agents – basic concepts

Unit 2: Antimicrobial Resistance – Basic concepts

Unit 3: Antiseptic agents

Unit 4: Immuno suppresion

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

30. Written Test
31. Record Book
32. Assignments
33. Oral Presentations

Reference Books

1. Tripathi K. D: Essentials of Medical Pharmacology. JPB, (2013)
2. Smeltzer – Brunner & Siddhartha Textbook of Medical Surgical Nursing, 2010,LWW
3. Black – Medical Surgical Nursing, 2009, Elsevier
4. Nettina – Lippincott manual of Nursing Practice, 2009. LWW
5. Lewis – medical Surgical Nursing, 2008, Elsevier

PATHOLOGY & PATHOPHYSIOLOGY

COURSE DESCRIPTION

The course is designed o assist students to acquire the knowledge of the fundamentals of pathology and pathophysiology in disease states.

OBJECTIVES

At the end of the course, the student will be able to describe the basic pathology and pathophysiology of the important disease states of respiratory system, cardiovascular system, CNS, hematology, renal and GI system in ICU settings.

COURSE CONTENT

Block 1: General

Unit 1: Inflammation and healing

Unit 2: Tumors

Unit 3: Immune system

Block 2: Respiratory system

Unit 1: Respiratory failure

Unit 2: Acute respiratory distress syndrome

Unit 3: Pneumonia, TB

Unit 4: Opportunistic infections

Unit 5: Bronchial asthma and COPD

Unit 6: Bronchiectasis and Lung abscess

Unit 7: Atelectasis, collapse

Unit 8: Pleural disease: Pneumothorax, pleural effusion

Unit 9: Occupational lung diseases - Smoke inhalation , Pneumoconiosis

Block 3: Cardiovascular

Unit 1: Shock: hypovolemic, cardiogenic, obstructive, septic

Unit 2: Hypertension in ICU

Unit 3: Congestive cardiac failure, acute Left ventricular failure, Right ventricular failure

Unit 4: Pulmonary edema

Unit 5: Pulmonary Hypertension

Unit 6: Pulmonary embolism

Unit 7: Ischemic heart disease

Block 4: CNS

Unit 1: Cerebrovascular disease (stroke)

Unit 2: Coma

Unit 3: Delirium in ICU

Unit 4: Neuromuscular disease

Section 1: Myasthenia gravis

Section 2: Critical illness polyneuropathy

Section 3: Diaphragmatic paralysis

Unit 5: Guillian Barre syndrome

Unit 6: Brain death, Persistent vegetative state

Unit 7: Trauma

Section 1: Head injury

Section 2: Unstable spine and protection

Block 5: Haematology

Unit 1: Anemia in ICU/VAP (Ventilator Associated Pnemonia)

Unit 2: Neutropenia

Unit 3: Bleeding disorders

Unit 4: Clotting disorders

Block 6: GIT, Liver, Pancreas, Renal, Endocrine

Unit 1: Upper GI bleed

Unit 2: Hepatic coma

Unit 3: Pancreatitis

Unit 4: Renal failure in ICU

Unit 5: Hypoglycemia

Unit 6: Hyperglycemia

Unit 7: Disorders Sodium, Potassium and Fluid balance.

Unit 8: Stress response role of Adrenals

Block 7: Miscellaneous

Unit 1: Envenomation – snake bite, scorpion sting

Unit 2: Poisoning – general supportive care, common poisons

PRACTICALS – NONE

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record
4. Interpretation of Lab reports

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

REFERENCE BOOKS

1. Smeltzer – Brunner & Suddharth Textbook of Medical Surgical Nursing, 2010,LWW
2. Black – Medical Surgical Nursing, 2009, Elsevier
3. Nettina – Lippincott manual of Nursing Practice, 2009. LWW
4. Lewis – medical Surgical Nursing, 2008, Elsevier
5. Davidson's Principles &Practice of Medicine, 2010, Elsevier
6. Bailey & Love Short Practice of Surgery, 2008, Hodder Arnold
7. Timby – Introductory Medical Surgical Nursing, 2009, WK
8. Das – textbook of Surgery, SD Publishers
9. Woods – Cardiac Nursing, 2010, LWW
10. Hickey – Neurologic & Neurosurgical Nursing, 2009, LWW
11. Morton – Critical Care Nursing, 2009, LWW
12. Thelan's Critical Care Nursing, 2008, Elsevier
13. Spring House – Medical Surgical Nursing Made Incredibly Easy, 2008, LWW
14. Webber – Health assessment in Nursing, 2010, WK

III Year TOPICS

ICU Monitoring- II (Advanced)

Equipment Maintenance

ICU Therapy

ICU Administration, Logistics, Ethics & Statistics

YEAR – III

ICU MONITORING- II (ADVANCED) AND EQUIPMENT MAINTENANCE

COURSE DESCRIPTION

This course is designed to enable students to understand in detail the principles of monitoring of respiratory, cardiovascular and other systems of the patients in ICU. It is designed to assist students in understanding the details of the techniques and equipment used for monitoring the patient in ICU and their troubleshooting.

OBJECTIVES

At the end of the course the students will be able to:

1. Describe in detail the principles of basic and advanced monitoring of respiratory system, cardiovascular system, CNS, nutritional status, renal function and liver function of patient in ICU
2. Describe in detail monitoring techniques used in ICU for a mechanically ventilated patients.
3. Describe principles and methods of hemodynamic monitoring.
4. Describe monitoring of brain stem function and nutritional monitoring.
5. Describe principles of maintenance of equipment used in ICU.
6. Describe the various aspects of equipment troubleshooting.

COURSE CONTENT

Block 1: Respiratory system

Unit 1: Monitoring lung and chest wall mechanics

- Compliance
- Resistance
- Pressures
- Auto PEEP Volumes

Unit 2: Monitoring muscle strength, work of breathing, Maximum inspiratory and expiratory pressures

Unit 3: Monitoring patient ventilator system, Graphics monitoring

Unit 4: Bedside PFT

Block 2: Cardiovascular System

Unit 1: Assessment of Preload responsiveness static and dynamic parameters

Unit 2: Basic Echocardiography in ICU/ Ultrasound in Critical Care
Unit 3: Defibrillator and Cardioversion

Unit 4: PICCO

Unit 5: Monitoring tissue perfusion

Unit 6: Pulmonary artery catheters

Unit 7: Temporary pacemaker

Block 3: CNS

Unit 1: Monitoring brain stem function

Unit 2: Sedation and analgesia scoring

Block 5: Nutritional monitoring

Unit 1: Functional nutritional assessment (history and physical examination)

Unit 2: Metabolic assessment
Unit 3: Estimating nutritional requirements

Block 6: Care & maintenance if ICU equipment & Troubleshooting

(Includes quality checks and calibrations of all the equipment)

Unit 1: Mechanical Ventilators & Non-invasive ventilators

Unit 2: Pumps: Infusion, syringe

Unit 3: Monitors: Stand-alone & multi-parameter, Cardiac Output monitors.

Unit 4: ECG machine

Unit 5: ABG machine

Unit 6: Defibrillator

Unit 7: Ultrasound machine

Unit 8: Bronchoscope Dialysis Machine

PRACTICALS

1) Log book and project completion for internal assessment
2) Should know the workings of all ICU equipment
3) Should know care and maintenance of all ICU equipment
4) Should be able to monitor ventilator parameters
5) Should be able to assess fluid responsiveness in a patient

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

REFERENCE BOOKS

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller,
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
3. Practical Methods for Respiratory Care – Raymond Sibberson (Mosby)
4. Respiratory Physiology – The Essentials l John B West (Williams & Wilkins)
5. Ventilation / Blood Flow & Gas Exchange – John B West (Blackwell Scientific Publications)
6. Techniques in Bedside haemodynamic Monitoring – Elaine Kiess Daily & Johnspeer Schroeder (Mosby)
7. All you really need to know to interpret arterial blood gases – Lawrence Martin (Lea & Febiger)
8. Text book of Advanced Cardiac Life Support. American Heart Association
9. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
10. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
11. Washington Manual of Critical Care

ICU THERAPY

COURSE DESCRIPTION

This course is designed to assist students in developing expertise and in depth knowledge in the field of critical care technology. It will help students to appreciate the patient as a holistic individual and develop skill to function as a specialized critical care technologist.

OBJECTIVES

At the end of the course the students will be able to:

1. Discuss in detail the concept of Mechanical Ventilation
2. Describe in detail the design features of ventilators, their types, how they work and the various modes of ventilation
3. Describe in detail the care of patient on ventilator and weaning from ventilator.
4. Discuss in detail the Basic and Advanced Life Support.
5. Discuss in detail the care of unconscious patient.

COURSE CONTENT

BLOCK 1: Mechanical ventilation/ventilator dependence/difficult weaning

Unit 1: Basic Concepts Mechanics of ventilation

Mechanics of exhalation

Work of breathing

Distribution of ventilation

Efficiency and effectiveness of ventilation

Indications

Mechanical Ventilators

How ventilators work

Operator interface

Types of ventilators

Unit 2: Modes of Mechanical Ventilation

Basic and newer modes

Ventilator initiation

Initial ventilator settings

Adjusting ventilatory settings

Oxygenation

Ventilation

Timing – Inspiratory of gas / Expiratory,

inspiratory hold Flow

Tidal volume

Pressure- Peak /Plateau PEEP

POP – OFF

Pressure support

Proximal airway (VS) distal

FiO2

Unit 3: Humidification Humidifier types

Advantages & disadvantages

Unit 4: Non-Invasive Ventilation

Types of NIV (CPAP, BIPAP)

Goals of & indications of NIV

Patient selection and exclusion criteria for NIV

Equipment used in the application of NIV Instituting

and managing NIV

Complications of NIV

Time & cost associated with NIV

Unit 5: Trouble shooting and alarms

Unit 6: Weaning and Extubation Weaning

Definitions

Reasons for ventilator dependence

Patient evaluation

Preparing the patient

Methods

Newer techniques for facilitating ventilator

discontinuance Selecting an approach Monitoring

the patient during weaning

Chronically ventilator dependent patients & difficulty in weaning

- Terminal weaning
- Extubation
  - Indications
- Procedure
- Post extubation care
- Unit 7: Nebulization and MDI
- Inhaled drug therapy
- Nebulization Different types
  - Advantages & disadvantages
- MDI with spacer
- Characteristics of therapeutic aerosols Hazards of aerosols therapy
- Aerosol drug delivery system
- Assessment based bronchodilator therapy protocols Special considerations
- Controlling environmental and contamination
- Unit 8: Suctioning and chest physiotherapy
- Unit 9: Incentive Spirometry
- Unit 10: Inspiratory resistance exercises
- Unit 11: Care of Patient on Ventilator
- Ensuring proper placement
- Cuff pressure
- Tracheo bronchial hygiene & suctioning
- Humidification, chest physiotherapy
- Ventilator settings
- Monitoring ventilatory parameters
- Unit 12: Care of the chest tube
- Drainage systems of pleural with fluid
- Unit 13: Extubation failure

Block 2: Airway Assistance

Unit 1: Tracheal intubation (oral, nasal) – Insertion of ICD

Unit 2: Cricothyrotomy

Unit 3: Open/percutaneous tracheostomy

Unit 4: Fiberoptic bronchoscopy

Section 1: FOB Intubation

Section 1: Therapeutic BAL

Unit 5: Decanulation of tracheostomy

Block 3: Cardiovascular system

Unit 1: Fluid resuscitation and inotropes

Unit 2: Basic of IABP /ECMO

Unit 3: Pericardiocentesis

Block 4: Life support

Unit 1: Basic life support

- AED, Mask ventilation, Chest compression

Unit 2: Advanced cardiac life support

- Drugs, defibrillation

Unit 3: Trauma life support

A –Airway and cervical spine stabilization

B – Breathing

C –Circulation and hemorrhage control

D –Disability

E--Exposure D Manual in line stabilization

Basic care of surgical wounds and fractures

Unit 4: Burns Assessment

Section 1: History and physical assessment

Section 2: Assessment of burns and fluid and electrolyte loss

Section3: Etiology classification, Pathophysiology, clinical manifestations, Diagnosis, treatment modalities

Block 5: Renal / Abdomen

Unit 1: Basics of Renal Replacement Therapy, modes of dialysis

Unit 2: Intra-abdominal pressure, abdominal compartment syndrome

Block 6: Central Nervous system

Unit 1: Care of Unconscious Patient, Comfort

Section 1: Skin integrity assessment and care

Section 2: Physiotherapy – chest & limbs

Section 3: Nutritional needs & supply

Unit 2: Pain Control, Care of epidural, Patient control led analgesia

Block 7: Infection Control

Unit 1: Hand hygiene

Unit 2: Universal precautions Isolation

PRACTICAL

- Clinical rotations in selected Medical and Surgical areas
- Patient assignments for patient centered comprehensive care
- Case presentations,
- Drug study discussion

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

REFERENCE BOOKS

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller,
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
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6. Techniques in Bedside haemodynamic Monitoring – Elaine Kiess Daily & Johnspeer Schroeder (Mosby)
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8. Text book of Advanced Cardiac Life Support. American Heart Association
9. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
10. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
11. Washington Manual of Critical Care
12. Smeltzer – Brunner & Suddharth Textbook of Medical Surgical Nursing, 2010,LWW
13. Black – Medical Surgical Nursing, 2009, Elsevier
14. Nettina – Lippincott manual of Nursing Practice, 2013. LWW
15. Lewis – medical Surgical Nursing, 2008, Elsevier
16. Davidson's Principles &Practice of Medicine, 2010, Elsevier
17. Bailey & Love Short Practice of Surgery, 2013, Hodder Arnold
18. Timby – Introductory Medical Surgical Nursing, 2013, WK
19. Das – textbook of Surgery, SD Publishers
20. Woods – Cardiac Nursing, 2010, LWW
21. Hickey – Neurologic & Neurosurgical Nursing, 2009, LWW
22. Morton – Critical Care Nursing, 2009, LWW
23. Thelan's Critical Care Nursing, 2013, Elsevier
24. Spring House – Medical Surgical Nursing Made Incredibly Easy, 2008, LWW
25. Webber – Health assessment in Nursing, 2010, WK

ICU ADMINISTRATION, LOGISTICS, ETHICS, COMMUNICATIONS, MANAGEMENT AND STATISTICS

COURSE DESCRIPTION

This course is designed to enable students to understand in the principles of ICU administration, patient safety and transport. It is designed to assist students in understanding the principles of medical ethics and communication.

OBJECTIVES

At the end of the course the students will be able to:

1. Describe the principles of basic ICU administration
2. Describe various aspects of medical ethics.
3. Describe the medico-legal aspects of medical records
4. Describe the principles of communication and counseling.
5. Describe all the aspects of patient safety and patient transport.
6. Understand the basic principles of management

COURSE CONTENT

Block 1: Basic administration

Unit 1: Economic issues in ICU

Unit 2: Raising purchase orders for equipment

Unit 3: Maintaining consumable stock

Unit 4: Equipment repair

Block 2: CSSD Procedures

Unit 1: Waste disposal collection of used items from user area, reception protective clothing and disinfection safe guards.

Unit 2: Disinfection in ICU –Surfaces

- Reusable equipment and kaccessories

Unit 3: Wrapping & packing

Unit 4: General principles of sterilization

Section 1: Moist heat sterilization

Section 2: Dry heat sterilization

ection 3: Chemical sterilization

- EO gas sterilization
- H_2O_2 gas plasma vap sterilization

Block 3: Medical ethics

Unit 1: Medical ethics –Definition – Goal – Scope

Unit 2: Code of conduct

Section 1: Introduction

Section 2: Basic principles of medical ethics

Section 3: Confidentiality

Section 4: Autonomy and Informed consent – Right of patients

Unit 3: Care of the terminally ill – Euthanasia, withdrawal, withholding support

Unit 4: Organ transplantation

Unit 5: Medico legal aspects of medical records

Unit 6: Medico-legal case and type – Records and document related to MLC

Unit 7: Ownership of medical records –

Unit 8: Confidentiality Privilege communication –

Release of medical information –

Unauthorized disclosure – retention of medical records – other various aspects.

Block 4: Communication and counseling

Unit 1: Basic principles

Block 5: Basics of statistics

Unit 1: Basic concepts in measurement

Section 1: Scales of measurements

Section 2: validity, reliability, variation, measurement system, conversion.

Unit 2: Basic descriptive statistics

Section 1: Central tendency, mean, mode, median.

Section 2: Dispersion range, variance, standard deviation

Unit 3: Concept of normal and abnormal

Block VI: Patient safety and transport

Unit 1: Electrical safety

Unit 2: Fire safety

Unit 3: Intra-hospital Patient transport

Unit 4: Inter-hospital Patient transport

Block VII: Principles of management

Unit 1: Basic principles of Management – functions, types, importance, motivation etc.

Unit 2: Personnel management – staffing, orientation, disciplining, complaints etc

Unit 3: Financial management – short and long term

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

THIRD YEAR

Subjects	Internal assessment		Theory		Practical		Total	
	THEORYx	PRCTICAL	Max	Min	Max	Min	Max	Min
Paper 1: ICU Monitoring II + Maintenance of equipment (ICU Monitoring 75% + Maintenance 25%)	20	20	80	40	80	40	200	100
Paper 2: ICU Therapy	20	20	80	40	80	40	200	100
Paper 3: ICU Administration + Logistics + Statistics + Medical Ethics	20		80	40	-	-	100	50

POSTINGS DURING ONE YEAR INTERNSHIP

IMCU	- 3 Months
PACU (Post Anaesthetic Care Unit)	- 3 Months
Coronary Care Unit (CCU)	- 2 Months
RICU	- 2 Months
Nephrology (Dialysis Unit)	- 15 days
NICU/PICU	- 15 days
CSSD/Sterilisation	- 15 days
Labs	- 15 days

PROCEDURAL SKILLS

I Year BSc Critical Care Technology Course

OBSERVE	ASSIST	DO
Hand washing		Hand washing
Universal Precautions	Universal Precautions	Universal Precautions
Wearing clean/sterile gloves		Wearing clean/sterile gloves
Bed side manners		Bedside manners
Assessment of Consciousness AVPU Score		Assessment of Consciousness AVPU Score
Placement of pulse oximeter probe	Placement of pulse oximeter probe	Placement of pulse oximeter Probe and ECG probes
Placement of ECG leads	Placement of ECG leads	
Applying NIBP cuff	Applying NIBP cuff	
Mask ventilation		
Endotracheal intubation		
Connection of patient to ventilator		
Documentation		
Waste segregation and disposal		Waste segregation and disposal

PROCEDURAL SKILLS

II Year BSc Critical Care Technology Course In addition to Skills required in I Year

BSERVE/ CLASS	ASSIST	DO
Applying NIBP cuff	Applying NIBP cuff	Applying NIBP cuff
Peripheral line insertion	Peripheral line insertion	
Placement of ECG leads	Placement of ECG leads	Placement of ECG leads
ECG recording	ECG recording	ECG recording
Basic ECG interpretation	Basic ECG interpretation	Basic ECG interpretation
Central line insertion	Central line insertion	
Arterial line insertion	Arterial line insertion	
Setting up arterial transducer	Setting up arterial transducer	Setting up arterial transducer
Bedside Pulmonary Function Test	Bedside Pulmonary Function Test	Bedside Pulmonary Function Test
Mask ventilation	Mask ventilation	
Endotracheal intubation		
Endotracheal suctioning	Endotracheal suctioning	Endotracheal suctioning
Endotracheal tube fixing	Endotracheal tube fixing	
Checking ETT cuff pressure	Checking ETT cuff pressure	
Setting up ventilator	Setting up ventilator	
Placement of pulse oximeter probe	Placement of pulse oximeter probe	Placement of pulse oximeter probe
Connecting Ventilator to patient	Connecting Ventilator to patient	
Humidification	Humidification	Humidification
Nebulization	Nebulization	Nebulization

Chest tube insertion	Chest tube insertion	
Monitoring ventilator parameters	Monitoring ventilator parameters	Monitoring ventilator parameters
Basic ABG interpretation	Basic ABG interpretation	Basic ABG interpretation
Extubation process	Extubation process	
Post extubation care	Post extubation care	
Chest physiotherapy	Chest physiotherapy	Chest physiotherapy
Incentive spirometry	Incentive Spirometry	Incentive Spirometry
Setting up EtCO2	Setting up EtCO2	Setting up EtCO2
Setting up Intra- abdominal pressure transducer	Setting up Intra- abdominal pressure transducer	Setting up Intra- abdominal pressure transducer
Haemodialysis canulation	Haemodialysis canulation	
Pressure sore monitoring	Pressure sore monitoring	Pressure sore monitoring
CXR interpretation	CXR interpretation	Chest X Ray interpretation
Brain death certification		
Setting up O2 cylinder for transport of patient	Setting up O2 cylinder for transport of patient	Setting up O2 cylinder for transport of patient
Setting up Monitors for transport of patient	Setting up Monitors for transport of patient	Setting up Monitors for Transport of Patient
Care and maintenance of ventilator	Care and maintenance of ventilator	Care and maintenance of ventilator
Care and maintenance of NIV	Care and maintenance of NIV	Care and maintenance of NIV

Care and maintenance of infusion/syringe pump	Care and maintenance of infusion/syringe pump	Care and maintenance of infusion/syringe pump
Care and maintenance of monitor	Care and maintenance of monitor	Care and maintenance of monitor
Defibrillator calibration	Defibrillator calibration	Defibrillator calibration
Setting up transducer for Intracranial pressure	Setting up transducer for Intracranial pressure	
monitoring	monitoring	
Wrapping and packing reusable equipment for sterilization	Wrapping and packing reusable equipment for sterilization	Wrapping and packing reusable equipment for sterilization

PROCEDURAL SKILLS

Year BSc Critical Care Technology Course In addition to Skills required in I and II Year

OBSERVE	ASSIST	DO
Bedside Pulmonary Function Testing	Bedside Pulmonary Function Testing	Bedside Pulmonary Function Testing
Fiberoptic intubation		
Connecting Ventilator to patient	Connecting Ventilator to patient	Connecting Ventilator to patient
Troubleshooting ventilator	Troubleshooting ventilator	Troubleshooting ventilator
Extubation process: cuff leak test	Extubation process: cuff leak test	Extubation process: cuff leak test
Bronchoalveolar lavage	Bronchoalveolar lavage	
Tracheostomy		
Defibrillation	Defibrillation	
Temporary pacemaker insertion		
GCS scoring	GCS scoring	GCS scoring
Setting up transducer for Intracranial pressure monitoring	Setting up transducer for Intracranial pressure monitoring	Setting up transducer for Intracranial pressure monitoring
Insertion of external ventricular drain (EVD)	Insertion of external ventricular drain (EVD)	
Transport of patient out of ICU	Transport of patient out of ICU	Transport of patient out of ICU
APACHE scoring	APACHE scoring	APACHE scoring

RADIOLOGY & IMAGING TECHNOLOGY

FIRST YEAR SYLLABUS

S.NO	SUBJECT	NUMBER OF HOURS OF TEACHING (PRACTICAL AND THEORY)
Subsidary/Allied subject to becompleted in first6months		
1	**ENGLISH**	**10**
2	**MEDICAL ETHICS**	**10**
Core Subjects to be completed in first 12 months		
1	**ANATOMY INCLUDING HISTOLOGY**	**75**
2	**PHYSIOLOGY**	**75**
3	**BIOCHEMISTRY**	
4	**PATHOLOGY(Clinical pathology,Haematology&Blood Banking)**	**75**
5	**MICROBIOLOGY**	**75**
	TOTAL HOURS	**375**

TEACHING SCHEDULE:

S.NO	ACADEMICYEAR (12 MONTHS)	TIMINGS	
1	FIRSTYEAR		THEORY CLASSES
		9.00AM-4.00PM	

PATTERN OF EXAMINATION:

ACADEMIC YEAR	SUBJECTS			
FIRST YEAR	SUBSIDARY	CORE	THEORY	PRACATICAL EXAM
	ENGLISH	ANATOMY INCLUDING HISTOLOGY	ONE PAPER IN EACH SUBJECT	NO PRACTICAL EXAM
	MEDICAL ETHICS	PHYSIOLOGY		
		BIOCHEMISTRY		
		PATHOLOGY		
		MICROBIOLOGY		
	EXAMS AT THE END OF FIRST TERM (06 MONTHS)	EXAMS AT THE END OF THE YEAR		

PERIODICITY OF THE EXAMINATION: There shall be only two examinations in each academic year.The annual examination shall be held at the end of each academic year,with the exit examination being conducted in the third year.Supplementary examination will be held in the middle of each academic year,not earlier than four months later than six months of the main exam.

DISTRIBUTION OF MARKS-ALL SUBJECTS:

		Written Exam		I.A Theory	Total
Paper	**Subject**	**Duration (Hours)**	**Marks**	**Marks**	**Marks**
	Main Subject*				
1	Basic Anatomy(Including Histology)	3	80	20	100
2	Physiology	3	80	20	100
3	Biochemistry				
4	pathology	3	80	20	100
5	Microbiology &	3	80	20	100
	Subsidiary Subject				
1	English	3	80	20	100
2	Medical Ethics	3	80	20	100
		University theory Exam		Internal Assessment	
		(Min50%)		(Min50%)	

Note:IA=Internal Assessment

Main Subjects shall have University Examination.There shall be no University Practical Examination.

** subsidiary Subjects: Examination for Subsidiary subjects shall be conducted by respective colleges.

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2outof3	10	20
Short answers	6outof8	5	30
Brief answers	10outof 10	3	30
Total			80

NOTE:

1. Classes will be scheduled Monday to Friday between 2 and 4 pm on all working days.
2. The students will be posted in their respective department from 9 am to 1 pm from Monday to Friday and from 9 am to 4 pm on Saturday.
3. Teaching of the above core subjects shall be completed one month before the final 1styr university examination.
4. The Teaching hours and Exam pattern for second and third years are furnished separately under each speciality.
5. Thereshallbeaninternshipduringthefourthyearwhichincludesclinicalwork, maintenance of log-book and project work if any.
6. Workshop including basic life support, advanced cardiac life support and advanced trauma life support will be conducted during the internship.

1ST YEAR

ENGLISH

TotalTeaching hours: 25

Unit1.Communication

Role of communication, Defining Communication Classification of communication,Purpose of communication, Major difficulties in communication, Barriers to communication, Characteristics of successful communication –The seven Cs-communication at the work place, Human needs and communication, "Mind mapping" Information communication.

Unit2.Comprehension passage Reading purposefully, Understanding what is read, Drawing conclusion, Finding and analysis.

Unit3.Explaining How to explain clearly, Defining and giving reasons, Explaining differences, Explaining procedures and Giving directions.

Unit4.Writing business letters How to construct correctly, Formal-language, Address, Salutation, Body, Conclusion.

Unit5. Report writing Reporting an accident. Reporting what happene data session

Unit6.Reportingwhathappened atameeting

Unit 7.Lagunage activité

Syllable-division, Precis–Writing, Common errors,Expansion of proverbs,Resume writing, One- word substitutes

Unit8.Grammar

Unit9.Prose

- 1.After twenty years–O.Henry
- 2.Once more to the lake–E.BWhite
- 3.Playing the English gentleman–M.K. Gandhi
- 4.The Boy who Broke the bank–RuskinBond

Recommended text book

1. Paths to skills in English.Orient Blackswan.Sundaravalli,AS.Kamalakaretal.
2. English Grammar in use.RaymondMurphy.Cambridge University Press.
3. Practical English Usage by Michael Swan20

MEDICAL ETHICS

Total teaching hours:10

Unit1.Introduction to medical ethics

- What's special about medicine?
- What's special about medical ethics?
- Who decides what is ethical?
- Does medical ethics change?
- Does medical ethics differ from one country to another?
- The role of the WMA
- How does the WMA decide what is ethical?
- How do individuals decide what is ethical?

Unit2.Major principles of medical ethics.Uni t

3. Perspective of medical ethics

- The Hippocratic-oath
- The Declaration of Helsinki
- The WHO Declaration of Geneva,International code of Medical Ethics(1993)
- Medical Council of India Code of Ethics(2002)

Unit4.Ethics of the individual

- The rights of the patient
- Truth and confidentiality
- The concept of disease,health and healing
- The right to health and responsibilities of individuals

Unit5.The ethics of human life

- Beginning-of-lifeissues
- Prenatal sex determination
- The family and society in medical ethics
- Euthanasia, cancer and terminal care. Death and dying. Use of life-support systems, the right to die with dignity
- Suicide–the ethical out look.
- Communication and consent,
- Decision-making for in competent patients
- Confidentiality

Unit6.Ethics in relation to society, colleagues and research

- Contract and confidentiality,malpractice and negligence
- Increasing the awareness and knowledge of students of the value dimensions of interactions with the patients, colleagues, relations and public.
- Dualloyalty,Resource allocation.
- Professional Ethics. Respect and equal treatment
- Relationships with physician colleagues,teachers and students.Relationships with other health professionals. Cooperation. Conflict resolution
- Reporting unsafe or unethical practices.
- Duties and responsibilities of the technologists.

BASIC ANATOMY

(Including Histology)

Total Teaching hours: 50

Unit1. Human Body as a whole

Definition of anatomy, List the sub-divisions of anatomy, Anatomical terms of location and position of various parts and organs in the human body, Fundamental planes of the body, Levels of organization of human body, Structure of cell, Basic Tissues of the body - classification and preparation of tissue for observation under microscope – describe properties of various basic tissues of the body with examples–Epithelial tissue,connective tissue, muscular tissue, nervous tissue along with illustrations of histological slides of basic tissues.

Unit2. Locomotor System

Classification of different types and description of different parts of bones, Identification of major bones and their parts, Classification of various types of joints, Understanding blood supply of a long bone, Description of a synovial joint, Classification of different types of synovial joints with type of movements and examples and Classification different types of muscles.Names of muscles as functional groups, Important muscles in the body- Trapezius, Deltoid, Pectoralis major, Gluteus maximus, Hamstring muscles, Soleus, sternocleidomastoid, oblique muscles of abdomen, muscles of tongue, scapular muscles, Description of Axilla, cubital fossa, popliteal fossa, Triangles of neck, Flexor and Extensor Retinaculum, Palmar and Plantar Aponeurosis.Description of Articular surface, Ligaments, Relations, Blood supply, Nerve supply, Movements and Clinical Anatomy of Shoulder joint, Elbow Joint, Wrist joint,1stcarpo-metacarpaljoint, Hip Joint, Knee Joint, Ankle Joint along with Illustrations- major bones, important muscles, and joints.

Unit3. Nervous System

Description of the parts of nervous system, Structure of nervous tissue, Spinal cord - coverings, extent, general features, sub-divisions, structural organization of grey matter and white matter, Blood supply, Formation of tracts–Posterior column, pathway, pyramidal tract and their clinical importance,Injuries to spinal cord,Brainstem–components,Blood supply, important functional components and effect of their injury, Cerebellum – location, parts, functional subdivisions, connections, blood supply and functional importance, Cerebrum – surfaces, poles, lobes, blood supply, sulci, gyri and important functional areas and

Their Clinical importance,Thalamus,hypothalamus,basalganglia,corpus striatum,

hippocampus and amygdala – their location and function, Cranial nerves – names, location of nucleus and the functional components, Spinal nerves – Course of a typical spinal nerve, Formation of plexuses – brachial, lumbar – important nerves of upper limb, lower limb with Illustrations– Brain, spinal cord and their sections.

Unit4. Circulatory System

Description of circulatory system.Pulmonary, portal and systemic circulations.Structure of cardiac muscle,blood vessels.Thoracic cavity–Bony cage,muscles–intercostal muscles,diaphragm. Mediastinum – sub-divisions, contents. Heart - coverings, external features,chambers,blood supply,nerve supply.Major arteries of upper limb,lower limb,head and neck,abdomen and pelvis.Important veins–superior and inferior venacava,portal vein, veins of upper limb and lower limb-varicose veins and their importance.

Lymphatic system– components, Describe in brief anatomy and microscopic structure of lymphoid organs – lymphnode, tonsil, thymus, spleen, thoracic duct with Illustrations -thoracic cavity, mediastinum, heart, major vessels, lymphoid organs.

Unit5. Respiratory System

Describe the parts of respiratory system. Nasal cavity, para nasal air sinuses, nasal septum, lateral wall of nose. Pharynx – extent, sub-divisions, muscles. Larynx – cartilages, muscles, parts, nerve supply. Trachea and bronchial tree – extent, measurements, histological structure of trachea – subdivisions of bronchial tree–broncho-pulmonary segments and their clinical importance. Pleura – types, reflections, recesses. Lung – location, relations, lobes, fissures, surfaces. Illustrations – Cut section of head & neck, trachea, lungs.

Unit6. Digestive System

Describe the abdomen – quadrants, musculature of wall, Formation inguinal canal, rectus sheath and their importance. Components of digestive system.Mouth - Tongue, palate – Structure of tongue.Salivary glands – parotid, sub-mandibular – Brief anatomy and structure.

Stomach – position, parts, blood supply, nerve supply, lymphatic drainage, relations, structure. Small intestine – sub-divisions, microscopic structure.Large intestine in general-sub- divisions,microscopic structure.Specific-caecum and appendix.

Accessory organs of digestive system–Liver, pancreas, extra hepatic biliary apparatus-Gross features, relations, blood supply, microscopic structure. Illustrations of abdominal wall, inguinal canal, various organs of digestive system.

Unit7. Excretory and Reproductive Systems

Describe the parts of excretory system. Kidney – Gross anatomy and microscopic structure. Ureter, urinary bladder and urethra – gross anatomy in brief.Male reproductive system – parts – external genitalia – Testis and duct system in detail. Female reproductive system - parts – external genitalia – Ovaries and duct system in detail. Accessory organs of reproduction – prostate gland, mammary gland- gross anatomy and their structure. Illustrations – urinarysystem, reproductive systemof male and female.

Unit8. Endocrine System

List the endocrine glands and their location. Thyroid and parathyroid glands – location, relations, blood supply, functions, clinical importance. Pituitary gland – location, parts, relations, blood supply, functions, clinical importance. Supra renal gland - location, parts, relations, blood supply, functions, clinical importance -Illustrations – Demonstration of Thyroid, Pituitary, supra renal glands.

Recommended text books

1. B.D.Chaurasia–GeneralAnatomy.

ReferenceBooks

1. P RRanganath, SuruchiSinghal, LeelavathyN, VaniVijayRao, Roopa R- Basics in Human Anatomy For BSc paramedical Courses, Jaypee publishers.

General Slides:

1. Hyaline Cartilage
2. Fibro Cartilage
3. Elastic Cartilage
4. T.S &L.S.Bone
5. Blood Vessels
6. Tonsils
7. Spleen
8. Thymus
9. Lymphnode
10. Epithelial Tissue
11. Skeletal and Cardiac Muscle-Excluded
12. Peripheral nerve and optic nerve-Excluded

II.Systemic Slides:

1. G.I.T –Fundamental structure of G.I.T.& Liver,Stomach,Small intestine
2. R.S.-Lung, Trachea
3. Kidney
4. Endocrines -Pituitary,Thyroid and Parathyroid
   - Adrenal
   - Pancreas.
5. Reproductive System:Ovary,Testis
   Uterus-Excluded,

PHYSIOLOGY

Total Teaching hours: 50

Unit1. General Physiology

The structure and function of cell, Cell structure and functions, Transport across membranes, Body water and bloody fluids.

Unit2. Blood and Body Fluids

Composition and functions of blood, Plasma proteins, Erythrocytes – morphology and functions, Platelets-morphology and functions, Blood groups, Coagulation of blood, the immune system.

Unit3. Nerve Muscle Physiology

Nerve structure and function, classification of nerve fibres, Mechanism of impulse formation and conduction. Muscles-classification, structure, Neuro-muscular junction, Muscle contraction– mechanism, types.

Unit4. Digestive System

Physiological anatomy of gastrointestinal tract, physiology of salivary secretion, mouth and esophagus, the stomach, pancreas, liver and gall bladder, small intestine, large intestine, digestion and absorption. GIT hormones.

Unit5. Cardiovascular system

Physiological anatomy of the heart, properties of the cardiac muscle, cardiac cycle, Electrocardiogram, principles of circulation Heart rate, arterial pressure, cardiac output, cardiovascular regulatory mechanisms, regional circulation. Effect of exercise on CVS & respiration.

Unit6. Skin

Structure of sweat glands;temperature regulation.

Unit7. Excretory System

Physiological anatomy of the kidney mechanism of formation of urine, renal clearance, counter current mechanism, regulation of volume and concentration of the body fluids, physiology of micturition, kidney function tests.

Unit8. Endocrine System

Posterior pituitary hormones and their actions, Hypo thalamohypophyseal inter relationship, Diabetes Insipidus.Anterior pituitary hormones and their functions.Dwarfism, giganitism, acromegaly.Thyroid hormones, biosynthesis and functions.Cretinism, Myxoedema, Goiter and Grave’s disease.Parathyroid hormones, functions, tetany.Insulin, glucagon actions and diabetes mellitus.Adrenal medullary hormones and their actions.Adrenal cortex hormones and their functions.

Unit9. Reproductive System

Male reproductive organs spermatogenesis and testosterone actions.Female reproductive organs- menstrual cycle,ovarian,uterine.Cervical,vaginal and breast changes,hormonal control.Contraceptive methods of couple (rhythm method).Male and female contraceptive methods.

Unit10. Respiratory System

Structure of upper and lower respiratory tract.Muscles of respiration and mechanism of Respiration. Lung volumes and capacities – definitions, normal values intra pulmonary and intra pleural pressures,surfactants Oxygen transport,Carbon dioxide transport.Nervous and chemical regulation of respiration Hypoxia, cyanosis and artificial respiration.

Unit11. NervousSystem

Structure of neurons.Properties of neurons (excitation and conduction).Synapses and synaptic transmission, reflexes and properties of reflexes.Sensory endings and sensory mechanisms Spinal cord-pathways in the spinal cord.Brain stem, thalamus, basal ganglia, cerebellum, cortex and reticular formation.Cerebrospinal fluid.Control of posture and control of voluntary motor activity Autonomic nervous system.

Unit12. Special Senses

Vision,Audition,olfaction, gustation and vestibular apparatus.

Recommended text book

1. Basics of Medical Physiology By Dr.D.Venkatesh.

Reference Books

1. Text book of Human Physiology Dr. D.Venkatesh.
2. Text book of physiology Prof A K Jain.

BIOCHEMISTRY

Unit1. H+, Acids, Bases, Buffers

Equilibrium constant, dissociation of water, H+ concentration, pH, acids-strong and weak, bases, titration behaviour, Henderson-Hesselbach equation, buffers, pH measurement, physiological buffers.

Unit2. Membrane and Cell

Organelles, functions, membrane structure, transport across membranes, ionophores, membrane proteins, transporters.

Unit3. Chemistry of Carbohydrates

Classification, important monosaccharides, stereoisomerism, anomerism.Reaction with acids, amines, oxidizing agents, reducing agents.Osazones, Disaccharides, polysaccharides.

Unit4. Chemistry of lipids

Definition, classification, nature of fatty acids, triacyl glycerol, saponification and iodine number, rancidity, antioxidants, complex lipids, steroids.energitics, Lipolysis.

Unit 5. Chemistry of aminoacids,peptides, proteins

Structure of 20 amino acids, grouping isomerism, charge properties, ninhydrin reaction, peptide bond, examples of peptides, Proteins –classification, Structure-primary, secondary, tertiary and quaternary forms, denaturation.

Unit6. Chemistry of Nucleic Acids including protein synthesis

History, bases, nucleosides, nucleotides.DNA and gene.Types of RNAs, Nucleotides co enzymes.

Unit7. Haemoglobin Structure and functions of haemoglobin,Hb derivatives,degradation of Hb,Jaundice, Haemoglobinopathies.

Unit8. Enzymes

History, catalyst, classification, efficiency, specificity, basic

Account of mechanism of action.Factors affecting enzyme activity.Units of measurement,Inhibitors– competitive,

noncompetitive, examples. Coenzymes, proenzymes, isoenzymes, Clinical enzymology, normal values.

Unit9. Vitamins

History, Vitamins A, D, E and K. B-complex vitamins – thiamine, riboflavin, niacin, pyridoxine, folic acid,pantothenic acid,biotin,B-12,Vitamin C.Brief account of chemistry, source, requirements, deficiency diseases, biochemical functions, Hypervitaminosis.

Unit10. Mineral metabolism

Bulk and trace elements. Sodium, potassium, Calcium, Phosphorous, Iron.Brief account of iodine, magnesium, copper, zinc, fluoride, manganese, selenium and molybdenum.

Unit11. Energy Metabolism

Calorimetry, basal metabolism, specific dynamic action, energy requirements under different conditions.Hormonal influence.

Unit12. Nutrition

Distribution of energy in dietary factors, Nitrogen balance, Protein quality, Kwashiorkar and Marasmus. Protein supplementation, Recommended dietary allowance and diet planning.

Unit13. Immunology:

Innate & acquired immunity, humoral & cell mediated immunity,antigen&antibodies.

Recommended text book

Biochemistry by U.Sathyanarayana.

Reference Books

1. Text book of Biochemistry for Medical students by D.M.Vasu devan.
2. Textbook of Biochemistry for Medical students by Dr. MD.Rafi.

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	6 out of 8	5	30
Brief answers	10 out of 10	3	30
Total			80

PATHOLOGY

Unit 1. Introduction

Concept of diseases,classification of lesions

Unit 2. Bacterial,viral and parasitic infections A general outline

Unit 3. Inflammation and repair

Unit 4. Degeneration,necrosis and gangrene

Unit 5. Haemorrhage,shock,embolism and thrombosis.

Unit 6. Tuberculosis

Unit 7.Leprosy and Typhoid.

Unit 8. Deficiency diseases

Unit 9. Tumors–Terminologies,Nomenclature.Differences between benign and malignant tumors

Unit 10. Tumors–Etiology,pathogenesis and spread of tumors

Unit 11. Anaemias

Unit 12. Coronary Heart Disease (Ischaemic Heart Disease) to include atherosclerosis

Unit 13. Congenital and Valvular Heart Diseases

Unit 14. Bone and Joints–Autoimmune diseases,septic arthritis,osteomyelitis.

Unit 15. Rheumatoid Arthritis

Unit 16. Diseases of the Kidney

Unit 17. Diseases of other parts of the Urinary System

Unit 18. Central Nervous System.CNS infections and Neurologic disorder

Unit 19. Diseases of muscle including poliomyelitis, myopathies

Unit 20. Diseases of Esophagus,Stomach and Intestine

Unit 21. Diseases of Liver and Pancreas.

Recommended text book

1. Text book of pathology by Harsh Mohan.

Reference Books

1. Practical Haematology by Dacie & Lewi"s.
2. Haematology practice by Dr.Tejendra Singh.
3. Histopathology Techniques by Bancraft.
4. Clinical Diagnosis and laboratory methods by Todd & Sanfort.

PATTERN OF THEORY EXAMINATION

Theory Duration: 3 hours

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	6 out of 8	5	30
Brief answers	10 out of 10	3	30
Total			80

MICROBIOLOGY

Unit 1. Introduction and History of microbiology.

Unit 2. Classification, shape and arrangements of micro-organisms, special characteristics, spores, capsules, enzymes, motility and reproduction.

Unit 3. Disinfection and antiseptics**.**

Unit 4. Sterilization and asepsis**.**

Unit 5. Anti-bacterial agents. Fundamental aspects and susceptibility tests.

Unit 6. Infection.Sources of infection,portals of entry and spread of infection.

Unit 7. Non-specific immunity. Immunity–natural and acquired;Immunisation schedule.

Unit 8. Allergy and Hypersensitivity.

Unit 9. Outline of common pathogenic bacteria, diseases produced by them, treatment and Prevention.Respiratory tract infections, meningitis, enteric infections, anaerobic infections, urinary tract infections, leprosy, TB and miscellaneous infections, wound infections, sexually transmitted infections, hospital acquired infections.

Unit 10. Pathogenic Yeasts and Fungi.

Unit 11.Virology. Viral infections with special mention of hepatitis,poliomyelitis,HIV and rabies,FLU (Influenza), Dengue, Chikungunya.

Unit 12. Basic Parasitology.

Recommended text books

1. Ananthanarayana Paniker Text book of Microbiology.

Reference books

1. S C Parija,Text book of parasitology.
2. Monika Ches brow Distric laboratory practice in Tropical countries II volume.
3. Baveja Medical Paracytology.

RADIOLOGY & IMAGING TECHNOLOGY SECOND YEAR

OBJECTIVES OF THE COURSE

- Provide the profession and community with trained qualified technologist.
- Provide education in a comprehensive program that promotes problem solving, critical thinking and communication skills in the clinical environment.
- Students will demonstrate quality patient care skills including professionalism and ethical behaviours as specified in the code of ethics.
- Graduate students with specific skills necessary to be competententry level.

TEACHING HOURS & EXAMINATION PATTERN

2nd Year

Paper No	Paper	Teaching hours		Examination				
		Theory	Practicals	UE TheoryMin Pass(50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)		TotalMinPass (50%)
						Theory	Practical	
1	DiagnosticRadiography & Physics Radiation hazards & patient safety	60	140	80	80	20	20	400
2	Image processing techniques & equipment	60	140	80		20		
3	Radiographic anatomy-Positioning & Special radiographic procedures	60	140	80		20		
	Total	180	420	240	80	60	20	

SECOND YEAR SYLLABUS

Total Teaching hours 600

PAPER-1

DIAGNOSTIC RADIOGRAPHY & PHYSICS - RADIATION HAZARDS & PATIENT SAFETY

Total teaching hours 200.

Theory:

Fundamental Concepts of Radiologic Science

- Matter and Energy
- Sources of Ionizing Radiation
- Discovery of X-Rays
- Development of Medical Imaging
- Reports of Radiation Injury
- Basic Radiation Protection: Filtration, Collimation, Protective Apparel, Gonadal Shielding, Protective Barriers
- Standard Units of Measurement: Length, Mass, Time, Units
- Mechanics: Velocity, Acceleration, Newton's Laws of Motion, Weight, Momentum, Work, Power, Energy,

Heat Terminology for Radiologic Science: Numeric Prefixes, Radiologic Units

j. The Medical Imaging Team

2. **The Structure of Matter**

a. Fundamental Particles

b. Atomic Structure

c. Electron Arrangement

d. Electron Binding Energy

e. Atomic Nomenclature

f. Combinations of Atoms

g. Radioactivity

h. Radioisotopes

i. Radioactive Half-life

j. Types of Ionizing Radiation

k. Particulate Radiation

l. Electromagnetic Radiation

3. **Electromagnetic Energy**

a. Photons
  i. Velocity and Amplitude
  ii. Frequency and Wavelength

b. Electromagnetic Spectrum
  i. Measurement of the Electromagnetic Spectrum
  ii. Visible Light
  iii. Radio frequency
  iv. Ionizing Radiation

c. Waves and Particles
  i. Wave Model: Visible Light
  ii. Inverse Square Law
  iii. Particle Model: Quantum Theory

d. Matter and Energy

4. Electricity, Magnetism, and Electromagnetism

a. Electrostatics
  i. Electrostatic Laws
  ii. Electric Potential

b. Electrodynamics
  i. Electric Circuits
  ii. Electric Power

c. Magnetism
  i. Magnetic Laws
  ii. Magnetic Induction

d. Electromagnetism
  i. Electromagnetic Induction
  ii. Electromechanical Devices
  iii. The Transformer

5. **The X-ray Imaging System**

a. X-ray Generators:
Transformer and laws of Transformers Rectification

Typesof generators
Exposure timers and exposure switches

b. Auto transformer

i. Adjustment of Kilo volt Peak (kVp)
ii. Control of Milli amperage (mA)
iii. Filament Transformer

c. Exposure Timers

i. Synchronous Timers
ii. Electronic Timers
iii. mAs Timers
iv. Automatic Exposure Control

d. High-Voltage Generator

i. High-Voltage Transformer
ii. Voltage Rectification
iii. Single-Phase Power
iv. Three-Phase Power
v. High-Frequency Generator
vi. Capacitor Discharge Generator
vii. Falling Load Generator
viii. Voltage Ripple
ix. Power Rating
x. X-ray Circuit

Introduction to Production of X-rays:

Electromagnetic spectrum
units of Radiation
X-ray Tube
Design
Types of X-ray Tubes
Line focus principle
Heel effect,
Tube rating,
Characteristic & Bremstrrah lung radiation, mAs& KV.

Attenuation, Filtration and X-ray beam Restrictors: Definition of Attenuation, factors affecting attenuation, Definition of filtration and types of filtration, Types of X-ray beam restrictors and their importance.

Grids: Grid construction, Grid ratio, uses of Grids, Types of Grids, Grid performance, Grid cut off, Air gap Technique, Grid cassettes.

Interaction of Radiation with matter:

Narrow Beam and Broad Beam - Exponential Attenuation of X and Gamma Rays in medium – X-rays transmission through the medium - HVT and TVT - linear and mass attenuation coefficient - Total Attenuation Coefficient –

Rayleigh Scattering - Photo Nuclear Reaction – Elastic Nuclear Scattering – Nuclear Resonance Scattering - Auger Electrons – Photoelectric Interaction – Coherent Scattering – Thompson Scattering – Compton Scattering – Ionization of matter, Energy absorbed from X-rays, X-rays scattering - Pair production - Positron Annihilation – Triplet production - Interaction of Neutron with matter – Resonance absorption – Neutron scattering – Reaction with fast neutron - In-elastic scattering – Elastic scattering - Interaction of charged particles with matter

Radiation Quantities and Units:

SI system — Stochastic and Non Stochastic quantities – Particle Number - Radiant Energy – Flux - Energy Flux – Fluence - Energy Fluence – Fluence Rate - Energy Fluence Rate Cross Section – Mass Attenuation Coefficient – Mass Energy Transfer Coefficient – Mass Stopping power - Dosimetry – Conversion of Energy – KERMA – KERMA rate – Exposure – Exposure Rate – CEMA – CEMA Rate – Energy - Deposition of Energy – Energy Imparted – Linear Energy – Specific Energy – Absorbed Dose – Absorbed Dose Rate - Physical Quantities – Protection Quantities – Operational Quantities – Equivalent Dose – Effective Dose – Weighting factor – ICRU Sphere Phantom.

Measurement of Radiation:

Ionization of Gases -Fluorescence and Phosphorescence – Effect on Photographic Emulsion – Free air Ion chamber - Ionization chambers – Proportional counter - G.M. counters - Scintillation detectors – Semiconductor diode detectors – Neutron detectors - Pocket dosimeters - TL Dosimeters and their use in personnel monitoring badges – Advantages and disadvantages of various detectors - appropriateness of different types of detectors for different types of radiation measurement. Principle of Radiation Detectors - General properties of Radiation detectors – Zone monitor – Teletector – Contamination Monitor - Personnel monitoring devices – Film and TLD badges. In vivo – Direct patient dosimeter (DPD) - TLD, Diodes, MOSFET

Radiation Hazards & Protection:

Radiation, Types, Units, Effects, Preventive Measures, Personal Monitoring, Protective Barriers, Devices, Statutory Bodies -National&International laws.

1. Radiation Hazard Evaluation and Control
2. Biological Effects of radiation
3. Radiation Emergency Preparedness
4. Regulatory requirements
5. Quality Assurance
6. Maintenance and care of equipment:

Records relating to the Patients and Departmental statistics and Medicolegal aspects

Text books recommended (Latest edition):

VIII. The Physics of Radiology and Imaging. K Thayalan
IX. Radiologic Science for Technologists - Bushong
X. Christensen's Physics of Diagnostic Radiology – Thomas S curry, James E. Dowdey, Robert C. Murry
XI. The Physics of Radiology Harold Elford Johns &Jonh Robert Cunningham.

XII. The Physics of Radiation Therapy Faiz M. Khan.
XIII. Radiation Oncology physics A Handbook for Teachers and Students – E.B. Podgorsak.
XIV. ICRU report 83
XV. Radiation Detection and measurement – Glenn F. Knoll.
XVI. Radiation Dosimetry – H.E.Johns
XVII. Atomic Nucleus – M. Korsunsky
XVIII. Radiological physics – M.E.J. Young.
XIX. Text book of physics applied to Radiotherapy and Radio-diagnosis – Massey and Meredith.
XX. Radiation Dosimetry –Hine & Brownell
XXI. Radiation Dosimetry - Attix F. H. and Roesch. W. C.

PAPER-2

IMAGE PROCESSING TECHNIQUES & EQUIPMENTS
(Total teaching hours 100)

Theory :

Image processing techniques:

- **Film-screen radiography**
  - Dark room planning
  - Dark room – safelight, pass box, dry and wet side
  - Luminescent Screens
  - X-Ray Cassette
  - X-Ray Film - film structure and film technology,film type ,size and packing , other types of films handling of X-ray film
    - Physical characteristics of X-ray film
    - Film processing
    - Automatic film processor
    - Photographic characteristics of X-ray film – photographic density and characteristic curve
    - Speed, Latitude, Emulsion Absorption
    - Film defects and their possible causes

- **Digital Radiography**
  - Cassette-Based Equipment - The Computed Radiography Cassette, Imaging Plate, and Reader
  - **CR** Cassette-Based Image Acquisition
  - **DR** - Cassetteless Equipment and Image Acquisition
  - Digital Radio graphic Image Processing and Manipulation
  - Total Quality Management of CR and DR Systems

- **PACS**
  - Basic Computer Principles
  - Networking and Communication Basics
  - PACS Fundamentals
  - PACS Archiving
  - Digitizing, Printing, and Burning
  - Quality Control and Quality
  - Management h. Ensuring Quality in PACS

- **Mammography**

Principles of mammography
Anatomy
Mammography equipment
Magnification mammography Digital
mammography Stereotactic Biopsy
system Breast Tomosynthesis
Digital Tomosynthesis

- **Flouroscopy**

  Image Intensification Fluoroscopy: Design and Principle of operation of fluoroscopy Direct vision fluoroscopy & Image intensifier
  Digital fluoroscopy
  Recording the Fluoroscopic Image.

- **Other equipments & Techniques**

  Conventional tomographic equipment Mass miniature radiography Macro radiography
  Bone densitometry- DEXA

Reference books:

- D.N. Chesney & M.O Chesney: radiographic imaging (CBS)
- I.C.R.P.: Protection of the patient in medical radiography (Bergaman)
- Derrick p. Roberts &nigel l. Smith: radiographic imaging a practical approach (Churchill living stone)
- Stewart c. Buchong: radiological science (workbook and laboratory manual)
- Kodak: fundamentals of radiographic photography books 1,2,3,4,5 (kodak ltd.)
- Seeman &herman: physical and photography principles of medical radiography (Wiley)
- Hford: Manual of photography Bouth worth & bently: elementary photogenic chemistry

(pitmans) 8 . The Physics of Radiology and Imaging. K Thayalan

- Radiologic Science for Technologists – Bushong
- Mammo graphic Imaging,Book by Shelly Lillé and Wendy Marshall.

PAPER-3

RADIOGRAPHIC ANATOMY– POSTIONING & SPECIAL RADIOGRAPHIC PROCEDURES

(Total teaching hours 100)

Theory:

- **General Anatomy and Radio graphic Positioning Terminology**

- **Upper Extremity and Shoulder Girdle**
  - Anatomy
  - Radiography
    - Hand, Fingers, and Thumb
    - Wrist
    - Forearm
    - Elbow
    - Humerus
    - Shoulder
- **Lower Extremity and Pelvis**
  - Anatomy
  - Radiography
    - Foot and Toes
    - Ankle
    - Lower Leg
    - Knee
    - Femur
    - Pelvis
    - Hip joints
- **Vertebral Column**
  - Anatomy
  - Radiography
    - Cervical Spine
    - Thoracic Spine
    - Lumbar Spine
    - Sacrum
    - Coccyx

- **Head and Neck**
  - Anatomy
  - Radiography

x. Skull
xi. Cranium
xii. Orbits
xiii. Facial Bones, Zygomatic Arches, and Nasal Bones
xiv. Mandible and Temporomandibular Joints (TMJs)
xv. Paranasal Sinuses
xvi. Soft Tissue Neck
xvii. sella

xviii. temporal bone
xix. mastoid
xx. optic foramen
xxi. Internal auditorycanal
xxii. Superior and inferior orbital fissure
xxiii. Base of skull
xxiv. petrous apex

- **Respiratory System**
  - Anatomy
  - Radiography
    - Introduction
    - Chest; PA, Lateral, and Obliques
    - Chest; Axial and Decubitus
    - Airway
    - Terminology and Pathology

- **Sternum and Sternoclavicular Joints**

- **Digestive System**
  - Anatomy
  - Radiography
    - Introduction
    - Patient Preparation
    - Abdomen
    - Terminology and Pathology

- **Urinary System**
  - Anatomy
  - Radiography
    - Introduction
    - Patient Preparation and
    - Procedure
    - Types of Examinations
    - KUB
    - Terminology and Pathology

- **Paediatric Imaging:**

3. special needs of patient and radiographer-
4. use of dedicated equipment and accessories
5. Modified technical considerations
6. selection of exposure factors
7. Image quality considerations
8. Radiation protection of the patient
9. special techniques in children for contrast studies.

3. **Geriatric radiography**

- **Mobile Radiography**
    - Principles
    - Machines
    - Technical considerations
    - Radiation safety
    - Isolation
    - Performing examinations – general points
        - Chest
        - Abdomen
        - Femur
        - Cervical spine
        - Neonate- chest and abdomen
- **Surgical Radiography**
    - Surgical team
    - Proper Surgical attire
    - Operating room attire
    - The Operating room
    - **Equipment – C-arm**
    - **Cleaning of equipment**
    - Fluoroscopic procedures

- **Dental Radiography**
    - Dental X-ray equipment
    - Dental X-Ray Film
    - Infection Control and the Dental Radiographer
    - Introduction to Dental Imaging

      Examination OPG
        - Paralleling Technique
        - Bisecting Technique
        - Bite-Wing Technique
        - Exposure and Technique Errors
        - Occlusal and Localization Techniques
        - Panoramic Imaging
        - Extraoral Imaging

- **Foreign Body Localization**

RADIOGRAPHIC SPECIAL

PROCEDURES

V. **Introduction to the subject**

1. Diagnostic procedures
2. Therapeutic procedures

Lecture Discussion Presentation

VI. **Contrast media**

1. Definition
2. Classification
3. Chemistry
4. Physiology
5. Toxicity
6. Treatment- emergency drugs

Urinary system:

Intra venous Urogram (IVU/IVP)

7. Anatomy of urinary system
8. Indications Contra indications & Risk factors
9. Contrast media, Preparation, procedure
10. Filming technique
11. IVU in children
12. Special views & modifications of Urogram
13. Nephrotomogram
14. Complications & after care

VII. **Retrograde pyeloureterography**

1. Indications & contraindications
2. Procedure & filming
3. Complications & after care

VIII. **Micturating Cystourethrogram (MCU)**

1. Anatomy of lower urinary tract
2. Indications & contraindications
3. Preparation, Procedure & filming
4. Complications
5. Other techniques

IX. **Ascending Cystourethrogram (ASU)**

1. Indications & contraindications
2. Preparation, technique, procedure
3. Filming
4. Complications & after care

Central Nervous system:

X. **Myelogram**

1. Anatomy of spinal cord
2. Definition, indication & contraindication
3. Preparation requirements & contrast media
4. Lumbar, cisternal & lateral cervical puncture
5. CT myelogram

Special Investigations in G.I. Tract

XI. Contrast media in GIT

1. Introduction
2. Properties of an ideal barium preparation
3. Advantages of barium sulphate preparation
4. Manufacture
5. Characteristics influencing coating
6. Adverse effects
7. Other contrast media used

XII. Barium swallow

1. Anatomy of upper GI tract
2. Indications & contraindications
3. Contrast
4. Procedure and techniques
5. Specific conditions
6. Complications

XIII. Barium meal

1. Anatomy of stomach
2. Indications & contraindications
3. Preparation
4. Contrast media
5. Standard views
6. Conventional single contrast study
7. Double contrast barium study
8. Biphasic study of upper GIT
9. Hypotonic duodenography
10. After care & complications

XIV. BMFT

1. Anatomy of GI tract
2. Indications & contraindication
3. Contrast medium
4. Patient preparation
5. Small bowel follow through
6. Dedicated small bowel follow through
7. Peroral pneumocolon
8. Retrograde small bowel examination
9. Advantages, disadvantages & complications

XV. Enteroclysis

1. Anatomy of small bowel
2. Indication contraindication
3. Equipment, contrast medium
4. Preparation
5. Techniques
6. Single contrast study
7. Double contrast study
8. Air D C enteroclysis
9. Comparison
10. Advantages, disadvantages & after care

XVI. Barium enema

Anatomy of large bowel Definition, indication, contraindication Contrast Preparation and positioning DCBE, SCBE Special barium enema studies Aftercare & complications

XVII. Hepatobiliary system:

Oralcholy - cystography, Pre & Post-operative(T-Tube) Cholangiography ERCP.

Female Genital Tract :

XVIII. HSG

Anatomy of female reproductive system Definition, indication and contraindication Equipments, procedures & techniques After care & complications

XIX. Vaginography

17. **Gynaecography .**

18 .FTR (Fallopian tube recanalisation) Definition, indication and contraindication Instrumentation Timing of the study, patient preparation Technique and filming Other methods Post procedure follow up and complications

Male Genital Tract:

- Vasography,
- Seminal vesiculography,

Respiratory system:

- Bronchography

Others:

- **Sialography**
  - Anatomy of salivary glands
  - Definition, indication & contraindication
  - Equipments
  - Preparation of the patient
  - Procedure & filming

- **Dacrocystography**
  - Anatomy of nasolacrimal duct
  - Definition, indications & contraindication
  - Materials and techniques
  - Complications & after care
  - Other techniques

- **Joints**:

Knee Arthorgraphy, Hip Arthrography Shoulder Arthrography.

- **Catheters**
  - Classification
  - Catheters used for different studies
  - Sterilization of catheters
  - Balloon angioplasty catheters

Reference Books:

- R.F. Fatr& P.J. Ahisy: Physics for Medical Imaging (Saunders)
- D.N. Chesney & M.O. Chesney: X-Ray Equipment for Student Radiographers (CBS)
- Christensen, Curry & Dowdey: An Introduction of Physics to Diagnostic Radiography (Lea & Febiger)
- Cullinan: Illustrated Guide Techniques (Blackwell)
- Bruce W. Long, Jeannean Hall Rollins, Barbara J. Smith - Merrill's Atlas of Radiographic Positioning and Procedures.
- Dental Radiography: Principles and Techniques. Joen M. Iannucci
- Anita Biedrzycki - Radiography Procedure and Competency Manual-F.A. Davis Company
- Philip W. Ballinger: Atlas of radiographic positioning and Radiological Procedures.
- RA Swallow, E Naylor: Clark's positioning in Radiography. EJ Roebuck, AS Whitley
- Dental Radiography: Principles and Techniques. Joen M. Iannucci,
- Radiologic procedures– AGuidelines, 2019–BhushanNLakhkar

PRACTICALS SYLLABUS FOR SECOND YEAR

- Radiographic Anatomy
- Radiographic positioning and Procedures.
- Personnel Monitoring Services – TLD
- Radiation Measuring Instruments
- Ionization Chambers and Dosimeters
- Perfuming radiography of axial and appendicular skeleton, head and neck, respiratory system, digestive system, urinary system etc.
- Facility Preparation and Efficient use of available radiographic equipment
- Patient preparation and communication, including radiation safety instruction
- Assessment of Radiographic Image Quality
- Identification of anatomical landmarks in acquired images

THIRD YEAR

TEACHING HOURS & EXAMINATION PATTERN

Paper No	Paper	Teaching hours		Examination				
		Theory	Practicals	UE Theory MinPass (50%)	UE Practicals Min Pass (50%)	Internal Assessment Min Pass (50%)		Total Min Pass (50 %)
						Theory	Practical	
1	Advance Imaging Technology-I Computed Tomography (CT) DSA	6 0	140	80	80	20	20	400
2	Advance Imaging Technology-II (Basics of MRI, MR Physics & various procedures, protocols & safety	60	140	80		20		
3	Advance Imaging Technology– III ,Ultrasound, Color Doppler Nuclear Medicine	60	140	80		20		
	Total	180	420	240	80	60	20	

UE:UniversityExam***Practicals includes long & short cases, Orals, Spotters & Record***

THIRD YEAR SYLLABUS

Total teaching hours 300

PAPER-1

ADVANCE IMAGING TECHNOLOGY I (CT&DSA) ***Total teaching hours 100***

- Introduction to computed Tomography & Clinical applications.
- Various Generations in C.T.Scan.
- Hardware in CT:X-ray Tube.Collimators & Detectors. inC.T.
- C.T.Numbers(Hounsfield units) & Algorithms & windowing.
- C.T.Artefacts.

- Factors affecting CT Image Quality Basic Principles of CT
- Data Acquisition – helical, multi detector
- Image Reconstruction
- Image Display
- Methods of Data Acquisition
- Image Quality
- Quality Assurance
- Post-Processing
- Patient Communication
- Patient Preparation
- Injection Techniques
- Radiation Dosimetry in CT & dose reduction in CT
- Cross sectional anatomy
  - Neuroanatomy
  - Thoracic Anatomy
  - Abdominopelvic Anatomy
  - Musculoskeletal Anatomy

27. CT scan procedures
    a. Neurologic Imaging Procedures
    b. Thoracic Imaging Procedures
    c. Abdomen and Pelvis Imaging Procedures
    d. Musculoskeletal Imaging Procedures
    e. CT perfusion
    f. CT angiography
    g. Dual energy CT

    CT virtual colonoscopy
    3 D Reconstruction Techniques.

16. Interventional CT and CT Fluoroscopy
17. Recent Advances in CT.Scan.
18. **DSA–Technical aspects and Clinical applications.**

19. **Digital subtraction Angiography, Interventional radiology Physics**

1. Basic X-Ray Physics
2. Fluoroscopy
3. Digital fluoroscopy
4. Principles of Radiation Safety in Interventional Radiology
5. Common Equipment in Interventional Radiology, Catheters, Guides, and Introducer Sheaths
6. Seldinger Technique.

Retrograde and Antegrade Approach Through the Femoral Artery

7. Complications of Vascular Access.
8. Medications Used in Interventional Radiology

Techniques

16. Biopsy and Drainage
17. Arterial and Venous Access
18. Embolization Materials and Principles
19. Image-Guided Tumor Ablative Therapies
20. Common Interventional Radiology Procedures

Angiography

9. The Thoracic Aorta. Obtaining a Thoracic Aortogram
10. The Abdominal Aorta. Obtaining an Aortogram
11. The Pelvis. Angiographic Study
12. Lower Limbs. Angiographic Study
13. Upper Limbs.

Angiographic Study Interventional radiology

x. Thoracic Interventional Radiology
xi. Gastrointestinal Interventions
xii. Hepatobiliary and Pancreatic Interventions
xiii. Genitourinary Interventions
xiv. Peripheral Vascular Intervention
xv. Neuro interventions

PAPER-2

ADVANCE IMAGING TECHNOLOGY II -MRI

(MRI PHYSICS - VARIOUS PROCEDURES & PROTOCOLS & SAFETY)

Total teaching hours 100

20. Introduction to MRI and its Clinical applications.
21. MR Hardware: Types of magnets, Types of Coils and their usage.
22.

viii. **Basic principle**

- Introduction
- Atomic structure
- Motion within the atom
- The hydrogen nucleus, alignment
- Precession
- Larmor equation
- Resonance
- MR signal
- Free induction decay signal
- Relaxation • T1 recovery • T2 decay
- Pulse timing parameters

ix. **Encoding and image formation**

xi. Introduction
xii. Gradients
xiii. Slice selection
xiv. Frequency encoding
xv. Phase encoding
xvi. Sampling

x. **Data collection and image formation**

xi. Introduction
xii. K space
xiii. Fast fourier transformation
xiv. Matrix
xv. Scan timing
xvi. K space filling
xvii. Partial or fractional echo imaging & averaging • Pre- scan • Types of acquisition

xi. **Parameters and trade- offs**

x. Introduction

xi. Signal to Noise Ratio (SNR) & How to increase SNR

xii. Contrast to Noise Ratio (CNR)

xiii. Spatial resolution & how to increase the spatial resolution

xiv. Scan time & how to reduce time

xv. Trade-offs

xvi. Decision making

xvii. Volume imaging

5 Pulse sequences

VIII Introduction

6 **Spin echo sequences**

6. Conventional spin echo

7. Fast spin echo

8. Inversion recovery

9. STIR

10. FLAIR

xvi. Gradient echo pulse sequences

- Conventional gradient echo
- The steady state
- Coherent gradient echo
- Incoherent gradient echo
- Balance gradient echo
- SSFP
- Ultra- fast sequences EP

xvii. **Flow phenomena**

- Introduction
- The mechanisms of flow
- Time of flight phenomenon
- Entry slice phenomenon Intra- voxel dephasing

9 . Flow phenomena compensation

- Introduction
- Gradient moment rephrasing
- Pre-saturation
- Even echo rephrasing

10. Artifacts and their compensation

6. Introduction
7. Phase mis - mapping
8. Aliasing or wrap around
9. Chemical shift artifact
10. Chemical mis registration
11. Truncation artifact
12. Magnetic susceptibility artifact
13. Zipper artifact
14. Shading artifact
15. Motion of the patient Cross excitation and cross talk

11. Instrumentation and E quipment's

- Introduction
- Magnetism
- Permanent magnets
- Electromagnets
- Super conducting magnets
- Fringe fields
- Shim coils
- Gradient coils
- Radio-frequency coils
- The pulse control units
- Patient transportation system
- Operator interface

12. Vascular and cardiac imaging

- Introduction
- Conventional vascular imaging techniques
- MRA
- Perfusion and diffusion imaging
- Cardiac imaging
- Peripheral gating
- Pseudo-gating
- Multi-phase cardiac imaging
- Cine
- SPAMM

13. MR safety

- Introduction
- MRI Environment
- Safety from main magnetic field
- Safety from varying magnetic field (gradient)
- Safety from Radio frequency field
- Projectiles
- Medical emergencies
- Implants and prostheses
- Claustrophobia
- Quenching
- Safety education
- Patient monitoring
- Monitors and devices in MRI
- MRI personnel
- Safety tips

14 .Contrast agents in MRI

- Introduction
- Uses and methodology
- Review of weighting
- Mechanism of action
- Dipole - dipole interactions
- Magnetic susceptibility
- Relaxivity
- Gadolimium safety
- Feridex safety
- Current applications of contrast agents

15. Advanced imaging techniques

- Introduction
- High speed gradient system
- Developments in fast spin echo
- Developments in gradient echo

- Applications of echo planar imaging
- Spectroscopy
- Diffusion imaging
- Perfusion imaging
- Functional imaging
- Interventional MRI

16. MRI Imaging protocol

- Brain
- Neck
- Heart
- Abdomen
- Pelvis
- Extremities
- Spine

PAPER-3

ADVANCE IMAGING TECHNOLOGY III

(NUCLEAR MEDICINE AND ULTRASOUND & COLOR DOPPLER)-

Total teaching hours100

Unit 1.Ultrasound & Doppler

4. **Introduction to Ultrasound Imaging**
   - Ultrasound imaging
   - Doppler imaging
   - Basic principle
   - Advantages and disadvantages Ultrasound
   - Sound
   - Ultrasound
   - Attenuation
   - Echoes
5. **Instrumentation**
   - Knowledge of console and keys
   - CRT
   - USG probes
   - Coupling agent
   - Contrast agents used
6. **Piezoelectric effect**
   - Definition
   - Types of elements
   - Properties
   - Use
7. **Transducers**
   - Construction and operation
   - Types
   - Beams and focusing
   - Resolution Lecture Discussion Presentation
8. **USG display**
   - A mode
   - B mode
   - M mode
   - TM mode
   - Gray scale imaging
   - Time gain compensator
9. **Doppler**
   - Principle
   - Doppler effect
   - Flow

4. **Instrumentation**
    - Color Doppler
    - Continuous wave Doppler
    - Pulsed wave Doppler
5. **Artifacts**
    - Definition
    - Types
    - Causes
    - Remedies
6. **Performance and safety**
    - Performance measurement
    - Bioeffects
    - Safety
7. **Practical aspect**
    - Scanning protocols
    - Indications
    - Patient preparation
    - Positioning
    - Knowledge of all USG guided procedures
    - Equipment Maintenance in Ultrasound

8. Procedures
    1. Abdominal Ultrasound
    2. Gynaecologic Ultrasound
    3. Obstetric Ultrasound
    4. Colour Doppler Sonography in Obstetrics
    5. Chromosomal Abnormalities
    6. Ultrasound of Small Parts and Superficial Organs
    7. Neonatal Cranial Ultrasound
    8. Ultrasound-Guided Biopsy, Aspiration and Fine Needle Aspiration Cytology
    9. Ultrasonic Imaging of Neck & Neurosonogram

Unit 2.Nuclear medicine

Principle of Radioactive Isotopes and Fundamentals of Nuclear Medicin eImaging.
Elution of Technetium from Generators,Radiopharmaceutical preparation. Hotlab procedures.
Various Radiopharmaceuticals used in NuclearMedicine– Their Bio-routing in Human Body.

4. Introduction & History
5. Basic atomic & nuclear physics
    - Quantities and Units
    - Atom composition and structure
    - Nucleus composition
    - Radioactivity
    - Exponential decay
    - Parent / Daughter decay
    - Modes of Radioactive decay
6. Introduction to radio pharmaceuticals
    - Ideal features of Radio pharmaceutical
    - General principle of tracer technique
7. Radiation safety in Nuclear medicine
    - Safe handling of Radioactive
    - Storage of radioactive materials
    - Procedures for handling spills
    - Disposal of Radioactive waste
8. Gamma Camera
30. PET
31. SPECT
32. Radiation monitoring
    - Survey meters
    - Personnel dosimeters
    - Wipe testing
    - Contamination monitor
    - Isotope calibrator
    - Area monitor
    - Inventory of isotopes

5. . In vivo technique
    - Static and dynamic studies
    - Thyroid imaging

- Imaging of bone
- Respiratory system

- Urinary system
- G.I. system
- Cardiovascular system
- Iodine131 uptake studies
- Iodine 131 therapy for thyrotoxicosis and thyroid ablation

6. Basics and fundamentals PET CT.
7. PET/CT Fusion Imaging
8. Basics and fundamentals of SPECT-CT, PETMRI.

ReferenceBooks

1. Computed Tomography for Technologists A Comprehensive Text by Lois E. Romans
1. .Sriharsha Athreya (eds.) - Demystifying Interventional Radiology_ A Guide for Medical Students- Springer International Publishing
2. José J. Muñoz, Ramón Ribes (auth) - Learning Vascular and Interventional Radiology Springer-Verlag Berlin Heidelberg
3. John R. Haaga, Charles F. Lanzion, David J. Sartoris & Elias A. Aerhouni: Computerised Tomography and Magnetic Resonance Imaging of the whole Body (Vol I & II) (Saunders)
4. Vascular and Interventional Radiology: The Requisites John A. Kaufman , Michael J. Lee. Mosby.
5. DigitalSubtractionAngiography:PracticalAspects–ArinaVanBreda,BarryT.Katzen.
6. AtextbookofRadiology,BookbyDavidSutton.
7. ComputedTomographyandMagneticResonanceImagingoftheWholeBody-JohnR Haaga.
8. ThePhysicsandtechnologyforDiagnosticUltrasoundbyDr.RobertGill.
9. NuclearMedicineandPET/CTtechnologyandtechniquesKristenM. Waterstram-Rich.
10. Apracticalapproachtomodernimagingequipment -Trefler.M
11. Diagnostic Ultrasound Physics and Equipments Edited by Peter Hoskins, Kevin Martin and Abigail Thrush
12. Rajendra K. Diwakar (eds.) - Basics of Abdominal, Gynaecological, Obstetrics and Small Parts Ultrasound

PRACTICALS SYLLABUS FOR THIRD YEAR

- Advance Imaging CT , DSA and MRI Physics and Various Procedures.
- Advance Imaging Nuclear Medicine .
- Techniques,Various Procedures As per the theory and interventionalprocedures

- Computed tomography- anatomy, planning, positioning and contrast media
- Planning CT studies of the Head, body including angiograms
- Various contrast media used in CT scanning – indications, dosage, advantages & disadvantages, safety screening, injection techniques
- Assessing adequacy of acquired CT images
- Interpretation of CT anatomical landmarks in acquired images
- . Patient preparation and communication, including radiation safety instruction

PATTERN OF THEORY EXAMINATION

Type of Questions	No of questions	Marks allotted for each question	Total marks
Essays	2 out of 3	10	20
Short answers	6 out of 8	5	30
Brief answers	10 out of 10	3	30
Total			80

Theory Duration: 3 hours

PERIPHERAL POSTING

Radiography and Imaging Technology				
Academic Year	Duration	Specialty		
Second year	One week each	Orthopaedics	RICU	EMD
Third year	One week each	Paediatrics	Nuclear Medicine	Nuclear Medicine

IV Year BSc. Medical Imaging Technology INTERNSHIP

A student after having successfully completed the final year university examination is qualified to commence the Compulsory Rotatory Internship.

The completion of Internship is mandatory to enable a student to obtain the degree of Bachelor of Medical Imaging Technology.

Aims:

The internship program is designed to facilitate the transition from student hood to becoming a competent professional.

It is meant to instill in the students clinical practice skills, which would encompass the following qualities:

5. Sense of timing.

5. Work behaviors, roles and routines

6. Communication and interaction skills with patients, colleagues, supervisors & other professionals of multidisciplinary team.

- Ability to take certain independent decisions exercising their clinical judgment.

7. Ability to deal with a critical situation using analytical skills.

8. Successful completion of the internship program will facilitate the students to become competent independent Medical Imaging Technologists. Procedure:

9. After the 3rd year BSc. RIT University Examination results are declared, the candidate has to obtain no-dues clearance from various departments and sections as prescribed by the University.

10. On submission of the no dues clearance to the college office, a No Dues slip will be issued to the student.

11. The student should submit the no due slip to the Head of Medical Imaging Technology.

12. Faculty in charge will give the Clinical posting schedule & Guidelines for internship program.

Duration and Description:

The internship program is of one-year duration.

A student doing internship has to practice under supervision of experienced staff in all the modalities of radio diagnosis and imaging.

All the postings are compulsory.

B.Sc Audiology and Speech Therapy Technology

FIRST YEAR

SCHEME OF EXAMINATION

PAPER	THEORY	
1	Introduction to Human Communication	
2	Speech Language Development and Disorders	PRACTICALS
3	Introduction to Hearing and Hearing Sciences	PRACTICALS
4	Technology and Management for Persons with Hearing Impairments–I	
5	Basic Medical Sciences Related to Speech and Hearing	
6	Psychology Related to Speech and Hearing	

FIRSTYEAR–PRACTICALS

.2	Speech-Language pathology	Speech Language Development and Disorders
3	Speech-Language pathology	Introduction to Hearing and Hearing Sciences

Internal Assessment	**Marks**
Theory	20
Practical including log book	20
Total	**40**

MARKS SCHEDULE SCHEME OF EXAMINATION FIRST YEAR:

Theory Subject Title	University -theory Exam		Practical Subject Title	Practical Marks		VIVA	IA
	Max	Min		Max	Min		
Introduction to Human Communication	80	40		-	-	-	20
Speech Language Development and disorders	80	40	Speech-Language-pathology	80	40	20	20
Introduction to Hearing and Hearing Sciences	80	40	Audiology	80	40	20	20
Technology and Management for Persons with Hearing Impairments –I	80	40		-	-	-	20
Basic Medical Sciences Related to Speech and Hearing	80	40		-	-	-	20
Psychology Related to Speech and Hearing	80	40		-	-	-	20

2ND YEAR

PAPER	THEORY	
1	peech Language Diagnostic and Therapeutics Articulation and Phonological Disorders	PRACTICALS
2	Voice and Laryngectomy,Laryngeal speech	
3	DiagnosticAudiologya and Pediatric Audiology	
4	Technology and Management for Persons with Hearing Impairments-II	
5	Basic Statistics and ScientificEnquiry in Audiology and Speech Language Pathology	PRACTICALS

SECOND YEAR- PRACTICALS

1	Speech-Language pathology	Speech Language Diagnostic and Therapeutics
5	Audiology	Technology and Management For Persons with Hearing Impairments –II

MARK SCHEDULES SCHEME OF EXAMINATION SECOND YEAR

Theory Subject Title	University Theory Exam		Practical Subject Title	Practical Marks		VIVA	IA
	Max	Min		Max	Min		
Speech Language Diagnostic and Therapeutics Articulation and Phonological Disorders	80	40	Speech Language Pathology	80	40	20	20
Voice and Laryngectomy,Laryngeal speech	80	40		-	-	--	20
Diagnostic Audiologya and Pediatric Audiology	80	40		-	-	--	20
Technology and Management for Persons with Hearing Impairments-II	80	40	Audiology	80	40	20	20
Basic Statistics and Scientific Enquiry in Audiology and Speech Language Pathology	80	40		-	-	--	20

3RD YEAR

PAPER	THEORY	
1	Fluency and its Disorders	PRACTICALS
2	Neurogenic Language Disorders in Adults	
3	Motor Speech Disorders	PRACTICALS
4	Rehabilitative Audiology	PRACTICALS
5	Noise Measurements and Hearing Conservation	
6	Community Oriented Professional Practices in Speech Language Pathology and Audiology	

THIRD YEAR-PRACTICALS

1	Speech-Language pathology	Fluency and its Disorders
3		Motor Speech Disorders
4	Audiology	Rehabilitative Audiology

MARK SCHEDULES SCHEME OF EXAMINATION THIRD YEAR

Theory Subject Title	University-theory Exam		Practical Subject Title	Practical Marks		VIVA	IA
	Max	Min		Max	Min		
Fluency and its Disorders	80	40	Speech Language Pathology	80	40	20	20
Neurogenic Language Disorders in Adults	80	40		-	-	- -	20
Motor Speech Disorders	80	40	Speech Language Pathology	80	40	20	20
Rehabilitative Audiology	80	40	Audiology	80	40	20	20
Noise Measurements and Hearing Conservation	80	40		-	-	- -	20
Community Oriented Professional Practices Speech Language Pathology and Audiology	80	40		-	-	- -	20

FIRST YEAR
1 INTRODUCTION TO HUMAN COMMUNICATION

(Total=75hrs)

Objectives:

After studying this paper at the end of the year,the student should be able to understand the following –

1. Human communication,processes involved in communication
2. Inter relation between Hearing,Speech and Language
3. The neurological,psychological,social and acoustic bases of communication
4. Concept Of Linguistics.Branches Of Linguistics.

Unit1(15hrs)

1. History and development of the profession of Speech- Language Pathology(SLP)specifically in India
2. Major work activities of the SLP
3. Various settings of service delivery
4. Otherprofessionsconcernedwithcommunicationdisorders
5. Human communication:
    - · Definition and component
    - · Inter dependency &inter relation between communication,hearing,speech,and language.
    - · Function of communication,speech and language
    - · Modes of communication(Verbal&Non-verbal)
    - · Characteristics of good speech
6. Interactive bases of human communication
    - · Genetic bases
    - · psychological&cognitive bases
    - · Social bases
7. Speech as an overlaid function
8. Pre-Requisites and actors affecting language and speech development

Unit2 (15hrs)

1.Nervous system:

Divisions and functions of the nervous system, nerve cell,receptors and synapse, types of nerve fibers.Peripheral nervous system.Brief description of spinal cord and CSF.Structure of the brain and divisions:general and lobes of cerebrum.Reticular formation, Basal ganglia and cerebellum. Reflex action and common reflexes.Cranial nerves,distribution and supply with the special reference to II , V, VII , IX, X,XII., Nerve tracts (motor and sensory), Brodmann's area, anatomy of the nervous system related to speech and language.

Unit3 (15hrs)

Mechanism of speech and language production-I

- Anatomy and physiology of respiratory system:Detailed study of trachea,larynx,oropharynx and nasopharynx.
- Respiration for life and speech
- Physiology: External and internal respiration. Mechanism of respiration-internal and external influence, nervous control, Lung volumes (vital capacity-tidal volume,residual air,artificial respiration.(in brief)
- Exchange of gases in the lungs and tissues.Hypoxia,asphyxia and cyanosis.Regulation of respiration. Respiratory efficiency test.

Unit4 (15hrs)

1. Basic Acoustics of speech:

- Waves – What is a wave? Progressive waves – sound waves – wave propagation Doppler effect–reflection,diffraction,interference,absorption.Resonance of a mass Spring vibrator–standing waves–partials,harmonics and overtones–Acoustics impedance–Helmholtz resonator–sympathetic vibrations.

2. Mechanism of speech and language production-II

- Anatomy and physiology of laryngeal system (including Doppler Effect)
- Development of voice

Bases of pitch and loudness change mechanism

Unit5 **(15hrs)**

Mechanism of speech and language production-III

- · Anatomy and Physiology of Articulatory system
- · Development of Articulation
- · Anatomy and Physiology of Resonatory system
- · Phonetics: Definition and Branches. Brief sketch of articulatory, acoustic and auditory phonetics.Classification Of Speech Sounds viz Segmental (consonants and vowels, semi vowels, dipthomgs) and Suprasegmentals (stress, pitch, tone and intonation-)IPA symbols and transcription of sentences of typical speech)

LISTOF BOOKS

Compulsory Reading:

1. Speech Correction:An Introduction to Speech athology and Audiology(8thEd.).VanRiper, CandEmerick, L.(1990). New Jersey:Prentice HallInc.
2. Singh,I.(1996).Text book of Anatomy with Color Atlas,Vol.III Jaypee Brothers.
3. Zemlin,W.R.(1981).Speech and Hearing Science:Anatomy and Physiology,(2nd Ed.)Engle wood Cliffs,NewJersey: Prentice Hall.

Additional/Optional Reading:

1. Minifie,F.D.,Hixon,T.J.,and Williams,F.(1973).Normal aspects of Speech,Hearing and Language.New Jersey:Prentice Hall Inc.
2. Skinner,P.H.andShelton,R.L.(1978).Speech,Language and Hearing-Normal Processes and Disorders. (2ndEd.). New York:John Wiley and Sons.
3. Human Communication Disorders:An Introduction(4thEd.).Shames,G.H.Wiig, E.H.&Secord,W.A.(1994)NewYork:MerillPublishingCo.
4. Speech and Hearing Science,Anatomy and Physiology(3rded.).Zemlin,W.R.(1988)NewJersey: Englewood Cliffs
5. Human Communication & Its Disorders (2ndEd.).Boone, D.R.& Plante, E.(1993).New Jersey: Prentice HallInc.
6. Palmer,J.M.(1984).Anatomy for Speech and Hearing,(3 rd Ed.). New York:Harper and Row.
7. Perkins,W.H.andKent,R.D.(1986).Text book of Functional Anatomy of Speech,Language and Hearing.London:Taylor and Francis.
8. Gray'sAnatomy.(37thEd.).Williams Warwick and Dyson Banniser.(1989).Churchill

SPEECH-LANGUAGE DEVELOPMENT AND DISORDERS

(Total=75hrs)

Objectives

After studying this paper at the end of the year,the student should be able to understand the following:

· Development of speech & language

· Identify different speech & language disorders

· Basics of assessment and intervention for Child language disorders.

Unit1 (15hrs)

Development of speech and Language:

Development of language

· Semantics:A brief introduction to different types of meaning homonyms,synonyms And antonyms.

· Phonology:

· Morphology:Morpheme–bound and free,process of word formation,content and function words.

· Syntax:grammatical and syntactic categories,sentence types,Syntactic analysis.

· Pragmatics:Introduction to verbal and non-verbal communication and other indicators,intent of communication.

Unit2 (15hrs)

Theories and models of language Acquisition–Behavioral,Nativistic,Cognitive,Linguistic,Pragmatic,Biological and Information processing model.

Developmental issues in communicative development–genetic,neurological,medical, behavioural,social and psychological.

Bilingualism/multilingualism in children;Bilingual Language learning contexts at home and school situations,compound/coordinate context and others.

Unit3 **(15hrs)**

Definition,Etiology,Characteristics,Classification and Impact of

- · Hearing Impairment
- · Mental Retardation
- · Cerebral Palsy
- · Seizure disorders

Introduction to assessment procedures,differential diagnosis and management.

Unit4 **(15hrs)**

Definition,Etiology,Characteristics and classification of

- · Autism Spectrum Disorders/Pervasive Developmental Disorders
- · Attention Deficit Disorder/Attention Deficit Hyperactive Disorder
- · Multiple disabilities

Introduction to assessment procedures,differential diagnosis and management.

Unit5 **(15hrs)**

Definition,Etiology,Characteristics,Classification and Impact of

- · Specific Language Impairment
- · Learning Disability
- · Acquired aphasias in childhood
- · Traumatic Brain Injury
- · Multiple disabilities

Introduction to assessment procedures,differential diagnosis and management

In brief **(5hrs)**

LISTOFBOOKS

Compulsory Reading:

1. Reed,V.(1994).An Introduction to children with language disorders.(2ndEd.)NewYork:Macmillan.
2. NelsonN.W(1998).Childhood language disorders in context–infancy through adolescence,AllynandBacon,Boston.
3. Hegde,M.N.(1996).A Course book on Language Disorders in Children.San Diego:Singular Publishers.
4. LadefogedP.(1992).AcourseinPhonetics.(3rdEd.).NewYork:HarcourtBraceJovanovich.
5. Lees,J.A.andUrwin,S.(1991):Children with Language Disorders.Whurr Publishers

Additional/Optional Reading:

1. Woolfolk,E.&LynchJ.(1982).Anintegrativeapproachtolanguagedisordersinchildren. New York:Grune andStratton.

2. Thirumalai M.S.Shyamala Chengappa(1988)Simultaneous Acquisition of two languages CIIL,Mysore

3. Fromkin,L.F.and Rodman,R.(1993).An Introduction to Language(5thEd.).New York: Harcourt Brace Jovanovich

4. Subba Rao(1992).Developing communication skills in MR,NIMH,Secunderabad.

5. Shyamala K.Chengappa(1992).Speech and Language of the cerebral palsied, CIIL,Mysore.

6. Shyamala K.Chengappa(1986).Introduction to speech disorders in children an introduction IED cell, Port Blair, Anadamans & Nichobars.

7. O'Connor.(1993).Phonetics.Hammondsworth:Penguinbooks

8. Yule,G(1996).The Study of Language:An Introduction.(2ndEd.).Cambrige: Cambridge University Press.
9. Lyons,J.(Ed.).(1970).New Horizons in Linguistics.Hammonds worth:Penguin Books.
10. Akmajian.A.etal.(1990).Linguistics:An Introduction to Language and Communication

INTRODUCTION TO HEARING & HEARING SCIENCES

(Total=75 hrs)

Objectives:

After studying this paper at the end of the year,the student should be able to understand the following –

- Basic aspects of auditory system
- Physical and psycho physical basis of sound
- Causes of hearing loss
- Procedures involved in clinical testing–tuning fork tests,AC and BC testing in pure tone audiometry,clinical masking

Unit1 (03hrs)

- Origin of Audiology
- Its growth & development(since World War II)
- Its growth in India
- Scope of Audiology
- Branches of Audiology

Unit2 (25hrs)

- Audio vestibular system:Anatomy of the external,middle and internal ears.Ascending and descending auditory and vestibular pathways.
- Physiology of the external,middle &inner ear,central hearing mechanisms,cochlear micro phonics,action potentials,theories of hearing(AC&BC).
- Vestibular system:Functions of utricle,saccule and vestibular apparatus.Posture and equilibrium.
- Role of anatomy and physiology in hearing (threshold concept, binaural hearing,head shadow, pinna shadow effect, MAF, MAP – Curve for threshold of hearing)& in understanding causes of hearing impairment.

Unit3 **(10hrs)**

· Sound Pressure, Power and Loudness. Physical and psychophysical scales, Equal loudness contours,Frequency weighting curves,combined sources, Pitch and Timbre.Physical and psychophysical scales.Fourier analysis of complex Tones

· dB concept: power and pressure formulae: zero dB reference for pressure and power calculation of actual SPL, reference and dB values with any to given values,calculation of overall dB when two signals are superimposed.

· Phones and Sones:relation between phones and sones;use of phone and sonograph; computation of relative loudness of two given sounds using these graph. Frequency and intensity, their psychological correlates: dL for frequency and intensity.

Unit4 **12hrs)**

· Causes of hearingloss
· Genetic(congenital,late onset,progressive,syndromic/non-syndromic)
· Non-Genetic(Congenital/acquired)
· Importance of case history in identifying the cause of hearing loss

Unit5 **(25hrs)**

· Tuning fork tests(Rinne,Weber,Bing, Schwa bach), interpretation, merits & demerits.
· Pure Tone audiometry: Need and scope, Instrumentation, Standards, Permissible ambient noise levels for audio metric testing, Different types of transducers, Basic concepts of AC&BC testing procedures,Theories of bone conduction,Precautions to be taken while testing,Sound field&closed field testing,Factors affecting AC&BC testing,Screening Vs Diagnostic pure tone testing.Interpretation of audio grams,Classification of audio grams,Calibration:Biological and instrumental for AC&BC transducers.
· Masking: Definition, types of masking, types of noises, critical band concept,Terminology related to masking:Test ear,non-test ear,masker, maskee,crossover,cross hearing and shadow curve. Inter aural attenuation;

Factors affecting IA;Criteria for masking during AC & BC. Factors determining amount of masking noise,AB gap in masked ear, masking dilemma in bilateral symmetrical conductive hearing loss.

Fusion Inferred Test(FIT)

· Orientation to speech audiometry

LISTOFBOOKS

CompulsoryReading:

1. Hodgson,H.R.(1980)Basic Audiologic Evaluation,London Williams and Wilkins.
2. Martin,F.N.(1991),Introduction to Audiology,IV Edition,New Jersey:Prentice Hall.
3. Newby,H.A.(1985),Audiology,New York:Appletion-Century-Crofts.
4. Testing,interpretation and recording-ISHA Battery(1990).ISHA publication.
5. The Science of sound–Thomas D.Rossing, Addion–Wasloy Publishing Company
6. ArchitecturalAcoustics.Egan,M.D.McGrawHillInc,(1988)
7. Bess and Humes(1990)Audiology-Fundamental.Williams and Wilkins,London.
8. Davis and Silver man, (LatestEdition). Hearing and deafness.Holt, Rineheart & Winston, London.
9. Rose,D.M.(Ed.)1978),Audiological Assessment,New Jersey:Prentice Hill.
10. Speaks Charles.Introduction to Sound.
11. Yost,William.(2000).Fundamentals of Hearing.4thedition.
12. Durrant,J.andLovrinic,J.(1995).Bases of Hearing Science.3 rdedition.

Additional Reading:

1. Beagley,H.A.(Ed.)(1981).Audiology and Audiological Medicine.Vol.1,Oxford University Press.
2. Relevant BIS documents & ANSI Document
3. Stach–ClinicalAudiology
4. Gelfand–DiagnosticAudiology

TECHNOLOGY AND MANAGEMENT FOR PERSONS WITH HEARING IMPAIRMENT–I

(Total=75 hrs)

Objectives:

After studying this paper at the end of the year ,the student should be able to understand the following –

· Basics of electricity,electronics and digital processing

· Transducers

· Basic components and types of hearingaids

· Earmoulds

Unit1 (15hrs)

(Operational characteristics,types and specifications.-No design aspects.Concepts and block diagrams only.)

1. Basics of electricity & electronics - Direct and alternating current, DC Power supplies,voltage stabilizers,Passive circuit elements,transistors.Linear and digital Integrated circuits, micro processors. Micro computers and Computers. Filters, Linear and non-linear Amplifiers and Oscillators,Amplifier power and distortion.
2. Basics of digital signal processing – Analog signal, digital signal, A to D and D to A conversion, Basic concept of Digital Signal Processing and its implementation, How does a DSP based system works? Application-DSP based hearing aids.

Unit2 (15hrs)

1. Microphones as transducers.Velocity microphones.uni-directional microphones Microphone impedance and sensitivity.Loudspeakers as transducers.Structure of a dynamic loudspeaker. Air suspension. Baffles and enclosures. Horn speakers. Multi speaker systems.Loud speaker Efficiency,Loud speaker power and distortion.Recording and Reproduction of sound.Recording characteristics.Dynamic Range,Stereophonic recording. Magnetic tape recording and playback. Tape speed and frequency response, Bias and equalization,Tape noise,Digital Tape recording, CDROM recording.
2. Measuring Instruments-Multi-meter.Cathode ray oscilloscope.Sine wave generator.

Function Generator, Frequency counter, Measuring microphones, Sound Level Meter,Integrated Sound Level Meter,Artificial ear,Artificial Mastoid,Couplers,Hearing aid test box,Measurement of different types of sound.

Unit3 **(15hrs)**

a) Historical development of hearing aids Non-electrical hearing aids,Electric hearing aids

b) Introduction to hearing aid technology: Parts of hearing aids & their functions, Basic elements of hearing aids:Microphone,Amplifier,Receiver,Cords,Batteries,ear moulds.

Unit4 **(15hrs)**

• Classification of hearing aids.Type of hearing aids,their advantages and limitations:

-Body level,ear level(BTE,ITE,ITC,CIC).

-Monaural Vs Binaural Vs Pseudo binaural.

-AC and BC hearing aids.

• Classroom amplification devices;Group amplification systems–hardwired,induction loop,FM,infrared rays.

Unit5 **(15hrs)**

· Ear moulds:Importance,types(hard,soft),procedure of making each type of ear mould, styles of ear moulds, criteria for selection of one style over the other, ear mould modifications,

· Importance of counseling for users & parents – importance of harness, BTEloops.Tips to facilitate acceptance of hearing aids,battery life,battery charger.

Counseling

For geriatric population,Trouble shooting of hearing aids.Solar Charger and its specifications.

LIST OF BOOKS

Compulsory Reading:

1. Skinner HW(1988),Hearing aid evaluation,Prentice Hall,Englewood Cliffs,HJ.

2. PollackM(1980)Amplification or the hearing impaired.Grune and Stratton,NY.

3. Basic Electronics:Atext-labmanual;PaulBZbar,Albert,P.Malvino.(5thEdn),McGrawHill Inc,(1983)

4. Hearing aid assessment and use in Audiologic Habilitation.(3rded.).William Hodgson(Ed.)

5. Audiologist's desk reference.

6. Hearing Aids:Standards,Options and Limitations.Michael Valente.

7. AudiologicTreatment.MichaelValente,Hosford-Dunn,Roeser.

8. Hearing Instrument Technology for the hearing healthcare professional.A.Vonlanthen.

Additional Reading:

1. Loavenbruck All and Madell IR (1981), Hearing aid dispensing for audiologists: A guide for clinical service.NewYork: Grune and Stratton.

2. Bessetal(1981).Amplification in Education,Alexander GrahamBell Association for the Deaf,Washington.

3. Hull,R.H.(1982).Rehabilitation Audiology,NewYork: Grune and Stratton.

4. DonnellyK(1974),Interpreting hearing aid technology,CC,Thomas,Springfield.

5. MarkidesA(1977)Binaural hearing aids,Academic Press Inc.,London.

6. Hodgson HR and Skinner(PH)(1977,1981),Hearing aid Assessment and use in audiologic habilitation,Williams and Wilkins,Baltimore.

7. Cooper (1991),Practical aspects of Audiology:Cochlear implants:A practice guide.Whurr Publisher,London.

8. MuellerHG,HawkinsDB.,NorthernJL.(1992),Probe microphone measurements:Hearing aid selection and assessment,Singular publishing group.Inc.,California.

9. ANSI & IEC Specifications

Basic Medical Sciences related to Speech & Hearing

(Total=75hrs)

Objectives:

After studying this paper at the end of the year,the student should be able to understand the following –

· Basic anatomy and physiology related to speech and hearing

· Basic neurological,genetic issues related to speech and hearing

· General diseases/conditions related to speech and hearing disorders

Unit1 (15hrs)

(a) General introduction,definitions,Coronal/saggital/plane)Planes.Definition of anatomy,morphology,physiology,histology,embryology.
(b) Definition of Cell and organelles,tissue,organ system,specialized tissues like nervous tissue,vascular tissue, muscle and bone tissue.
(c) Nervous system: Definition of neuron, synapse, reflex action, bio electrical phenomena,action potential,depolarisation, division and functions of the nervous system, brain–general lobes,reticular formations,basal ganglia,cerebellum,circle of willis,cranial nerves, spinal cord,CSF –formation & flow.
(d) Circulatory system: Definition of capillaries, arteries, veins, cardiac cycle, blood brain barrier, aneurysm,vascular shock–its reference to aphasia /speech disorders.
(e) Respiratory system:General outline,detailed study of trachea,larynx and naso pharynx,mechanism of respiration – internal and external influence, nervous control –vital capacity–tidal volume, residual air, artificial respiration(in brief).

Unit2 (15hrs)

(a) Definition of inflammation,infection,tumor–benign&malignant,tissue healing.

(b) Genetics :introduction – structure of DNA and RNA, karyo typing, family tree (pedigree chart), symbolic representation, inheritance, autosomal dominant, autosomal recessive, sex chromosomal disorders, structura laberrations, mutation(in brief).

(c) Endocrine system:Definition of harmone,functions of thyroid hormone,growth harmone,androgen, testosterone and its influence in voice disorders.

Unit3 (15hrs)

(a) Anatomy & Physiology of external,middle&inner ear,auditory pathways,vestibular pathway.Diseases of the external middle and inner ear leading to hearing loss:
Congenital malformations,traumatic lesions,infections,management of middle ear and Eustachian tube disorders.
(b) Other causes of hearing loss – Facial paralysis, Tumors of the cerebello- pontine angle,Acoustic neuroma. Infection and management of inner ear diseases. Cochleo-vestibular diseases and its management.

Unit4 **(15hrs)**

(a) Anatomy&Physiology of pharynx & oro-peripheral structures Causes of speech disorder, Disorders of the mouth, Tumors of the jaw and oral cavity, nasopharynx and pharynx,pharyngitis,Diseases of tonsils and adenoids.

(b) Oesophageal conditions:Congenital abnormality–Atresia,Tracheo-oesophagea fistula, Stenosis, Short oesophagus. Neoplasm – Benign, Malignant, Lesions of the oral articulatory structures like cleft lip, cleft palate, submucosal cleft, Velopharyngeal incompetence.

Unit5 **(15hrs)**

(a) Anatomy&Physiology of larynx–physiology of phonation/physiology of respiration.

(b) Congenital diseases of the larynx – difference between an infant and an adult larynx.Stridor – causes of infantile stridor. Disorders of structure – Laryngomalacia, Bifid epiglottis,Laryngeal web,Atresia,fistula,Laryngeal cleft,Tumors and Cysts,Laryngitis,Laryngeal trauma and Stenosis.Neuro muscular dysfunctions of the larynx–Vocal cord palsy,Spastic dysphonia,Hypothyroidism,gastro oesophageal reflux disorders,Laryngectomy,artificial larynx,oesophageal speech,tracheooesophageal puncture.

LIST OF BOOKS

Compulsory Reading:

1. Singh,I.(1996).Text book of Anatomy with Color Atlas,Vol.III Jaypee Brothers.
2. Zemlin,W.R.(1981).Speech and Hearing Science:Anatomy and Physiology,(2ndEd.). Englewood Cliffs,New Jersey: Prentice Hall.
3. Alper,C.M.,Myers,E.N.,Eibling,D.E.(2001).Decision making in Ear,Nose&Throat disorders. W.B.Saunders Company,Philadelphia.
4. Dhingra,P.L.(1992).DiseasesofEar,Nose&Throat.ChurchillLivingstone,NewDelhi.
5. GraymR.F.,Hawthorne,M.(1992).Synopsis of Otolaryngology.Butterworth Heinemann Ltd,Oxford.5th Edition.

Ramalingam,K.K.,Sreerama moorthy,B.(1990).A short practice of Otolaryngology.

A.I.T.B.S.PublishersDistributors.

6. Scott-Brown,W.G.,Ballantyne,J.,Groves,J.Diseases of the nose & throat.Butter worth& Co., Ltd.2nd edition,Chichester.

Inderbeer Singh(1996)–Text book of embryology.

Additional/Optional Reading:

1. Palmer,J.M.(1984).Anatomy for Speech and Hearing,(3rdEd.).NewYork:Harperand Row.
2. Perkins,W.H.and Kent,R.D.(1986).Text book of Functional Anatomy of Speech,Language and Hearing.London:Taylor and Francis.
3. Gray's Anatomy.(37thEd.).Williams Warwick and Dyson Banniser.(1989).Churchill Living stone.

PSYCHOLOGY RELATED TO SPEECH AND HEARING

(75hrs.)

Objectives;After studying this paper at the end of the year,the student should be able to understand the following:-

· Developmental Psychology

· Psychology of learning

· Neuro-Cognitive issues in the field of speech and hearing

Unit1 (15hrs.)

· Introduction to psychology–Definition,History and perspectives,Branches and scope,application of psychology in the field of speech and hearing.
· Introduction to Clinical Psychology–Definition,perspectives and models of mental disorders.
· Disorders of infancy,childhood and adolescence association with hearing and speech and language disorders – Mental Retardation, Learning Disorders, Communication Disorders,Attention Deficit Hyperactivity Disorder, Conduct Disorders.

Unit2 (15hrs)

· Psychology of learning–Introduction,Definition of learning,Theories of learning,Classical conditioning, Operant conditioning and Social learning.
· Application of learning theories in the field of speech and hearing (therapeutic,educational and rehabilitative applications).

Unit3 (15hrs)

· Cognitive Psychology–Introduction,Definition and theoretical perspectives(David Rumelhart and David McClell and,Noam Chomsky,George Miler,Allan Newell).
Applications of cognitive psychology in the field of speech and hearing.

· Intelligence–definition,theories and factors affecting intelligence

· Neuro psychology–Introduction,definition,principles of neuro psychological assessment, diagnosis and rehabilitation.
· Applications of neuropsychology in the field of speech and hearing.

Unit4 **(15hrs)**

· Psycho diagnostics–Case history taking,Mental status examination,behavioural analysis, psychological testing.
· Play as a therapeutic tool

·Counselling–Meaning and definition,types of counseling,Counseling in rehabilitation practice.

Unit5 **(15hrs)**

· Developmental Psychology–Introduction,definition,principles,motor development,emotional and social development
· Cognitive development–definition,Piget'sTheory

· Personality Development–Introduction,theories,hallmarks of the well adjusted personality,
Hazards in personality development.

LISTOFBOOKS

Compulsor yReading:

1) Hurlock,E.B.(1981).Child development VI Ed. McGraw Hill International Book Co.

2) MorgonC.T.,King,R.A.,Robinson N.M.Introduction to Psychology.Tata McGraw Hill Publishing Co.

3) ColemanJ.C.Abnormal Psychology and Modern Life,Taraporevala Sons & Co.
4) Cognitive Neuro-Science of Development by Michall ede Hank & Mark H.Johnson

5) Application of Counselling in Speech-Language Pathology and Audilogy–Thomas A.Crowe, Acc.No.12917,6.8.5506

6) Counseling Individual with Communication Disorders.Psychodynamic approach and Family aspects,2nd Edition,Walles J.Rollin,Acc. No.15706,616.855.

Additional/Optional Reading:

1) SiegalM.G.(Ed.),(1987).Psychological Testing from Early Childhood Through Adolescence.International Universities Press.
2) Kline,P.(1993).The Handbook of Psychological Testing, Rout ledge.

3) Anastasi,A.(199).Psychological testing,London:Freeman

Clinical Practicum Speech Language Pathology

To include IPA for normal samples

To include tests:LPT,PAT,Reynell's scale,LST- cognitive pre requisites for language learning

1. Taking case history of a minimum of 10 individuals (5normal&5clients with complaints of speech-language problems)
2. Label and identify structures of the speech mechanisms with the help of charts,models,specimens and computer software
3. Conduct Oral Peripheral Mechanism examination on atleast 5normal and 5children/adults with speech language complaints

4. Analyze the following in normal,subjects:

· Pitch–normal/high/low

· Loudness-normal/loud/soft

· Quality –normal/hoarse/harsh/breathy/hyper-nasal/hypo–nasal

· Rate of speech-–normal/fast/slow

· Articulation–normal/abnormal

· Fluency–normal/abnormal

· Intelligibility–using the AYJNIHH intelligibility rating scale

5. Use varying range of pitch and loudness

· MeasureF0,Vital capacity,phonation duration,rate of speech,Alternate Motion Rates and Sequential Motion Rates, s/z ratioin5normalindividuals

6. Measure in2normal samples(with the help of video or live)

· Mean Length of Utterance(MLU)

· Syllable structure

· Syntactic structures

· Communication intent

7. Use proforma for the following disorders:

· Articulation

· Voice

· Fluency

· Cleft lip and palate

· Child language assessment

8. Use scale/test for:

· Receptive language skills

· Expressive language skills

Receptive Expressive Emergent Language Scale(REELS)

3-Dimensional Language Acquisition Test (3DLAT) Scales of Early Communication Skills for Hearing impaired children(SECS)and Indian tests
Maintenance of a clinical work record to be submitted at the end of the term

1. Observation of therapy of 10clients with speech language disorders.
2. Observation of a minimum of 5diagnostic clients and 5therapy clientsDeveloping therapy material specific to 10 clients they have observed Writing of observation reports of the above Maintenance of a clinical diary

CLINICAL PRACTICUMIN AUDIOLOGY

1. Public information materials(a videos,pamphlets,booklets etc.)

2. Taking case histories of 10 adults and 10 children with normal hearing and with hearing impairment under supervision.
3. Analyse10-15case histories of adults and children with hearing impairment.

4. Under going pure-tone audiometry. Becoming familiar with different types to sound stimuli used for assessment of hearing and sound generator software's.
5. Identifying the different types of audiometer (at least 1 portable and 1 diagnostic) and their accessories referring to their respective manuals. Get familiar with the various parts of audiometers and their functions. Carry out listening checks of audiometers. Trouble shoot audiometers. List the different earphone/ear cushion combination. BC vibrator. Stud the same and report the status of the same.
6. Preparing 0dBHLequivalent chart with different earphone/ear cushion combination.

7. Obtain audiograms of 10normal subjects.

8. Observations/Participation during audiological evaluation on a variety of cases under supervision.Plot the audio grams;calculate of Inter-aural attenuation,Occlusion effect.
9. Obtaining audio grams under supervision
on20adultsclients(AC&BC)10.Obtaining audio grams with masking
(5cases)
11. Classify audio grams as per:nature of hearing loss

- Nature of hearing loss

- Degree of hearing
loss ji Contour of audio
grams

12. Observe calibration of audiometers (Demonstration) – AC/BC/Sound field, instruments used,identifying the instruments,combination of equipments of different types of calibration, preparing correction charts.

SECONDYEAR

SPEECH LANGUAGE DIAGNOSTICS AND THERAPEUTICS

(Total=75hrs)

Objectives

After studying this paper at the end of the year,the student should be able to understand the following –

1. Importance of client history,diagnostics and therapeutic approaches
2. Taking client history and therapy in general
3. Will get theoretical backup for clinical documentation

A. Speech language diagnostics

Unit1 (7hrs)

1. Basic terminologies and concepts

· Introduction to diagnostics

· Terminologies in the diagnostic process

· General principles of diagnosis

· Diagnostic setup and tools

Unit2 (18hrs)

1.Diagnostic approaches and methods

· Client history – definition, description, utility & need. Essential factors to be included in the client history form – comparison of adults vs. children's history – usefulness of the client history Approaches to diagnosis – importance of diagnosis in client history, essential factors to be included according to the conditions/disorders.Methods of taking case history.

· Interview–principles and techniques

· Self-reports,questionnaire,observations.

· Diagnostic models–SLPM,Wep man,Bloom and Lahey

· Types of diagnoses–Clinical diagnosis,direct diagnosis,differential diagnosis,

Diagnosis by observation,diagnosis by exclusion,diagnosis by treatment,instrumental diagnosis,provocative diagnosis,provisional diagnosis;

Advantage /dis advantages

· Team approach to diagnosis

· Characteristics of a good clinician as diagnostician

·

B. Speech therapeutics

Unit3 **(15hrs)**

1. Basic concepts of therapeutics

· Terminologies in speech therapeutics

· General principles of speech and language therapy

· Speech therapy set-up

· Types of speech and language therapy

· Individual and group therapy

· Integrated and inclusive education

Unit4 **(19hrs)**

1. Procedures for speech- language therapy

· Approaches to speech and language therapy–formal,informal and eclectic approaches

· Planning for speech and language therapy–goals,steps,procedures,activities

2. Techniques for:Speech and language therapy for various disorders of speech and language

· Importance of reinforcement principles and strategies in speech and language therapy,types and schedules of rewards and punishment

Unit5 (16hrs)

1.Clinical documentation and professional codes.Documentation of diagnostic,clinical and referral reports.Introduction to parent counseling,facilitation of parent participation and transfer of skills, follow-up

- Evaluation of therapy out come
- Ethics in diagnosis and speech language therapy
- Self-assessment and characteristics of a clinician

LIST OF BOOKS

Compulsory Reading:

1. Meyer,S.M.(1998).Survivalguideforthebeginningspeech-languageclinician.Mary land:Aspen Publishers.
2. Owens,R.E.(1999).Language disorders:Functional approach to assessment and intervention.Boston:Allyn &Bacon Inc.
3. Tomblin,E.et.al.(1994).Diagnosis in Speech language pathology.SanDiego:Singular Publishing Inc.
4. Shipley,K.G.,7Mcafer,J.G.(1998).Assessment in speech language pathology:Are source manual.SanDiego:Singular Pub Inc.
5. Klein,H.B.,&Nelson,M.(1994).Intervention planning for children with communication disorders: A guide for clinical practicum and professional practice. New Jersey.PrenticeHall .

Additional/Optional Reading:

1. Frattali,C.M.(1998).Measuring out comes in Speech Language Pathology.New York:Thieme.
2. Shames,G.H.(2000).Counselling the communicatively disabled and their families.Boston:Allyn &Bacon.
3. Hegde,M.N.(1985).Treatment procedures in communicative disorders.Texas.Pro Ed.
4. Darley,F.L.,& Spriesterbach(1978).Diagnostic methods in Speech Pathology.SanDiego:Singular PubInc.
5. Leith,W.R.(1993).Clinical methods in communicative disorders.Texas.Pro.Ed.

ARTICULATION AND PHONOLOGICAL DISORDERS

(Total= 75hrs)

After studying this paper at the end of the year,the student should be able to understand the following –

· Development of phonology
· Factorsrelatedtoarticulationandphonologicaldisorders
· Assessment and therapy procedures

Unit1 (20hrs)

1. Review of phonological development and articulatory mechanism
2. Fundamentals of Articulatory phonetics
3. Definition and types of co articulation
4. Suprasegmental aspects
5. Transcription methods in perceptual analysis
6. Phonological processes–types,language specific issues,identification and classification of errors
7. Distinctive features–types,language specific issues,identification of errors and analysis.
8. Acoustic aspects of production and perception of speech sounds;use of spectro gram.

Unit2 (15hrs)

1. Factors related to articulation and phonological disorders:Structural Cognitive – Linguistic Neurological Psychosocial
Social Metalinguistic
2. Transcription methods in perceptual analysis
3. Phonological processes– types,language specific issues,identification and classification of errors.
4. Distinctive features–types,language specific issues,identification of errors and analysis.
5. Acoustic aspects of production and perception of speech sounds;use of spectro grams

Unit3: Oral anomalies/ablations **(20hrs)**

Cleft lip and palate:

1. Etiological factors
2. Developmental biology of the face and palate
3. Syndromes–Pierre–Robin's,Treacher–Collin's,Crouzon'sdiease
4. The velopharyngeal mechanism muscles and functions
5. Types of cleft lip and palate
6. Classification systems

7. Team management composition,responsibilities,coordinator
8. Speech and language problems of individual switch left
9. Associated problems of individuals with cleft hearing,dental,psychosocial,physical.
10. Diagnostic procedures and instruments used in assessment of speech.
11. Treatment Concepts–Surgical repair of cleft lip,palate and velopharynx(outline)
12. Treatment procedures for speech.
13. Prosthetic speech appliances for patients with cleft palate.

Glossectomy

1. Effect of partial and total glossectomy on speech
2. Characteristics of glossectomy speech
3. Rehabilitation of speech
4. Prosthetic fitting,design,assessment
5. Effect sons wallow
6. Rehabilitation of swallow

Unit4 (10hrs)

Assessment procedures:Types of assessment,sampling procedures,scoring procedures,criteria for selection of instruments for assessment. Assessment of Or peripheral mechanism Speech sound discrimination,stimuli ability and oral stereognosis Analysis and interpretation of data: Intelligibility and severity judgments Normative data
Error patterns.Characteristics of disordered phonology and differential diagnosis

Unit5 (10hrs)

Intervention:Stages of treatment and measuring improvement,long term goals,short term goals and activities for achieving goals in cases with misarticulation.
Issues in maintenance and generalization.
Team approach and professional communication(inter,intra professional and client oriented)
Approaches to treatment: moto kinesthetic, traditional approaches integral stimulation,phonological,distinctive feature,minimal contrast therapy,learning theories,programmed,paired–stimuli.
Computerized intervention packages,metaphon therapy

LIST OF BOOKS
Compulsory Reading:

1. Bernthal,J.E.and Bankson,N.W.(1988).Articulation and Phonological Disorders.(3rdEd.). New Jersey: Prentice Hall Inc.
2. Weiss,C.E.,Lillywhite,H.S.and Gordon,M.E.(1980).Clinical Management of Articulation
Disorders.St.Louis:C.V.Mosby
3. Creaghead,N.A.,Newman,A.W.and Secord,W.A.(1989).Assessment and remediation of articulatory and phonological disorders. (2nd Ed.). New York: Macmillan

Additional/Optional Reading:

4. Johnson,J.P.(1980).Nature and Treatment of Articulation Disorders.Spring field:Charles C.Thomas.

VOICE AND LARYNGECTOMY

(Total= 75hrs)

Objectives:
After studying this paper at the end of the year,the student should be able to understand the following:–

- Characteristics of voice and its disorders
- Laryngeal abnormalities
- Assessment and Management

Unit1 (15hrs)

Characteristics of normal voice:Physiological,acoustical and aerodynamic correlates
Development:Birth to senescence;including age-related changes
Theories of phonation Classification of
abnormal voice Voice disorders in
other conditions:
Voice disorders related to resonatory problems
Voice problems in conditions like Hearing impairment and deaf blind Voice problems in Endocrine disorders

Unit2 (15hrs)

Etiology,incidence,prevalence,signs and symptom of:
Organic voice disorders:Laryngeal cancer also to be included here
Non-organic voice disorders:eg:Functional disorders(Psychosomatic-Functional aphonia and physiological- voice abuse)
Congenital voice disorders
Neurological voice disorders

Unit3 (15hrs)

1. Evaluative procedures and Instrumentation for:

Invasive procedures–endoscopic procedures
Non-invasive (Acoustic,perceptual,aerodynamic,Electro Glotto Gram,Inverse filtering procedures)

2. Comparison of normal and abnormal voice patterns based on the above procedures

Unit4 (15hrs)

Laryngectomy:

- Types and characteristics of laryngeal surgery
- Assessment of a laryngectomee and associated problems
- Management of laryngectomee:

a) Esophageal speech:anatomy,candidacy,different types of air intake procedures,speech characteristics of esophageal speech;
b) Tracheo-esophageal speech:anatomy,candidacy,different types of TEP,fitting of prosthesis,speech characteristics,complications in TEP;

c) Artificial larynx:different types,selection of artificial larynx,speech characteristics;
d) Pharyngeal speech,buccal speech,ASAI speech,gastric speech;
e) Pre and post operative counseling

Unit5 **(15hrs)**

1. Medical/Surgical procedures in the treatment of voice disorders
2. Voice therapy–various techniques
3. Professional voice users:Definition,types,characteristics,importance of vocal hygiene and professional voice care

LISTOFBOOKS

Compulsory Reading:

1. Boone,D.R.&McFarlane,S.C(1994):The Voice and Voice Therapy.(FifthEd.).Englewood Cliffs,Prentice-Hall, Inc.New Jersy.

2. Prater,R.J.and Swift,R.W.(1984):Manual of Voice Therapy.Little,Brown and Co,Boston.

3. Andrews.M.L.(1995):Manual of Voice treatment,Singular publishing group,SanDiego.

4. Doyle,PC(1994)Foundation of voice and speech rehabilitation following laryngeal cancer.Singular publishing group.San Diego.

Additional/Optional Reading:

5. Brown.W.M.s.and others(1996)(ed):Organic voice disorders.Singular publishing group, Sandiego.

6. Joseph,CStempleLeble,EGlaze,Bernick K Gerdeman.Clincial voice pathology.Theory& Management (II Edition)

7. Aronson,A.E.(1990):ClinicalVoiceDisorders,NewYork:Thieme,Inc.

8. Greene,M.C.L.and Mathieson,L.(1989):The Voice and Its Disorders.Whurr publications, London.

9. Case,J.L.(1991):Clinical Management of Voice Disorders,Pro-Ed,Austin.

10.Fawcus,M.(Ed.)(1991):Voice Disorders and Their Management.Singular Publishing. Group. SanDiego

11.Salmon,S.J.and Mount,K.H.(Eds.)(1991):A laryngeal Speech Rehabilitation. Prof-Ed. Austin.

12.Keith,RL&Darley (IIIEdition) Laryngectomee rehabilitation.Pro.Ed.Austin

DIAGNOSTIC AUDIOLOGY

(Total=75hrs)

Objectives:

After studying this paper at the end of the year,the student should be able to understand the following –

· Need for test battery approach
· Indications for administering different audiological tests
· Procedures for identifying an individual with pseudo hypacusis
· Administration and interpretation of tests for APD

Unit1 **(12Hours)**

1. Introduction to Diagnostic Audiology:
· Need for test battery approach in auditory diagnosis & integration of results of audiological tests.
· Indications for administering audiological teststo identify Cochlear pathology, Retrocochlear pathology,functional hearing loss,Central-processing disorders.

2. Tests to differentiate between cochlear & retro-cochlear pathology Speech audiometry:Need for speech audiometry,Speech recognition threshold,speech identification score,UCL,MCL,dynamic range,articulation index,Tests developed in India and abroad,Factors affecting speech audiometry,Limitations of speech audiometry,Masking for speech audiometry,PI-PB function.Speech discrimination tests with and without the presence of noise. Filtered speech tests and time compressed speech tests.
Social Adequacy Index
· ABLB,MLB
· SISI
· Test for adaptation
· Bekesy Audiometry
· Brief tone audiometry

Unit2 **(18Hours)**

3. Immittance Audiometry
· Introduction,Principle of Immittance audiometry,Instrumentation,
· Tympanometry–Tympanometric peak pressure,static immittance,gradient/tympanometric width.
· Reflexometry–Ipsilateral&contra lateral acoustic reflexes,special tests
· Clinical application of Immittancee valuation

Unit3 **(20Hours)**

4. Auditory Brain stem Response Introduction & classification of AEPs, Instrumentation, Test procedure, factors affecting Auditory Brain stem Responses , Interpretation of results & clinical application,

· ECOG,early response
· Middle&Long latency auditory evoked potentials–test procedure,factors affecting
· MLR&LLR,Interpretation of results & clinical application.

Unit4 **(10Hours)**

5. Otoacoustic Emissions

Introduction,classification of OAEs, Instrumentation,measurement of OAE procedure,interpretation of results &clinical applications.

6. Tests to detect Pseudohy poacusis
· Pure tone tests including tonein noise test,Stenger test
· Speech tests including Lom bard test,Stenger test,Lip-reading test,Doefler-Stewart test.
· Identification of functional hearing loss
7. Vestibulartesting

Unit5 **(15Hours)**

8. Central Auditory Disorders

(a) Definition,terminologies used,incidence&causes,indications for administration of CAD test,rationale for CAD tests.

(b) Tests to detect Central Auditory Disorders
· Monoaur allow redundancy tests
· Filtered speech tests
· Time compressed speech tests
· Speech-in-noise test
· SSI with ICM
· Other monoaur allow redundancy tests

(c) Dichoticspeechtests
· Dichotic digit test
· Staggered spondaic word test
· Dichotic CV test
· SSIwithCCM
· Competing sentence test
· Other dichotic speech tests

(d) Binaural interaction tests
· RASP
· Binaural Fusion Test(BST)
· MLD
· Other binaural interaction tests

(e) Temporal ordering tasks
· Pitch pattern test
· Duration pattern tests

· Other temporal ordering tests

(f) Variables influencing Central Auditory Assessment

· Procedural variables

· Subject variables

(g) Test findings in subjects with central auditory disorders

· Brain stem lesion

· Cortical & hemispheric lesion

· Inter hemispheric dysfunction

· CAPD in children

· CAPD in elderly

(h) Other special test–Minimal auditory capability test,SPIN,HINT,CST.

LIST OF BOOKS

Compulsory Reading:

1. Hodgson,H.R.(1980)Basic Audiologic Evaluation,London Williams and Wilkins.
2. Martin,F.N.(1991),Introduction to Audiology,IVEdition,NewJersey:PrenticeHall.
3. Martin,H(1987),SpeechAudiometry.WhurrPublisher,London
4. Newby,H.A.(1985),Audiology,NewYork:Appletion-Century-Crofts.
5. ISHABattery
6. Katz,HandbookofClinicalAudiology4th/5thedn.
7. Rintleman–Contemporary issues inaudiology

Audiologists Desl Ref.Vol.I,by JamesW.Hall.

Additional Reading:

1. Beagly,H.A.(Ed.)(1981).Audiology and Audiological Medicine.Vol.1,Oxford University

Press.

2. Bess and Humes(1990)Audiology-Fundamental.Williams and Wilkins,London.
3. Davis and Silverman,(Latest Edition).Hearing and deafness.Holt,Rinehats&Winston,London.
4. Rose,D.M.(Ed.)1978),Audiological Assessment,New Jersey:Prentice Hill.
5. Relevant IS documents

TECHNOLOGY & MANAGEMENT FOR PERSONS WITH HEARING IMPAIRMENT–II

(Total= 75hrs)

Objectives:

After studying this paper at the end of the year,the student should be able to understand the following –

- Importance of early identification
- Different methods and approaches to train children with hearing impairment
- Educational options for children with hearing impairment
- Classification of hearing aids
- Setting up of class rooms for children with hearing impairment
- Electro acoustic characteristics
- Selection of hearing aids

Unit1 (15hrs)

- Definitions and goals of rehabilitation & aural rehabilitation
- Early identification and its important in aural rehabilitation
- Uni sensory Vs Multi sensory approach
- Manual Vs oral form of communication for children with hearing impairment
- Total communication

Unit2 (15hrs)

- Methods of teaching language to the hearing impaired
- Natural method
- Structured method
- Computer aided method

Unit3 (15hrs)

- Educational problems,of children with hearing impairment in India
- Educational placement of hearing impaired children
- Criteria for recommending the various educational placements
- Factors affecting their out come
- Counseling the parents and teachers regarding the education of the hearing handicapped
- Parent Infant Training Programme (PIP) & Mother's Training Programme, Home training–need,preparation of lessons;correspondence programs(JohnTracyClinic,SKI-HI), follow up
- Setting up classrooms for the hearing handicapped,Class room acoustics
- Preferential seating and adequate illumination
-

Unit4 **(15hrs)**

A) Electro acoustic Characteristics & measurements for hearing aids
a) Instrumentation & Analysis of Electro acoustic characteristics of all types of hearing aids.
b) Measurement of standard& specification of hearing aids according to ISI,IEC and ANSI
c) Interpretation of the analysis
d) EAC of hearing aid along with ear mould.
B) Directional hearing aids,modular hearing aids
Routing of signals,head shadow/baffle/diffraction effects Output limiting:Peak clipping,compression
Extended low frequency amplification,frequency transposition,Bone anchored hearing aid,Master Hearing aids
C) Signal processing in hearing aids BILL, TILL,PILL
Programmable and digital hearing aids
Signal enhancing technology

Unit5 **(15hrs)**

Hearing Aid selection
a) Pre-election factors:Ear to be fitted,mono aural-vs.binaural hearing aids,type of receiver, style of hearing aid.
b) Prescriptive&comparative procedure
c) Functional gain & insertion gain methods:Instrumentation,prescription formulae,Articulation Index, Speech-spectrum(banana),merit&demerits of each.
d) Hearing aids for conductive hearing loss,congenital malformation,chronic middle ear disorders
e) Hearing aids for infants/children/multiply handicapped
f) Hearing aids for adults & geriatrics:recruiting ears,poor word recognition cores(WRS)
g) Hearing aids for the sight less
h) Procuring hearing aids under various schemes of the Government of India/State

LIST OF BOOKS

Compulsory Reading:

1. Sanders,D.A.(1993).Management of Hearing Handicap;Infants to Elderly,3rdEd.,NewJersey,PrenticeHall.
2. Tucker,I.,&Nolan,M.(1984).Educational Audiology.London:Croom Helm,Chapter.10.
3. MarkidesA(1977)Binaural hearing aids,Academic Press Inc.,London.
4. Hodgson HR and Skinner(PH)(1977,1981),Hearing aid Assessment and use in audiologic habilitation,Williams and Wilkins,Baltimore.
5. PollackM.(1980).Amplification for the hearing impaired.NY:Grune and Stratton.
6. Skinner HW(1988),Hearing aid evaluation,Prentice Hall,Engle woodCliffs,HJ.
7. Audiologist's desk reference.
8. Hearing Aids:Standards,Options and Limitations.Michael Valente.
9. AudiologicTreatment.MichaelValente,Hosford-Dunn,Roeser.

Additional Reading:

1. Davis,J.M and Hardick,E.J.(1981).Rehabilitative Audiology for Children and Adults.NewYork: JohnWiley and Sons.
2. Ross, M. Brackett, D. and Maxon, A.B. (1991). Assessment and management of mainstreamed hearing-impairment children:Principles and practice.Austin:Pro.Ed.
3. Lynas,W.(2000).Communication options.InJ.Stokes(Ed.),Hearing impaired infants –
Support in the first eighteen months.London:Whurr Publishers Ltd.
4. Sims,L.G.,Walter,G.G.,and Whitehead,R.L.(1981).Deafness and Communication:Assessment and Training.Baltimore:Williams and Wilkins.
5. Alpiner,J.G.(1982).Hand book of Adult Rehabilitative Audiology.Baltimore:Williams and
Wilkins.
6. Chermak,G.D.(1981).Handbook of Audiological Rehabilitation.C.C.Thomas.
7. Ebbin,J.B.(1974).Critical Age in Hearing.InC.Griffiths(Ed),Proceeding of the International Conference on Auditory Techniques.Illinois:CharlesC.Thomas.
8. Griffiths,C.(1974).Early Identification-Plus the Auditory Approach.InC.Griffths(Ed.), Proceeding of the International Conference on Auditory Techniques.Illinois:CharlesC.Thomas.
9. Borastein,H.(1977).Systems of Sign.InL.J.Bradford&W.G.Hardy(Eds.),Hearing and Hearing-Impairment.NewYork:Grune and Stratt on Inc.
10. Hull,R.H.(Ed).(1982).Rehabilitative Audiology.NewYork:Grun and Stratton Inc.11.Fitzgerald, E.(1929). Straight Language for the Deaf. McClure.
12. Jackson, A. (1981). Ways and Means-3. Hearing-Impairment a Resource Book of Information,Technical Aids,Teaching Material,and Methods used in the Education of Hearing-Impaired Children. HongKong:Somerset Education Authority.
13. Tebbs,T.(1978).Ways and Means:A Resource Book of Aids,Methods,Materials,

Materials and Systems for use with the Language Retarded Child.Hong Kong:Somerset Education Authority.
14. Correspondence program for Parents of the Deaf,John Tracy clinic.
15. Nix,G.W.(1976)Mainstream Education for Hearing-Impaired Children and Youth.New York:Grune and Stratton Inc.
16. Ross, M. Brackett, D. and Maxon, A.B. (1991). Assessment and management of main streamed hearing-impairment children: Principles and practice. Austin: Pro.Ed.17.Webster,A.&Ellwood,J.(1985).The Hearing-Impaired Child in the Ordinary School. London:Croom Helm.

PAEDIATRIC AUDIOLOGY

(Total=75hrs)

Objectives:

After studying this paper at the end of the year,the student should be able to understand the following –

· Development of auditory system and behaviour
· Early identification procedures using subjective and objective measures
· Diagnostic tests for the paediatric population

Unit1 **(15hrs)**

a) Development of human auditory system Basic embryology
· Embryology of the auditory system
· Relevance of the in formation with special reference to syndromes
b) Development of auditory behaviour Prenatal hearing New born hearing
· Auditory development from 0-2years

Unit2 **(15hrs)**

a. Early identification of hearing loss–need with specific reference to conductive and sensor in eural hearing loss.
b. Screening for hearing loss using high risk registers
c. Behavioural screening tests:Stimuli,procedures,recording of response,interpretation of results and validation of results
d. Concept of universal hearing screening

Unit3 **(15hrs)**

a. Objective screening tests:Immittance,Evoked potentials,OAE,
b. School Screening–Objective:Screening for hearing sensitivity,screening for middle ear effusion.Need, criteria,instrumentation.
c. Individual and group screening/Mass media screening tests
Importance of follow-up.

Unit4 **(15hrs)**

a) Hearing testing in neonate and infants:
Behavioural Observation Audiometry(BOA),Conditioning techniques including CORA, VRA and its modifications, TROCA, Play audiometry.

b) Speech Audiometry in children:Tests & material used to obtain:

· Speech Detection Threshold(SDT)
· Speech Recognition Threshold(SRT)
· Speech recognition tests including VASC,WIPI,Nu Chip,Glendonald Auditory Screening Procedure (GASP), Early Speech Perception Test (EST), Speech tests developed in India.

c) Factors affecting speech audiometry results in children,BC speech audiometry

Unit5 **(15hrs)**

a) Functional hearing loss in children:Signs/symptoms,Tests
b) Central Auditory Processing Disorders in children:Signs/symptoms,Screening tests
c) Use of physiological tests in children

· Immittance audiometry in the pediatric population
· Auditory Brainstem Response in pediatric population
· OAE findings in the pediatric population.

LIST OF BOOKS

Compulsory Reading:

1. Northern,J.L.and Downs,M.P.(1991).Hearinginchildren.3rdEd.Baltimore:Williams andWilkins.
2. Hayes&Northern(1996).Infants and Hearing
3. McCormick,B.(ed.)(1993)wnded.PediatricAudiology0-5yrs.Valer ieNewton(ed)(2003). PediatAudiologicalMedicine

Additional Readings:

1. Davis,J.H.,and Hardick,E.J.(1981).Rehabilitative Audiology for children and adults,
2. NewYork:JohnWiley and Sons.
3. Erber,N.P.(1982),AuditoryTraining,Washington:A.G.Bell Association for deaf.
4. Fulton,R.L.andLloyd,L.L.(1975),Auditory assessment of the difficult to test,Baltimore:Williams and Wilkins,Co.
5. Gerber,S.E.(1982).Audiometry in infancy.NewYork:Grune andStratton.
6. Gerber,S.E.,and Mencher.,S.T.(1978).Early diagnosis of hearing loss,NewYork,Grune and Stratton.
7. Ling,D.(1978).Speech and hearing impaired child.Washington:Alexander Graham
8. Bell Association for the deaf.
9. Martin,F.N.(1978).Paediatric Audiology,NewJersey:Prentice Hall.
10.Sanders,D.A.(1993).Management of hearing handicap:Infants to elderly.3rdEd.NewJersey: Prentice Hall.

Basic Statistics and Scientific Enquiry in Audiology and Speech Language Pathology

(Total=75hrs)

Objectives:

After studying this paper at the end of the year,the student should be able to understand the following

- The basics of statistics and its relevance to the field of speech and hearing
- Carryout calculations of data related to basic statistical operations
- Interpret statistical results at basic level and make inferences
- Need or scientific enquiry
- Documentation of research

Part A: Basic Statistics (38Hrs)

Unit 1 (6Hrs)

Introduction to statistics: Its importance in behavioural sciences;descriptive statistics And inferential statistics;usefulness of quantification in behavioural sciences;application to speech and hearing

Unit 2 (9Hrs)

- Measures: scales of measurement;nominal,ordinal,interval and ratio scales
- Data collection: classification of data-class intervals,continuous and discrete measurement,drawing frequency curve,drawing inference fromagraph

Unit 3 (5Hrs)

- Measurement of central tendency: Need,types-mean,median,mode;working out theses measures with illustrations
- Measures of variability: Need,types of range,deviation-average deviation,standard deviation, variance; interpretation

Unit 4 (8Hrs)

- Normal distribution:general properties of normal distribution;theory of probability;illustration of normal distribution;area under normal probability curve
- Variants from the normal distribution:skewness,kurtosis;their quantitative measurement;Introduction to non-parametric statistics

Unit 5 **(10Hrs)**

Correlation:Historical contribution;meaning of correlation;types of correlation product moment correlation,content correlation,rank correlation etc 73 Standard error sampling distribution;Type I and Type II errors,Y2,'t' and 'F-tests;Methods of significance of differences between means and their interpretation and probability levels-small samples,large samples.

Part B:

Research Methods in Audiology and Speech Language Pathology (37Hrs)

Unit 1 **(10Hrs)**

· Scientific status of speech language pathology and audiology; speech language pathology and audiology as a behavioural science; need for scientific enquiry in speech language pathology and audiology; choosing a research problem, formulation of research question,statement of research question,formulation of hypothesis,types of hypotheses

Unit 2 **(9Hrs)**

· Parameters for scientific research in speech language pathology and audiology:Identification of variables and the types; types of data and its nature; measurement procedures in speech language pathology and audiology;instrumental and behavioural measures and recording procedures

Unit 3 **(6Hrs)**

· Sampling methods:types,methods of data collection
· Application of the above with hypothetical illustrations

Unit 4 **(6Hrs)**

· Introduction to research methods and designs:Expost-facto,experimental,standard group comparisons,evaluation research etc.
· Application of these to clinical population and community research

Unit 5 **(6Hrs)**

· Documentation of research:Reporting research-organization,analysis and presentation of data
· Components of research article,report writing style
· Ethics of research in behavioural sciences
· Qualities of a researcher/scientific clinician

LIST OF BOOKS

Compulsory Reading:

1. Hegde,M.N.Clinical Research in Communicative Disorders-Principles and Strategies.(1994) (2nd Edition).Pro-ed.
2. Pannbacker,M.H.and Middleton,G.F.(1994).Introduction to Clinical Research in Communication Disorders.San Diego: Singular Publishing.
3. Maxwell, D.L. and Satake, E. (1997). Research and Statistical Methods in Communication Disorders.Baltimore:Williams and Wilkins

Additional/Optional Reading:

1. Stein,F.and Cutler,S.K.(1996).Clinical Research in Allied Health and Special Education.San Diego:Singular Publishing Group Inc.
2. Portney,L.G.and Walkins,M.P.(1993).Foundations of Clinical Research.Connectient:Appleton and Lange.
3. Woods,A.,Fletcher,P.and Hughes,A.(1986).Statistics in Language Studies.Cambridge:University Press.

CLINICAL PRACTICUM IN SPEECH LANGUAGE PATHOLOGY

1. Carryout informal and formal assessment procedures for the following aspects of speech and language(from a normal child –2 samples)

i) Pre-linguistic skills

· Non-verbal communication

· Child directed speech

· ii) Semantics Syntax and morphology Pragmatics

· iii)Phonological process and its analysis Speech intelligibility

· Transcription of the sample in IPA should be done.

2. Familiarization of the tools used for evaluation and treatment of Childhood communication disorders,Articulation and Phonological Disorders,Maxillo facial anomalies:

· Receptive Expressive Emergen Language Scale

· Scale for Early communication Skills in Hearing Impaired children

· 3-Dimensional Language Acquisition Test

· Northwest Syntax Screening Test

· Bankson's Language Screening Test

· Test for Examining Expressive Morphology

· Autism Behaviour Composite Checklist and Profile

· Linguistic Profile Test

· Tests for learning Disability

· Screening Test for Developmental Apraxia of Speech

· Articulation assessment tests in different Indian languages

· Voice Handicap Index and other perceptual scales.

· Other Indian tests and materials available

3. Presentation of 5cases of detailed assessment and therapy plans(1 each atleast Under each category),using information from relevant proformae,tests administered and treatment options

4.

i) Perceptual analysis of 5 normal and 2 abnormal voice disorder samples

ii) Measurement of the following parameters in 5 normal samples and 5samples with voice disorders:

· Measurement of Fo,Amplitude,Diadacho kinetic Rate,Maximum Phonation Duration,s/zratio,Vital capacity and Mean Air Flow Rate

· Exposure to Electro glottogram and Perturbation measurements using software

· Measures of suprasegmental aspects

5.Transcription and analysis of phonological processes in children using IPA

· Familiarization with cerebral palsy assessment,reflex testing

6. Planning and executing a minimum of 5cases (including child and adult)for approximately

5sessions each and preparation of the following:

· Carryout baseline evaluation

· Preparation of pre therapy reports

· Develop proficiency in using various therapy techniques for childhood communication disorders,voice disorders,articulation and phonological disorders

· Provide guidelines for home-based intervention in the form of home training programs/modules for the above mentioned disorders

· Making appropriate referrals and reparing sample referral letters to various professionals connected with the above mentioned disorders

· Being aware of various centers available for rehabilitation (local,national,international)

7. Counselling parents of children with childhood communication disorders,voice disorders, articulation and phonological disorders; Compiling relevant counseling points pertaining to each of the above mentioned disorders

8. Maintaining audio samples used for the practical analysis

9. Practice in writing sample diagnostic and therapy reports (for real/hypothetical cases)

10. Compiling the clinical work done in to a clinical work record for submission

CLINICAL PRACTIUM AUDIOLOGY

SectionA:Diagnostic Audiology

Familiarization of instrumentation for speech audiometry,immittance audiometry,sound field-testing.

1. Complete pure tone audiometry(with AC/BC,unmasked/masked),interpretation of audio grams, identifying indicators for special/further diagnostic testing, writing case review(25 cases)
2. Speech Audiometry:familiarizing with speech test material in atleast 2 Indian languages,mastering live voice presentation/recorded presentation, administering SAT, SRT, WRS,MCL,UCL,PI/PB function test.
3. Collection of Speech Audiometry test materials in Indian languages.
4. Speech Audiometry on 10 normal subjects, and 20 cases with conductive hearing loss,sensori neural hearing loss and functional hearing loss.Interpretation of speech audiometry results.
5. Holistic audiological assessment for differential diagnosis(Cochlear&Retro cochlear):o Routine pure tone & speech audiometry
o Administering special tests using pure tone:Tone Decay Test,STAT,SISI,ABLB,MLB,SPAR,Test for functional hearing loss.
6. Immittance Audiometry (minimum of 5 cases) – PVT, Tympanometry, Acoustic Reflex testing (ipsi&contra).Interpretation of the findings taking into consideration the ENT reports.
7. Auditory Brain stem Response (ABR)&Oto-Acoustic Emissions(OAE)–

o Preparation of the patient

o Informing the patient/caregiver with respect to the procedure

o Electro demontage

o Conduct the procedure with respect to test protocol(5 cases each)

o BC-ABR,Tone burst ABR

Section B:Rehabilative Audiology

1. Speech and language characteristics of the deaf
2. Management of post-lingual hearing impaired.
3. Role-playa ctivities for teaching language to the hearing impaired.
4. Prepare schedules for educational placement of 5 hearing impaired children having different hearing capacities.
5. Counselling parents regarding educational placement of the hearing impaired.

Section C: **Paediatric Audiology**

1. Informal screening–purpose,materials used,noise makers,their spectral characteristics,procedure(5 normal &5hearing impaired children)
2. Sound field testing:BOA,VRA,Play audiometry(5cases each)
3. Observe auditory response based on video clippings or live case testing.
4. Testing multiply handicapped children.

THIRD YEAR

FLUENCY AND ITS DISORDERS

(Total=75hrs)

Objectives:

After studying this paper at the end of the year,the student should be able to understand the following –

- Characteristics and types of Fluency disorders,specify-Stuttering and Cluttering;Types of Stuttering viz developmental, Neurogenic and Psychogenic
- Theories of stuttering
- Assessment and Management

Unit1 **(15Hrs)**

- Fluency:Definition,development of fluency,factors in fluencing the development
- Definitions of intonation,stress and rhythm-Development of intonation,rhythm,stress – Their implications to therapy
- Measures of fluency and other prosodic aspects

Unit2 **(15Hrs)**

Stuttering:definition,nature,Loci Of stuttering viz Adaptation and consistency effect

- Facts - incidence and prevalence, onset , Heredity, speech language development in individuals with stuttering,role of imitation,socio-economic status and cultural factors Factors which reduce stuttering and factors which increase it. Normal non fluency;primary stuttering;secondary stuttering.Development of stuttering-VanRiper's

Tracks and Peter's and Guitar's 5 developmental levels Cluttering and neurogenic stuttering

Unit3 **(15Hrs)**

- Theories of stuttering:organic vs.functional;cerebral dominance;diagnosogenic and learning theories; demand-capacity model

Unit4 **(15Hrs)**

- Assessment of stuttering;
- Associated problems
- Differential diagnosis of developmental stuttering,neurogenic stuttering,cluttering,normal non fluency,spasmodic dysphonia

Unit5 **(15Hrs)**

· Prevention
· Therapy;rationale;prolongation;shadowing;habit rehearsal technique,DAF,masking shock therapy, desensitization, timeout, airflow and modified airflow technique; Group therapy
· Sequence of therapy procedures VIZ-
· MIDVAS and Perkin's Approach
· Transfer and maintenance
· Measurement of progress;naturalness rating
· Relapse and recovery

LIST OF BOOKS

Compulsory Reading:

1. Curlee and Perkins(Ed.).(1985):Nature and treatment of stuttering.Taylor and Francis,London.
2. Silverman,F.H.(1992).Stuttering and other fluency disorders.PrenticeHall,Inglewood Cliffs.
3. Peter and Guitar(1991).Stuttering-An integrated approach to its nature and treatment

Additional/Optional Reading:

1. Blood stein,O.(1993):Stuttering.Allyn and Bacon,Boston.
2. Fawcus,M.(1995):Stuttering.Whurr Publishers,London.
3. Mark Onslow(1996)Behavioural management of stuttering.Singular Publishing Group Inc.

NEUROGENIC LANGUAGE DISORDERS IN ADULTS

(Total=75hrs)

Objectives:
After studying this paper at the end of the year,the student should be able to understand the following —

· Brain and language relationship
· Aphasic and non-aphasic conditions
· Assessment and management

Unit1 (15Hrs)

Neural bases of language:Neuro anatomical,neuro physiological and for language function

· Patho physiology of neurological lesions affecting speech,language and hearing;concepts of recovery,reorganization and relearning Theoretical considerations in neurogenic language disorders:Competence Vs Performance; loss Vs Interference, Regression hypothesis, multilingualism,Uni dimensional Vs multi dimensional breakdown

Unit2 (15Hrs)

· Definitions of Aphasia
· Etiology
· Classification of aphasia based on anatomical,linguistic and psycho linguistic aspects
· Clinical features:Linguistic,pyscho-social ,neuro-behavioural
· Associated problems in aphasia:their definition,classification and clinical features

Unit3 (15Hrs)

· General and specific neurological examination procedures(higher functions,cranial nerves, motor and sensory systems,reflexes and fundus)
· Neurological investigations :Electro physiological(Electro EncephaloGram, Evoked potentials) and imaging (Computerized Tomography,Magnetic Resonance Imaging)
· Assessment of speech,language and cognitive behaviour of adults with a language based disorder:Informal and formal test procedures (Western Aphasia Battery,

Boston Diagnostic Aphasia Examination, Boston Naming Test, Minnesota Test for Differential Diagnosis of Aphasia,Porch Index of Communicative abilities,Functional Communication Profile, Token Test, Revised Token Test, Bilingual Aphasia Test and others;Indian tests

Unit4 **(15Hrs)**

· Other language disorders in adults:Introduction,Etiology,clinical profile,assessment and management
- Traumatic Brain Injury
- Right Hemisphere Damage Disorder
- Primary Progressive Aphasia
- Language disorders in Dementia

· Differential diagnosis of Adult Neurogenic disorders

Unit5 **(15Hrs)**

· Intervention: Prognostic indicators, Spontaneous recovery; General principles of therapy; specific techniques (Melodic Intonation therapy, Visual Action therapy,Schuell's Auditory stimulation,Thematic language stimulation,developing functional communication and others.

· Team approach; Group therapy; Family support-preparing family, friends and colleagues on what to expect and how to deal with aphasic as a person;Counseling regarding role of family;Individual counselling and spouse and family counseling AAC

LIST OF BOOKS

Compulsory Reading:

1. Understanding Aphasia.(1993).Goodglass,H.AcademicPressInc.

2. Davis,G.A.(1993).A Survey of Adult Aphasia and Related Language Disorders Prentice Hall Inc.

3. Chapey,R.(1994).(Ed).Language Intervention Strategies in Ault Aphasia.Williams and Wilkins Publication

Additional/Optional Reading:

1. Speech and Language Evaluation in Neurology:Adult Disorders.(1985). Ed. Darby, J.K.Grune and Stratton Inc.

2. Acquired Speech and Language Disorders.(1994). Murdoch, B.E.London:Chapman and Hall.

3. Aphasia and Related Language Disorders.(1990). LaPointe, L.L.Theime Medical Publishers.

MOTOR SPEECH DISORDERS

(Total=75hrs)

Objectives:
After studying this paper at the end of the year,the student should be able to understand the following –:

· Characteristics of motor speech disorders in children and adults
· Types of dysarthria, Apraxia (Developmental apraxia of Speech)and other conditions in children and adults
· Assessment and Management

Part A: Childhood Motor Speech Disorders(38Hrs)

Unit1 (8hrs)

· Introduction to neuro motor organization and sensori motor control of speech
o Motor areas in cerebral cortex,motor control by subcortical structures,brainstem,cerebellum and spinal cord.
o Central nervous system and peripheral nervous system in speech motor control.
o Centrifugal pathways and motor control
o Neuro muscular organization and control
o Sensori motor integration
o Introduction to motor speech disorders in children - Dysarthria and Developmental apraxia of Speech.

Unit2 (15Hrs)

· **Cerebral palsy(11hrs**)
o Definition,causes and classification
o Different types of Cerebral palsy: Can the titled be movement disorders
o Disorders of muscle tone:Spasticity,rigidity,flaccidity,atonia
o Disorders of movement:Hyperkinesias and dyskinesias - Ballismus, tremor, tic disorder, myoclons, athetosis,chorea, dystonia,hypokinesias
o Disorders of coordination-Ataxia
o Neuro muscular development in normals and children with cerebral palsy-
o Reflex profile
o Associated problems
o Speech and language problems of children with cerebral palsy
· Syndromes with motor speech disorders(4hrs)
o Juvenile progressive bulbarpalsy
o Congenital supranuclearpalsy
o Guillain-Barresyndrome
o Duchenne muscular dystrophy

Unit3 (6hrs)

- o Assessment of speech in cerebral palsy-objective and subjective methods
- o Differential diagnosis of cerebral palsy
- o Management:Introduction to different approaches to neuro muscular education (Bobath, Phelps and the others); Speech rehabiliatation in cerebral palsy- Verbal approaches: vegetative exercises, oral sensorimotor facilitation techniques,compensatory techniques- correction of respiratory, phonatory, resonatory and articulatory errors;
- o Team approach to rehabilitation; Neurosurgical techniques for children with cerebral palsy

Unit4 (5hrs)

Apraxia of speech in children or developmental apraxia of speech

- o Definition
- o Description:verbal and non-verbal apraxia
- o Differential diagnosis - dysarthria and other developmental disorders
- o Management of developmental apraxia of speech-Facilitation techniques for oral motor movements,speech therapy techniques,generalization of speech

Unit5 (4hrs)

Definition - alternative and augmentative communication (AAC). Application of alternative and augmentative communication methods in developmental dysarthrias and developmental apraxia of speech- Symbol selection, techniques for communication,assessment for AAC candidacy, choosing an appropriate system and technique, training communication patterns,effective use of AAC

PartB:Adult Motor Speech Disorders (37Hrs)

DYSARTHRIAANDAPRAXIA

Unit 1 (12hrs)

(a) Definition and classification of dysarthria in adults.
(b) Types of dysarthria in adults.
(c) Neurogenic disorders learning to dysarthria in adults.

- · Vascular disorders–dysarthria following strokes,CVA,cranial nerve palsies and peripheral nerve palsies.
- · Infection condition of the nervous system–eg.Meningitis,poly neuritis and neuro syphilis.
- · Traumatic conditions–Traumatic brain injury and dysarthria
- · Toxic conditions–dysarthria due to exogenic and endogenic causes.
- · Degenerative and demyelinating conditions–multiple

· sclerosis, Parkinson' sdisease, motor neuron diseases, Amyotrophic lateral sclerosis.
· Genetic conditions–Huntington's chorea, Guillian–Barre syndrome.
· Others leading to dysarthria – Anoxic conditions,metabolic conditions,idiopathic conditions and neoplams
·

· **Unit 2 (7hrs)**

d) Assessment of dysarthria
Instrumental analysis
· Physiological and Electro physiological methods
· Acoustics
· Advantages and disadvantages of instrumental analysis of speech in dysarthria.Perceptual analysis – measures, standard tests and methods, speech intelligibility assessment scales, advantages and disadvantages of perceptual analysis of speech in dysarthria.

e) Differential diagnosis of dysarthria from functional articulation disorders,apraxia of speech, aphasia and allied disorders.

Unit3 **(6Hrs)**

f) Management of dysarthria -Medical,surgical and prosthetic approaches-Speech therapy
· Vegetative exercises
· Oral sensorimotor facilitation techniques
· Compensatory approaches–correction of respiratory, phonatory,articulatory and prosodic errors.
· Strategies to improve intelligibility of speech.

Unit4 **(7Hrs)**

g) Apraxia of speech in adults
· Definition of verbal and non verbal apraxia of speech
· Different types,characteristics and classification
· Assessment of apraxia of speech–standard tests and scales,subjective methods and protocols
· Management of apraxia of speech–different approaches
· Improving intelligibility of speech.

Unit5 **(5hrs)**

Dysphagia:
· Definition
· Phases of normal swallow
· Etiology of swallowing disorders
· Assessment and Intervention
· Mechanical dysphagia related to glassectomy

LISTOFBOOKS

Compulsory Reading:

1. Clinical Management of Motor Speech Disorders in Children.(1999).Caruso,F.J.and Strand, E.A.New York:Thieme.
2. Motor Speech disorders - ATreatment guide.(1991).D work in,P.J.St.Louis:Mos by Year Book.Inc.
3. Motor Speech Disorders:Substrates, Differential diagnosis and Management.(1995).

Duffy, J.R.St.Louis: Mosby.

4. Prefeeding skills.Morris.S.and Klein.M.U.K.:Winslow

Additional/OptionalReading

1. Working with Swallowing Disorders.Langley.J.U.K.:Winslow
2. Acquired Speech and Language disorders - A Neuro anatomical and Functional Neurological Approach.(1994). Murdoch,B.E.London:Chapman and Hall.
3. Neurology for Speech - Language Pathology.(1986).(2nded.) Love,R.J.and Web, W.G.Butter worth.

REHABILITATIVE AUDIOLOGY

(Total=75hrs)

Objectives:
After studying this paper at the end of the year,the student should be able to understand the following –

- Speech reading
- Auditory learning
- Management of individuals with additional problems
- Assistive listening devices
- Implant able devices

Unit1 **(15hrs)**

1. Speech reading
(a) Definitions
(b) Need
(c) Visibility of speech sounds–audio visual perception vs.visual perception
(d) Visual perception of speech by the hard of hearing
(e) Tests for speech reading ability,including Indian Tests
(f) Speech reading activities
2. Factors influencing speech reading
(a) Methods of training:analytical vs.synthetic;(including speech tracking)
(b) Individual and group training

Unit2 **(25hrs)**

Auditory training
(a) Definition and historical background
(b) Role of audition in speech and language development in normal children and its application in education of the hearing impaired.
(c) Factors in auditory training:motivation of the case,intelligence,age,knowledge of progress, etc.
(d) Auditory Verbal Therapy
(e) Methods of auditory training
(f) Auditory training activities
(g) Communicative strategies
(h) Individual vs.group auditory training

Unit3 **(15hrs)**

1. Speech Characteristics of persons with hearing impairment.
2. Management of hearing impaired individuals with special needs
(a) Management of multi handicapped hearing impaired children(MHHI)
(b) Management of children with central auditory processing problems
(c) Rehabilitation of hearing impaired–elderly population

Unit4 **(05hrs)**

Assistive Listening Devices(ALDs)

· Classification based inauditory,visual&tactile stimulation
· Classification based on alerting devices Vs devices for speech perception.
· Selection of ALDs.

Unit5 **(15hrs)**

1. Implantable Devices
-Middle Ear Implants and BAHA(Bone Anchored Hearing Aid)
-Cochlear Implants
-Brainstem Implants
Components,Candidacy,Advantages and Complications for the same.
2. Utility of technology/devices in the management of tinnitus,hypercusis.

LIST OF BOOKS

Compulsory Reading:

1. Clark,G.M.,Cowan, R.S.C.& Dowell,R.C.(1997).Cochlear Implantation for Infants & Children: Advances.Singular Publishing Group Inc.
2. Davis J.M.& Hardick E.J.(1981).Rehabilitative Audiology for Children and Adults.New York:John Wiley & Sons
3. ErberN.P.(1982)Auditory Training.Washington DC:AG Bell Association for the Deaf
4. Schow;R.L.;& Nerbonne. M.A.(Eds)(1996).Introduction to Audio logic Rehabilitation(3rd edition).Bsoton: Allyn & Bacon
5. Maxon,A.B.& Brackett D.(1992).The Hearing Impaired Child:Infancy through high School years
6. Alpiner & Mc.Carthy
7. Aural Rehabilitation (2nded.) Raymond Hill(1982).
8. Visual communication for the HOH. History , Research, methods Oneill & Oyer (981).9 Speech reading (lipreading) Jeffers & Barley (1971)
10. Speech reading–away to improve understanding(2nded) Kaplan,Bally & Garret son(1985).
11. Deafness and communication–Sims,Walter,Whitehead.
12. Thirumalai and Gayathri.Speech of the Hearing Impaired.
13. Bench.

NOISE MEASUREMENT AND HEARING CONSERVATION

(Total= 75hrs)

Objectives:
After studying this paper at the end of the year,the student should be able to understand the following –

· Effects of noise
· Measurement of noise and vibration
· Audiological findings in noise induced hearing loss
· Legislations related to noise

Unit1 **(15hrs)**

a) Noise in the environment and effects of noise:
· Definition of noise
· Sources–community,industrial,music,traffic and others
· Types–steady&non-steady,Impulsive/Impact,intermittent
b) Auditory effects of noise exposure
· Historical aspects
· TTS and recovery patterns
· PTS
· Histo pathological changes(Metabolic,Mechanical,Biochemical,Vascular)
· Effect of noise on communication,Speech Interference Level(SIL),Articulation Index(AI)
· Perceived Noise ind B(PNdB),Perceived Noise Level(PNL),Effective
· Perceived Noise Level(EPNL),Noise Criteria(NC)curves,Noise Reduction Rating(NRR),Signal to Noise Ratio(SNR)
c) Non-auditory effects of noise exposure
· Physiological/Somatic&psychological responses,stress and health,sleep,audio analgesia effects on CNS and other senses
· Effects of noise on work efficiency and performance

Unit2 **(15hrs)**

Audiometry in NIHL,Pure tone audiometry:
· Baseline and periodic monitoring tests,high frequency audiometry,brief tone audiometry,correction for presbyacusis
· Instrumentation:Manual audiometer,automatic audiometer
· Testing environment
· High frequency audiometry,Speech audiometry:
· Other audiological evaluations:
· Impedance audiometry
· ERA
· OAE
· Tests for susceptibility
·

Unit3 **(15hrs)**

Noise & vibration measurement

- Instrumentation and procedure for indoor and outdoor measurement of ambient noise,traffic noise, aircraft noise,community noise and industrial noise.
- Calibration:Biological and instrumental for AC&BC transducers.

Unit4 **(15hrs)**

Hearing conservation:
Need for hearing conservation program,steps in hearing conservation program.
Ear protective devices: (EPDs) Types: Ear plugs, ear muffs, helmets, special hearing protectors,merits and demerits of each.Properties of EPDs:Attenuation,comfort,durability, stability,temperature,tolerance.Evaluation of attenuation characteristics of EPDs.Toughening.

Unit5 **(15hrs)**

Legislations related to noise:

- Damage Risk Criteria (DRC) – definition, historical aspects, use of TTS and PTS,information in establishing DRC,-Committee on Hearing Bio acoustics &Biomechanics (CHABA), Air Force Regulation (AFR 160-3), American Academy of Ophthalmology&Otolaryngology(AAOO),ASA-Z24.5,Damage risk contours,Walsh – Healey Act,Occupational Safety&Health Act(OSHA),Environmental Protection Agency(EPA), Indian noise standards. Correction for aging in NIHL.
- Claims for hearing loss:Fletcher point eight formula,AMA method,AAOO formula,California variation in laws, factors in claim evaluation, variations in laws and regulations,date of injury,evaluation of hearing loss,number of tests.
- Indian studies/acts/regulations,American acts.

LISTOFBOOKS

1. Bruel, and Kjaer,(1982),Noise Control-Principles and practices.
2. Harris,C.M.(Ed.2),Hand book of Noise Control New York:Mc Graw-Hill.
3. Kryter,K.D.(1970).The effects of noise on Man.New York:Academic Press.
4. Tempest,N(1985).The Noise Hand book.London:Assessment Press.
5. Sataloff,R.T.(1987).Occupational hearing loss.Marcel Dekker,Inc.
6. Trivedi, P.R.and Guru deep Raj(1992). Noise Pollution,1st Ed.New Delhi:Akash deep Publishing House.
7. BIS Specifications-List attached

-ISS pecifications-Noise Measurements.
-IS:7194-1973 Specification for assessment of noise exposure during work for hearing conservation purposes.
-IS:9167-1979 Specification for ear protectors.
-IS:6229-1980 Method for measurement of real-ear protection of hearing protectors any physical attenuation of ear muffs.

-IS:9876-1981Guide to the measurement of airborne acoustical noise and evaluation of its effects on man.
-IS:7970-1981 Specification for sound level meters.
-IS:9989-1981 Assessmen of noise with respect to community response.
-IS:10399-1982Methods for measurement of noise emitted by Stationary road vehicles.

Community Oriented Professional Practices in Speech Language Pathology and Audiology

(Total= 75hrs)

Objectives:
After studying this paper at the end of the year,the student should be able to understand the following –

- Epidemiology of speech,language and hearing disorders
- Service delivery and CBR issues
- Legislative support for rehabilitation
- Documentation and ethical issues

Unit1 **(15hrs)**

- Epidemiology of speech,language and hearing disorders
- Environmental,Social,Economic implications and preventive education
- Levels of prevention:Primary,Secondary,Tertiary
- Survey,prevalence,Incidence and its implication in planning
- Health promotion,specific protection,early diagnosis and treatment of a high risk infant,Disability limitation, Educational and Vocational rehabilitation

Unit2 **(15hrs)**

- Approaches to service delivery:Institution based,Camp based,Community based
- And Role of NGOs
- Review of services in India
- Integration of Disabled into the community and ICF2001

Unit3 **(15hrs)**

- Duties and responsibilities of SLP in various settings
- Professional ethics for SLPs,Code of Ethics,Right to Education Act,Industrial
- Employment Act
- Interacting with allied professional and community health workers

Unit4 **(15hrs)**

- Planning services for the communication disordered population: Philosophy,planning,establishment of services for communication disorders-infrastructure,budget, staffing, equipment, furniture, policy making, record keeping, proposal writing.
- Strategies for awareness,public education and information(Camps,Print and audiovisual media,Surveys.Radio broadcasts, street plays).
- Empowering parents,persons with disabilities and the community;Skill transfer to DHLS, parents;grass-root level workers,teachers and health workers

Unit5 **(15hrs)**

· Legislative support for rehabilitation- Rehabilitation Council of India Act (1992),Persons With Disability Act (1995), National Trust Act for the Welfare of Autism,CP,MR and Multiple Disabilities(1999),Environmental Act,Consumer Protection Act, Right To Information Act,UNCRPD Act.

· The professional as a witness;documentation;handling legal issues

LISTOFBOOKS

CompulsoryReading:

1. Baquer,A.&Sharma,A.(1997).Disability:Challenges Vs Responses.CAN publications.
2. Kundu,C.L.,Status of Disability in India,(2000&2003)Ed.Kundu,C.L.,RCI
3. Narsimhan,M.C.&Mukherjee,A.K.(1986).Disability a Continued Challenge:Delhi willey eastern.
4. WHO(2001).International classification of Functioning,Disability and Health.Geneva:WHO
5. Professional Issues in Speech-Language Pathology and Audiology-AText book.(1994). Lubinski R. and Frattali C. California: Singular Publishing Group

Additional/Optional Reading:

1. Administration and Management of Programs for Young Children.(1995)Shoe maker,C.J.NewJersey :Prentice Hall Inc.
2. Management of Child Development Centres.(1993)Hildebrand,V.(3rdEd.).MacMillan Publishing Company.

CLINICAL PRACTICUM IN SPEECH LANGUAGE PATHOLOGY

1. Understand aspects of informal and formal assessment for

i) Fluency disorders

ii) Neurogenic language disorders

iii) Motor speech disorders

2. Identify the Differential Diagnostic categories of these disorders

3. Familiarization on the use of various tests and materials available for assessment

i) Western Aphasia Battery

ii) Illinois Test of Psycho linguistic abilities

iii) Boston Diagnostic Aphasia Examination

iv) Revised Token Test

v) Right Hemisphere Language Battery

vi) Apraxia Battery for Adults

vii) Frenchay Dysarthria Assessment

viii) Stuttering Severity Instrument

ix) Stuttering Prediction Instrument

x) Indian tests and material available

4. Carryout assessment on atleast 1case each from the above mentioned disorders with an assessment report and appropriate referral letters.

5. Carry out therapeutic plan on a client with the above mentioned disorders and submit a report of the same.

6.Conduct a fluency analysis in 4 normal samples (2child sample and 2 adult sample) for the percentage of total disfluency and the individual disfluency on a conversation,narration and a reading task

· Measurement of rate of speech(words per minute,syllables per second)in normals

· Familiarization to different intonation,stress and rhythm patterns in speech samples(of different languages)

· IPA transcription of dysfluent speech;calculating these verity using any of the formal tests

· Comparing suprasegmental aspects of fluent and dysfluent speech samples

· Comparing normal non-fluency speech sample and child stutterings ample along with SSI scores

7.Counselling parameters for the following groups of disorders:

· Neurogenic language disorder(adult/geriatric;type)

· Motor speech disorder(based on age and site of lesion)

· Fluency disorders(age,motivation)

· Being cognizant about the legislative support available and direct the same to the parents/care takers

9.Preparing public education pamphlets,hand-outs on different disabilities

CLINICAL PRACTIUM AUDILOGY

SectionA: Hearing Aid Trial Postings

1. Hearing aid trial:pre-selection of hearing aids,styles,EAC,other issues,inspection of ear moulds. Functional gain method (10 children & 10 adults). Concept of speech banana,aided audiogram.
2. Observing Real Ear Insertion Gain measurement(10cases)
3. Pre-selection based on audiological evaluations(10cases)
4. Hearing Aid trials:
   · Functional gain,REIG,other methods with mono aural fitting,binaural fitting,Programmable hearing aid –Analog Digital
   · Explaining the benefits of hearing aid to the patient/caregiver
5. Counselling patients/caregivers regarding hearing aids – Care, maintenance,adjustments,tips to caregivers regarding acceptance of hearing aids (5children & 5adults), preparation of harness, cleaning of ear moulds. Binaural amplification and its uses.
6. Electro-acoustic evaluation of hearing aids (body level & ear level) ,with and without ear moulds.Equipment for analysis. Calibration of hearing aid analyzer.
7. Models and makes available in the market,their EAC,cost of hearing aids,its suitability to various audiogram configurations,age etc.
8. Specification sheets–BIS,ANSI,IEC with respect to hearing aids.
9. Administration of Self (Help) assessment scales.
10. Fitting of hearing aids for sloping hearing loss.

SectionB: Noise & Rehabilitative Technology

1. Compile information on cochlear implants regarding candidacy,cost,places where It is done and rehabilitation of cases.
2. Calibration of pure tone audiometry(AC,BC,Speech)
3. Noise measurement and attenuation measurement of ear protection devices.
4. Holisticaudiologicalassessmentfordifferentialdiagnosis:

a. Speech:PI/PB Function,Stenger,BC Speech
b. Noise:SAL,SPIN,(10cases)
c. Immittance audiometry:Basic tests,Acoustic Reflex Decay,Eustachian Tube function,SPAR Compiling reports for the above.

SectionC:

Rehabilitation Audiology

1. Role-playing activities for speech reading,communication strategies and auditory learning.
2. Compile activities on management of deaf-blind children.
3. Compile activities on management of children with central auditory processing disorders.

4. Compile information on cochlear implants reg.candidacy,cost,places where It is done and rehabilitation of cases,in Indian contexts.

5. SectionD: Diagnostic Audiology

Holistic Diagnostic Interpretation and Report writing for Adult and Paediatric Test battery.

SUBJECTS

Year	Papers	Internal Examinations
2nd Year	PAPER 1 Medical Record Science PAPER 2 Medical Terminology PAPER 3 Bio-Statistics, Hospital Statistics PAPER 4 Health Information Management I &Nomenclature	2. Basics of Computers 3. Communication Skills
3rd Year	PAPER 1 - International Classification ofDiseases (ICD-11,&10) and Surgical Procedures PAPER 2 - Hospital Organization and Administration, Medical Ethics and Consumer Protection Act PAPER 3 - Health Information Management II, Medical Transcription and Telemedicine PAPER 4 - Hospital Accounting and Financial Accounting and Health Insurance and Billing Design	3 Computers 4 Communication Skills

RECOMMENDED CLOCK HOURS OF INSTRUCTION FOR EACH SUBJECT:

Subjects	**Lecture hours**
Pre and Para clinical subjects	140 hours
Medical Terminology	300 hours
Communication skills	50 hours
Medical Record Science	120 hours
Bio-Statistics, Hospital Statistics	75 hours
Health Information Management I & Nomenclature	150 hours
International Classification of Diseases (ICD-10 & 11) andSurgical Procedures, CPT & HCPCS	175 hours
Hospital Organizations and Administration andMedicalEthics and Consumer Protection Act I	150 hours
Hospital Accounting and Financial Accounting,HealthInsurance and Billing Design.	150 hours
Health Information Management II, Medical Transcription and Telemedicine	175 hours
Practical Experience (Total hours for 3 years)	4310 hours
Special Lectures	50 hours

PRACTICAL TRAINING

	Outpatient Area	Hours
01	Registration of new cases	70
02	Registration of old cases	70
03	Patient guide	40
04	Computerized Alpha Index	20
05	OP coding (diseases) and Indexing	96
06	OP records retrieval	100
07	OP procedure test	2
08	OP Seminar	3
09	OP Statistics	20
10	Investigation Process	3
	Total	**524**
	Inpatient Area	**Hours**
01	Admission office (Computerized & Manual)	160
02	Inpatient record forwarding	150
03	Daily Census (Computer and manual)	160
04	Assembling and deficiency check	160
05	Inpatient diagnoses Coding and Indexing	192
06	Discharge analysis (Manual & Computer)	160
07	Incomplete record control	160
08	Completed record control (Group study)	160
09	Correction and authentication of Birth & death reports	150
10	Medico-legal procedures (OP & IP)	50
11	Medical Statistics	25
12	Record retention and destruction (OP and IP records)	72
13	Seminar	10
14	Test on IP procedures	3
15	Various OPDs	1500
	Total	**1599**

	Miscellaneous section	Hours
01	Orientation introduction to all sections of the hospital	42
02	Hospital Reception	15
03	Record system in other departments of the hospital(Radiation Therapy, MHC, CHAD, RUHSA)	20
04	Secretarial practice	15
05	Library	500
06	Visiting other Health Care Institutions	30
07	Special projects	20
08	Training in Rural and Urban Health Centres	45
	Total	**687**

SCHEME OF EXAMINATIONS

SECOND YEAR

Sl. No.	SubjectTitle	IA	Theory		Practical		Viva Voce	
			Max	Min	Max	Min	Max	Min
1.	Medical Record Sciences	20	80	40		-	-	-
2.	Bio-Statistics, Hospital Statistics	20	80	40	-	-	-	-
3.	Medical Terminology II	20	80	40	-		80	40
4.	Health Information Management I& Nomenclature	20	80	40			80	40
Internal Papers* Computers & Communication Skills are internal papers. Marks to be sent to the university.There will be no university examinations.								

THIRD YEAR

Sl. No.	SubjectTitle	IA	Theory		Practical		VivaVoce	
			Max	Min	Max	Min	Max	Min
1.	International Classification of Diseases (ICD-11, 10) and Surgical Procedures (ICD-9CM),CPT,HCPCS	20	80	40	-	-	80	40
2.	Hospital Organization and Administration, Medical Ethics and Consumer Protection Act	20	80	40	-	-	-	-
3.	Health Information Management II ,Medical Transcription and Telemedicine	20	80	40	-	-	80	40
4.	Hospital Accounting and Financial Accounting And Health Insurance and Billing Design	20	80	40	-	-	-	-
	PRACTICAL EXAMINATION							

SECOND YEAR SYLLABUS

PAPER 1: MEDICAL RECORD SCIENCE

Subject description: Information is the life blood of health care delivery system. The medical record, in manual or automated form, houses the medical information that describes all aspects f patient care. Physicians, nurses, and other health care providers require medical information for treating a patient. The medical record serves as a communication link among care-givers. Documentation in the medical record also serves to protect the legal interests ofthe patient, health care provider, and health care facility.

OBJECTIVES:

On completion of this Course, the students will be able to:

5.4 Get acquainted with brief Historical Review of Medical Records, in USA, at the International Level and in India
5.5 Learn Definition of Medical Record, its Values accruing to various users
5.6 Be familiar with Medical Record Forms and their Content Index Cards and Registers
5.7 Review of health records for Deficiencies, Qualitative & quantitative analysis
5.8 Acquire knowledge for the organization and management of medical record department (both for Inpatients & Out-patients, including Emergency care patients)
5.9 To know about different numbering, filing and color coding systems
5.10 To know about the role of a health record professional in quality management & improvement, Utilization and risk management programmes.
5.11 To know about health record documentation policies, corrections and authentication procedures
5.12 To know the Legal Aspects & Confidentiality of Medical Records
5.13 To know about different nomenclatures, and classification systems of medicine and procedures
5.14 To know about manual and computerized medical record administration
5.15 To know about claims through medical insurance
5.16 Learn the techniques to file medical records in an accessible manner;
5.17 Learn the Retention Polices of medical records, and ways of disposal of Inactive Medical records
5.18 Get acquainted with the latest storage devices- Scanning & Disk Storage, Digital Record keeping system, etc
5.19 Maintain and Manage Disease Index, Physician Index, Operation Index and registerssuch as Admissions& Discharges, Birth, Death, Medico-legal, Notifiable Diseases, Cancer Registry etc., and indexes such as Disease, Physician, and Operations.

CONTENTS OF THE CURRICULUM THEORY

8 History of Development of Medical Records During different periods

8.1. Early Ancient Times to Renaissance Period (16^{th} &17^{th} Centuries)
8.2. 18^{th} -20^{th} Centuries and Till Date
8.3. In U.S.A.
8.4. At International Level
8.5. In India

9 Characteristics of quality Medical Records:

9.1. Definition, Characteristics of 'Good' Medical Record
9.2. Values of 'Good' Medical Record to various users
9.3. Required Characteristics of entries in medical Records
9.4. Responsibility for Medical Record Quality
9.5. Source-oriented, Problem-oriented, and Integrated medical records
9.6. Medical Record Forms and their Content
9.7. Standard Order of Arrangement of Medical Record forms
9.8. Analysis of Medical Record-Quantitative & Qualitative
9.9. Incomplete Record Control

10 Medical Records for different patient encounters with health care facility

10 Ambulatory Care Records {Emergency & Outpatient Records]
11 Clinical Records in Long Term Care and Rehabilitation Facilities
12 Mental Health Records

11 Filing Methods, Storage, and Retention

11 Numbering and Filing Systems
12 Filing
13 Storage- Microfilming and Disk Storage
14 Retention
15 Registers & Indexes
16 Record movement control & Tracking system

12 Organizational Aspects of Medical Record Department/Services

4. Policies
5. Functions
6. Location, Space and Layout
7. Equipment
8. Forms Designing and Control
9. Medical Records Flow and Processing

13 Organizational Aspects of the Centralized Admitting Services

13.1. Principles of Identification of a Patient
13.2. Methods of Collection of Identification Data
13.3. Types of Central Admitting Services
13.4. Admitting Policies
13.5. Procedure Outlines for Admissions
13.6. Flow of Records following Admissions
13.7. Advantages of good Admitting Policies and Procedures
13.8. Pre-requisites for smooth & efficient functioning of the Centralized Admitting Services

14 Medical Record Department Management

2. Planning, Organizing, Directing and Controlling
3. Personnel
4. Principal Responsibilities and Duties of the Medical Record Aministrator/Director
5. Tools of Management in the Hands of the Medical Record Administrator/Director

15 Intradepartmental and Interdepartmental Relationships

5. Developing Intradepartmental Relationship
6. Developing Interdepartmental Relationships with various Departments of the Hospital

16 Quality Management

2 External and Internal Pressures for quality
3 Quality Assessment and Quality Improvement
4 Quality Assurance & Medical Care Evaluation
5 Utilization management
6 Peer Review
7 Utilization review processing & outcomes of Utilization management
8 Risk management program [Organization & Operation
9 International Standards Organization [ISO], Quality Council of India, & National Accreditation Board of Hospitals [NABH]

17 Heath Care Statistics, Quality control of Data Collection & Presentation

2 Incomplete Record Control
3 Inpatient census and rates computed from it.
4 Ambulatory care statistics
5 Long term Care Statistics
6 Processing and reporting of Reproductive Health Statistics
7 Reporting of Notifiable Diseases to Public Health Authorities

18 Nomenclatures and Classification Systems:

3 Standard Nomenclatures of diseases (SNDO).
4 Current Medical Information Terminology.
5 Systematized Nomenclature of Pathology (SNOP)
6 Systematized Nomenclature of Medicine (SNOMED)

7 Common Procedures Coding System (HCPCS)
8 Current Procedural Terminology
9 International Classification of Functioning, Disability and Health (ICF)
10 Case-Mix Classifications
11 Diagnosis Related Groups
12 ICD – 9 (CM)
13 ICD – 10
14 ICD- Oncology (ICD - O)

19 <u>Medico-Legal Aspects of the Medical Records</u>

4 Medical Ethics , Hippocratic Oath, and Code of Ethics for the Medical Record Professionals
5 Ownership of the Medical Record
6 Privileged Communication and confidentiality of Medical Records
7 Release of Information: To the Patient , To Authorized Persons /Agencies Legal Implications of release of Information to unauthorized , Persons/Agencies.
8 Consents: Different types and their validity, invalidity blanket, and improper consents.
9 Corrections in identification data medical documentations
10 Rights and responsibilities of patients
11 Medical Record in a Court of Law
12 Legal requirements in Retention of Medical Records

PAPER 2 : MEDICAL TERMINOLOGY

OBJECTIVES:

On the completion of this Course, the students will be able :

5 To know the elements of medical words.
6 To develop sense of correctness of medical terms.
7 To gain an understanding of standard medical abbreviations.
8 To understand the relationship between medical terms and their synonyms in common usage.

9 To spell correctly the medical terms, to detect the meaning of unfamiliar medical terms, by analysis into their elements, and to follow directions given in medical phraseology

10 To appreciate the logical order of medical terms, the exactness of concepts in medical terms, and the importance of medical terminology consciousness and continuous study

All the above characteristics will enable the students in

11 Developing an ability to read and understand medical records and the medical literature;
12 Writing terms correctly when abstracting medical records
13 Establishing accuracy in International Classification of Diseases, Surgical procedures which will be useful in statistics, medical billing, and auditing medical insurance claims.

I . Introduction to Medical Terminology

4 Definition and Origin of Medical Terms.
5 Components of Medical Terms
6 Prefixes
7 Suffixes
8 Roots and Combining forms
9 External Anatomy and Internal Anatomy
10 Additional Lists and their combining forms grouped as:

10.1. Verbs

10.2. Adjectives
10.3. Body Fluids
10.4. Body Substances
10.5. Chemicals
10.6. Colours
10.7. Phobias

5 Terms Relating to the Body as a Whole

5.1. Study of the Body
5.2. Basic Structures
5.3. Cells
5.4. Tissues
5.5. Organs
5.6. Systems
5.7. Directions
5.8. Anatomic Planes and Position

6 The Skeletal System

6.1. Pathologic conditions (Inflammations and Infections)
6.2. Hereditary, Congenital and Developmental Disorders
6.3. Fractures
6.4. Metabolic and Deficiency Diseases
6.5. Symptomatic Terms
6.6. Diagnostic Terms
6.7. Oncology Terms
6.8. Operative Terms
6.9. Laboratory Tests and Procedures
6.10. Standard Abbreviations

7 The Muscular System

7.1. Pathologic Conditions
7.2. Degenerative and Innervative Disorders
7.3. Hereditary, Congenital and Developmental Disorders
7.4. Symptomatic Terms
7.5. Diagnostic Terms
7.6. Oncology Terms
7.7. Operative Terms
7.8. Laboratory Tests and Procedures.
7.9. Standard Abbreviations

8 Integumentary System

7.10. Pathologic Conditions
7.11. Fungal, Viral and Parasitic Infections
7.12. Hereditary, Congenital and Developmental Disorders
7.13. Symptomatic Terms
7.14. Diagnostic Terms
7.15. Oncology Terms
7.16. Operative Terms
7.17. Laboratory Tests and Procedures

2 The Cardiovascular System

2.1. Pathologic Conditions
2.2. Hemorrhages and related Conditions
2.3. Hereditary, Congenital and Developmental Disorders
2.4. Symptomatic Terms
2.5. Diagnostic terms
2.6. Oncology Terms
2.7. Operative Terms
2.8. Laboratory Tests and Procedures
2.9. Standard Abbreviations

3 The Respiratory System

3.1. Pathologic Conditions
3.2. Symptomatic Terms
3.3. Diagnostic Terms
3.4. Oncology Terms
3.5. Operative Terms
3.6. Laboratory Tests and Procedures
3.7. Standard Abbreviations

4 The Gastro-Intestinal System

4.1. Pathologic Conditions
4.2. Hereditary, Congenital and Developmental Disorders
4.3. Symptomatic Terms
4.4. Diagnostic Terms
4.5. Oncology Terms
4.6. Surgical Procedures
4.7. Laboratory Tests and Procedures

10. Standard Abbreviations

5 The Genito-Urinary System

(A). Urinary Tract

5.1. Pathologic Conditions
5.2. Hereditary, Congenital and Developmental Disorders
5.3. Symptomatic Terms
5.4. Diagnostic Terms
5.5. Oncology
5.6. Surgical Procedures
5.7. Laboratory Tests and Procedures
5.8. Standard Abbreviations

3 Male Reproductive Organs

3.1. Hereditary, Congenital and Developmental Disorders
3.2. Sexually Transmitted Disorders (STD)
3.3. Symptomatic Terms
3.4. Diagnostic Terms
3.5. Operative Procedures

4 Female Reproductive Organs

4.1. Hereditary, Congenital and Developmental Disorders
4.2. Sexually Transmitted Disorders (STD)
4.3. Symptomatic Terms
4.4. Diagnostic Terms
4.5. Operative Procedures
4.6. Laboratory tests and Procedures

6 The Endocrine System (Pituitary-Anterior & Posterior: Hypothalamus; Thyroid;Parathyroid;

Adrenal-Cortex and Medulla; Pineal body; Pancreas; Gonads-Ovaries & Testes & Thymus)

6.1. Pathologic Conditions
6.2. Hereditary, Congenital and Developmental Disorders
6.3. Symptomatic Terms
6.4. Diagnostic Terms
6.5. Oncology
6.6. Surgical Procedures
6.7. Laboratory Tests and Procedures
6.8. Standard Abbreviations

7 The Nervous System

4 Neurological Disorders

7.1. Pathologic conditions
7.2. Hereditary Congenital and Developmental Disorders
7.3. Circulatory Disturbances
7.4. Other Organic Abnormalities
7.5. Oncology
7.6. Diagnostic Terms
7.7. Surgical and other Procedures
7.8. Laboratory Tests and Procedures

5 Psychiatric Disorders

5 Psychiatric Disorders
6 Other Descriptive and Diagnostic Terms
7 Various Tests
8 Treatment Methods for Psychiatric Conditions

8 The Sensory Organs

(A). Sense of Vision

8.1. Pathologic conditions
8.2. Hereditary, Congenital and Developmental Disorders
8.3. Diagnostic Terms
8.4. Operative terms
8.5. Oncology
8.6. Vision Tests and Procedures

(B). Sense of Hearing

9 Pathologic condition
10 Hereditary, Congenital and Developmental Disorders
11 Oncology
12 Surgical Procedures
13 Hearing Tests.

(C). Sense of Smell

11 Pathologic and Other terms
12 Laboratory Tests

15 Sense of Taste

1. Pathologic and Other terms

16 Touch and Other Cutaneous Senses

1. Terms referring to these senses

BLOCK-XII Multiple-System Diseases

2 Inflammations and Infections
3 Symptomatic Terms
4 Diagnostic Terms
5 Laboratory Tests and Procedures

PAPER 3 :
BIOSTATISTICS & HOSPITAL STATISTICS

OBJECTIVES:

On completion of this Course, the students will be able to:

3 Define i) General Statistics, ii) Biostatistics iii) Hospital Statistics and, iv) Health Statistics
4 Define various important Hospital Statistical Terms
5 Understand the basics of theoretical aspects of General Statistics & Biostatistics;
6 Learn the methods for the collection, presentation, analysis and interpretation of numerical data
7 Compute data on Admissions & Discharges, monthly analysis of Hospital Performance Statistics and the Daily Inpatient Census;
8 Compute percentages and rates commonly used in preparation of hospital statistical information;
9 Describe the role of the Medical Record Practitioner in ensuring accuracy and reliability of statistical Data compiled and presented by the Medical Record Department

OBJECTIVES (RESEARCH METHODOLOGY)

7 Enhance conceptual knowledge in budding researchers.
8 Use conceptual knowledge of Research Methodology in designing and implementing research design.
9 Train researcher to draw better conclusions from the analysis.

8. ***GENERAL & BIO-STATISTICS***

1. ***Definition*** of Statistics and Biostatistics
2. ***Frequency Distribution:*** Measures of Central Tendency – Arithmetic Mean, Median and Mode for un-grouped and grouped data
3. ***Presentation of data:*** Bar diagram, Pie Diagram,Histogram,Frequency polygon,Frequency curve, and Line diagram.
4. ***Measures of Variation:*** Range, Inter Quartiles, Mean Deviation, Standard Deviation Co-efficient of Variation
5. ***Probability:*** Definitions of Classical Probability (Priori) and Frequency, Probability (Posteriori), Addition and Multiplicative Theorems of Probability
6. ***Probability Distribution:*** Binomial distribution, Poisson distribution and Normal distribution
7. ***Sampling***- Definition: Population and simple Sampling, Simple Random Sampling, Stratified Random Sampling, Systematic Random Sampling and ClusterSampling
8. ***Correlation and Regression:*** Scatter Diagram, Linear Correlation andLinear Regression Equation Test of Significance – Procedure Test of Significance for large samples and for small samples Chi-square Test – Testing for association Misuse of Chi-square Test

9. ***HOSPITAL STATISTICS***

2 Definition of hospital statistics, and important Hospital Terms
3 Sources of Hospital Statistics – Registers, Medical Records and Daily Ward Census
4 Analysis of Hospital Services and Discharges
5 Important Rates, Ratio and Percentages with Formula
6 Uses and Limitations of Hospital Statistics.
7 Hospital Statistics Reporting.

3 VITAL STATISTICS

3.1 Definition and Uses of Vital statistics
3.2 Methods of Collection of Vital Statistics
3.3 Formulae for processing Vital Statistics:
Crude Rates
Specific Rate
Mortality Rates – Crude Death Rate, Specific Death Rates with respect to age , sex etc. Cause-of-death Rates; Infant Mortality Rates; Neonatal Mortality Rates
Post-Neonatal Mortality Rate or Late Infant Mortality Rate

4 Health Statistics

4.1 Introduction
4.2 Uses and Sources
4.3 Collection of hospital statistical data: Birth,Death,fetal death,live birth and immature infants,reporting,determination of basic data,daily analysis of hospital service,discharge analysis procedure,cumulative method,monthly and annual reports,computation of percentage (ratios) inpatient census and bed occupancy rate (computerized and manual), presentation of hospital data.
4.4 Criteria of ill health
4.5 Classification of healthy and sick
4.6 Measurement of morbidity

Research Methods:

5 Research in medicine and health care
6 Clinical research and clinical trials
7 Health record data in research
8 Research process
8.1 Defining the research question (problem)
8.2 Determining a research design and method
8.3 Data collection procedures
8.4 Data analysis
8.5 Presenting results
8.6 Publishing researcher
8.7 quality improvement and the use of aggregate data
8.8 The role of HIM professionals in quality improvement programs
8.9 Collecting data through questionnaire and Record forms, Methods of collecting data, literature review and steps in research methods Presentation of Data – Bar Diagram; Pie Diagram; Histogram; Frequency, Polygon, Frequency Curve; Cumulative Frequency Curve and Line Diagram.

Paper 4 :

HEALTH INFORMATION MANAGEMENT 1 & NOMENCLATURE

Health Information Management serves the healthcare industry and the public by managing, analyzing, and utilizing the data vital for patient care and making the data accessible to healthcare providers. Enhancing individual patient care through timely and relevant information is one of the primary goals for the Health Information Management Technology.

8. Informatics and Health Information Management

Introduction, Health care delivery systems, Informatics in Health Care, Health Information Management profession, Data and formation management, Information systems Development

9. Aggregate Health care data

Secondary records and Health care database, Clinical classification and Terminologies, Reimbursement methodologies.

Nomenclature

4. Introduction to Nomenclature
5. Early Nomenclature
6. Specialty Nomenclature
7. Statistical Classifications
8. Other Classifications
9. Choosing a Classification System
10. Encoding Systems
11. Summary

COMPUTERS

INTRODCUTION

Hospitals are highly complex institutions, with thousands of individuals sharing responsibility for the care and services provided to patients. Since medical interventions have expanded exponentially over the past several decades and average length of stay in hospitals has dropped sharply, patients now receive an enormously complex array of services in a much shorter period of time. Effective care and the survival of patients require the management of large amounts of information over a relatively short period of time. Failure to communicate or accurately record information in a timely manner can easily cost the life of a patient. In addition, growing pressures to constrain health care costs have put great pressure on hospitals to be more efficient as well as effective. The survival of a hospital requires the effective management of large amounts of information.

The hospital of the twenty-first century cannot survive without effective information technology. Relatively quickly, information systems and technology have become integral components of health care delivery systems.

Learning Objectives:

Medical informatics, may defined as the art and science of processing medical information.

Computer Applications and Technologies in Healthcare

This course provides an overview of healthcare information systems with a concentration on computerized health information management (HIM) functions. Students will be introduced to common software applications utilized to perform HIM processes. Emerging technology issues in healthcare will be explored.

Office Applications

This course focuses on the concepts and operation of the main components of word processor, electronic spreadsheet, database management, and presentation software programs. Students will gain fundamental knowledge of a major software suite and learn skills that have practical application in real world situations.

Basic ICD-10, ICD-9CM Coding

This course is designed to introduce the student to medical nomenclature and classification systems. Emphasis will be placed on ICD-9-CM structure, conventions, and guidelines for coding in hospitals and physicians offices.

On completion of this programmes, trainees will have knowledge of accessing and processing biomedical and clinical information, basic principles of patient and hospital data base management (expertise in computing, communications, and content)

16. The Internet

Define the Internet How the Internet worksInternet capabilities and limitations How to connect to the Internet via modem ISDN, etc. Navigate the World Wide Web Identify services and tools offered on the Internet Use services and tools offered on the Internet Explain book marks Safety

17. Email

Define electronic mail Compose electronic messages Send electronic messages using appropriate format Transmit document using electronic mail system

18. Basic knowledge of networks

Explain communications standards Describe network structures Explain network types and protocols Explain network connectivity Explain the function of servers in a graphic network Describe various network operating systems
Explain the difference between network software and individual use software Use a network to access, file, and store files

19. Information processing activities

Key, process, print and store text and data information using integrated software Troubleshoot basic computer malfunctions Load media devices Set up print devices Operate scanner devices Operate Print devices Maintain print devicesMonitor peripheral equipment operations

Operating Systems

Identify operating systems and their attributes (i.e., DOS, Unix, Macintosh, Windows) Identify the advantages and disadvantages of the computer to individuals and business. Identify the roles and equipment used for input, processing, and output in an information system.Identify correct safety procedures Demonstrate basic computer literacy Create directories/folders and sub-directories Format disks
Manipulate files (copy, rename, delete) Keyboard proficiently by touch Computer File Manipulation

Create data directory and subdirectories/folders and place files in subdirectories/folder. Copy, rename, move and delete files. Copy a disk.
Make backup disks/files of a data directory or Subdirectory/folder and delete data from backup disks/files

4. Personal computer systems

Monitor system status and performance Run diagnostics Report computer system malfunction(s) Report software malfunction(s) Maintain securityPerform backup procedure(s) Perform preventive maintenance Follow log-off and power-down procedure(s) Follow equipment maintenance procedures Follow quality control procedures

5. Maintain computer security requirements

Follow security rules, regulations, and codes Implement security procedures

6. Software applications

Define software types and functions Describe need for application software Describe different types of software applications Explain advantages and disadvantages of integrated and dedicated software Explain software copyrightlaws Explain data compression techniques Explain use of passwords/security Utilize desktop productivity tools

e) Operation of peripheral devices

Identify peripherals and operating requirements of each Explain purpose of input devices (e.g., keyboard, mouse, scanners, pens, bar code readers,credit/debit/smart cards, voice, video, gloves)

Describe operation of output devices (e.g. voice, speaker output devices, printers, plotters, printer sharing units, SCSI interface, video display) Describe operation of multimedia (video, audio sound)

g) Information Processing Cycle

Describe difference between data files and program files

Database

Define database:
Explain terms used in database systems Describe common functions of database systems
Use database to create, input, edit, and display fields and records Analyze structure of database file
Perform calculations with a data base file Alter structure of database file Sort records based on multiple fields Identify advanced database technology Use appropriate referencematerials Utilize relational database
Enter elements into database Proofread database Explain database Design report formats Transfer data to and from remote database Print reports using data from multiple databases Use database files with other application software Verifyaccuracy of output (e.g., edit reports)

Basic Data Processing

Input, update and store data into records in an existing database
Open stored spreadsheet, input and update data into spreadsheet, store revised spreadsheet and print revised spreadsheet

Database and Spreadsheet Operations

Plan and create database, input and update data into records, store database and print quick reports from database.
Create spreadsheet, input data into spreadsheet, update data in spreadsheet and store spreadsheet.

Introduction to Spread sheet packages

Introduction to Word Processing packages Document processing Key, print and store merge documents (form letters, mailing labels and envelopes)

Scan documents onto a formatted storage medium and import into a word processing program
Locate and retrieve information from a variety of electronic sources Prepare, place and send information on the internet Key, Print and store transparency masters for presentation from legible longhand or edited rough draftusing presentation software.

10. Basic Computer Concepts and Applications

Explain how data is stored in main computer memory Explain how computer system executes program instruction Explain computer storage capacity Explain how data is represented Describe data storage devices Identify types of memoryDescribe back-up and archival disciplines Merge a database application and a spreadsheet application with a word processing document.
Use available software to input personal, business, and organizational names in proper indexing order, and produce an alphabetical list.
Integrate database, spreadsheet and graphic files Convert documents from one system to another Demonstrate use of computer thesaurus Use multimedia techniques/resources Perform merge functions

11. Hospital Information System (HIS) with Electronic Medical Records (EMR)

COMMUNICATION SKILLS

OBJECTIVES:

On completion of this course, the student will be able to:

- Cut down common grammar errors
- Read, write and speak in right terminology appropriate to the context
- Develop vocabulary related to general and office communications
- Communicate effectively
- Use well mannered body language
- Maintain eye contact during conversations
- Demonstrate skill in writing and speaking
- Undertake office correspondence, that include letters, circulars, memos, reports, writing departmental policies and procedures
- Project department related presentations before invited audience

14. ***Basics of Communication:***

- Process of and models of communications
- Types of communications:
  - Oral communication
  - Written Communication
  - Non-verbal communication & Body language
- Barriers to communications

15. ***Reading Skills:***

- Types of readings:Skimming, Scanning, intensive / loud / silent reading, map reading
- Sample passages for reading with comprehension exercises
- Tables and Graphic Organizers

16. ***Listening skills***

- Definition of listening
- Types of Listening
- Purposes of listening
- Obstacles for listening
- Contexts of listening
- To be a good listener
- Listening to a Lecture

17. ***Speaking Skills***
    - Formal & Informal Conversation: Agreeing, Emphasizing, thinking ahead, correcting oneself, interrupting, politely expressing reservations, opinions, disagreeing, accepting invitations declining invitations etc.
    - Telephone Conversation
    - Interviews
    - Visual Presentation

18. ***Writing Skills***
    - Tenses
    - Writing Sentences
    - Writing Paragraphs: The Development of a Paragraph
    - Formal Letters – personal, applications, bio-data,
    - Official correspondence: Outgoing correspondence, replying incoming correspondence, writing circulars, notices, charge memos
    - Writing Reports
    - Tables, Charts and Graphs
    - Medical Transcription

19. ***Study Skills***
    - Improving Study Skills
    - Note Taking: Some Basic Devices,
    - Writing Summaries, observation reports, and action plan

20. **Effective communication in Hospitals:**
    - Communicating to match the mission and vision of the
    - institutionThe strategy of keep informed
    - The nature of communications in a
    - hospitalUpward and Downward
    - Communications Reporting of
    - feedbacks
    - Intra and interdepartmental communications
    - Communications with Medical Staff, Paramedical staff and Support Services
    - StaffThe care provider – customer relationship
    - Patient as VIP and his rights; Patient's locus standing, his agony, pains and
    - tensionsDirecting patients to right destinations
    - Giving hope to the hopeless
    - Communications with the sick and
    - injured
    - Communications with teens and youngsters, middle aged and the aged
    - Keeping up good impressions and manners before patients and their
    - attendantsBody language – How can you say it better than words?
    - Communicating practically and technically feasible solutionsHow to say “no” graciously?
      Effective Intra and interdepartmental communications
      Common problems arising out of bad quality communications and trouble shooting techniques.

THIRD YEAR

PAPER 1 :

International Classification of Diseases(ICD-11 & 10) and SurgicalProcedures(ICD-9CM), CPT, HCPCS

Coding of final diagnosis and secondary diagnosis.disease and operation nomenclatures, International Classification of Disease 10, International Classification of Disease – 9CM indexing of patient care data.Introduction and usage of International Classification of Disease in practicals.

International Classification of Diseases

ICD-10, ICD-9 CM (Surgical Procedures)

CPT – Current Procedural Terminology (Introduction)

HCPCS – Healthcare Common Procedure Coding System (Introduction)

ICD-10 - Alpha-numeric coding
Volume 1 – Tabular list
Volume 2 – Instruction manual
Volume 3 – Alphabetical Index

Classification of Diseases according to Clinical Pertinence

ICD-9CM (Procedure) coding – International Classification of Diseases – Clinical modification

CPT – Introduction of CPT and HCPCS – 3 levels of codes

PAPER 2 :

HOSPITAL ORGANIZATION AND ADMINISTRATION.MEDICAL ETHICS & CONSUMER PROTECTION ACT

6. **HOSPITAL ORGANIZATION AND ADMINISTRATION**

- ***Introduction to Hospital Administration***

a) Who's Who in hospital – Key administrators and their functions, overview of medical and para-medical specialities, main service departments:

b) Overview of health services – government services: private & not for profit: primary, secondary & tertiary health care: types of hospital: community, super – speciality etc.

- ***Principles of Organizational Management***

  - Culture, Values and Mission
  - Organizational Structure
  - Planning and Controlling
  - Hospital Organizational Structures – Government, Private and Not for Profit.

- ***Managing People (Human Resources)***

  - Overview – scope and functions of HR dept, HR planning
  - Recruitment and Appointment
  - Training and Development
  - Goal setting, rewards systems and motivation
  - Performance Appraisal
  - Promotion, internal transfers
  - Problems and Legal issues
  - Leadership
  - Working in teams

- ***Clinical Services***

  - Overview of clinical departments and services – OPD, In-patients, ICU, Surgical, Emergency, Community/family Health, Paramedical & Rehabilitation
  - Types of doctors, their training, roles and responsibilities
  - The role & responsibilities of the HOD
  - Medical Audit
  - Medical Negligence & Litigation

- ***Nursing Services and Wards***

  - Objectives of the nursing service
  - Nursing service organization, types of nurses, their training, qualifications and functions, other ward staff, personnel issues.
  - Ward management

- ***Product-based services***

  - Pharmacy purchasing and stores
  - Pharmacy dispensing
  - Prosthetics & Orthotics

- ***Diagnostic Services (Radiology, Laboratories, Blood Bank etc)***

  - Overview – main services and their functions
  - In-house services

- ***Patient Services (non medical)***

  - Reception, Welcome/Help Desk
  - Patient facilities, wheelchairs, Ambulances
  - Public Relations – objectives, functions, policies, different media, methodologies, networking

- ***Managing Support Services***

  - Overview of functions of all support services including Laundry, Catering, Cleaning, CSSD, Transport, Security, Materials (Purchase and Stores) etc
  - Functions of GS Office

- ***Hospital Infrastructure (Buildings and Plant)***

  - Civil Engineering – Planning and maintaining buildings, water & sewage
  - Electrical Engineering
  - Mechanical Engineering, Equipment Maintenance, Medical Gases, etc
  - Biomedical Engineering

- ***Hospital Information Systems***

  - Analysing information requirements
  - Reporting systems
  - Early warning systems
  - Computerized Systems, intranet

- ***Managing the Organization (putting it all together)***

    - Planning: strategy and corporate planning
    - Dealing with risk and uncertainty
    - Organizational Development and Change management
    - Corporate Governance & legal matters
    - Relationships with other institutions and organizations

MEDICAL ETHICS & CONSUMER PROTECTION ACT

This course is designed to provide Medical Record professionals, an advanced knowledge of structure of Indian Judicial system, Basics of Medical laws, Matters relating to Medical Negligence, Medical Ethics and Consumer Protection Act.

This course will equip student with general skills needed in guiding medical professionals to follow required standards of medical documentations to protect the welfare of the health care institution and the patients.

COURSE OBJECTIVES:

At the end of the course student will be able to understand:

- Structure of Indian Judicial System, Medico-legal cases.
- Prevention against complaint of medical negligence
- Negligence as a crime
- Encountering consumer by Medical Professionals
- Code of Medical Ethics
- Rights of patient as a consumer

Laws relating to Hospital Administration:

1. Structure of Indian Judicial System:

Subordinate courts - Various Tribunals - High court and Supreme court - their working relationships and effect of orders.

2. ***Medico – legal cases:***

IPC – Medical Termination of Pregnancy Act 1971, Transplantation of Human Organs Act.

3. ***Law of Contract:***

Patient as a consumer - Law of Tort - Composition of D.C.D.R.F, S.C.D.R.C and N.C.D.R.C - powers, terms and jurisdiction, enforcement of orders.

4. ***Medical Negligence:***

Negligence - Medical Negligence - Contributory Negligence - Gross Negligence - Criminal Negligence - Onus of Proof - Prevention of such Negligence.

5. ***Liability and Compensation:***

Vicarious Liability - Liability of Medical Professionals and Para-medical staff - Quantum of Compensation - Applicability of provisions of Consumer Protection Act for various institutions.

6. ***Consumer Protection Act 1986:***

Various provisions - structure, powers and jurisdiction of various forums constituted in C.P Act - orders - how enforced.

7.Consent:

Consent - Medical Consent - various types of Consent - Consent forms - "informed Consent" in clinical trials - Consent as a process - full proof methods for proper Consent - various defects in obtaining Consent.

8.Important case studies:

District Forums, State Consumer Disputes Redressal Commission - National Consumer Disputes Redressal Commission Case study as how cases were decided.

PAPER 3

HEALTH INFORMATION MANAGEMENT II, TRANSCRIPTION & TELEMEDICINE

Health Information Management serves the healthcare industry and the public by managing, analyzing, and utilizing the data vital for patient care and making the data accessible to healthcare providers. Enhancing individual patient care through timely and relevant information is one of the primary goals for the Health Information Management Technology.

1. Development of Health Care Information

Health Care Information standards, Paper based Health Records, Computer based patient records, Ethical issues in Health Information Management

2. Comparitive data

Research methods, Clinical quality management

3. Management of Health Information Services

Principles of Management and Leadership, Work Design and Performance improved, Human Resources Management, Training and Development, Project Management, Strategic Management.

Medical Transcription:

- Basics of Medical Transcription
- Objectives of Medical Transcription
- Rules of Medical Transcription
- Advantages of Medical Transcription
- Division of medical words into their component parts
- Forms, Suffixes, Prefixes and Terminology
- Laboratory tests, Clinical procedures and Abbreviations

Telemedicine:

- Basic health care
- Classification of Telemedicine
- Technology of Telemedicine
- Objectives of Telemedicine
- Rules of Telemedicine
- Telemedicine Act
- Merits of Telemedicine
- Future Telemedicine plans
- Research

PAPER 4 :

HOSPITAL ACCOUNTING AND FINANCIAL ACCOUNTING ANDHEALTH INSURANCE AND BILLING DESIGN

The course aims to give a fair view of exposure to the students on the basic conceptsof accounts, Finance and Financial Management in Hospital and practical application in Hospital Financial Management Accounting and Health Insurance.

1. ***The Nature and purpose of Accounting, Accounting Concepts & Accountingrecords:***
    a. What is accounting information? Who needs it? What they need or expect?
    b. What do accountants do?
    c. Single Entry Book – keeping
    d. Double Entry Book - keeping
    e. What is an Account? Making entries.
    f. Five types of Accounts (Income, Expense, Asset, Liability, Capital)
    g. Book – keeping rules
    h. Accounting books/ledgers (Nominal, Purchase, Sales, Journal etc)
    i. Dealing with cash, imprest system

2. ***Preparation of various Financial Statements:***
    i. Trial Balance
    ii. Receipts and Payments
    iii. Income and Expenditure Account
    iv. Balance Sheet

3. ***Fixed assets and Depreciation:***
    a. What are fixed assets and why are they different?
    b. What is depreciation and why do we need it?
    c. How do we calculate depreciation? (pros and cons of different methods)
    d. Accounting entries for depreciation

4. ***Costing and Pricing:***
    a. Financial accounting Vs. Cost accounting
    b. Key terms: Direct/indirect, fixed/variable/semi-variable
    c. Analysing results: Standard/budgeted/actual
    d. Costing hospital services
    e. Taken action: controllable /uncontrollable
    f. Making decisions: Marginal/book/out –of pocket costs
    g. Reporting costs: Cost Centres, allocation and apportionment of costs
    h. Pricing methods and decisions.

5. ***Inventory Accounting:***
    a. Inventory / stocks
        i. Valuation (FIFO, LIFO, WAC etc)
        ii. Optimum balance and reorder levels.

6. ***Analysis of Financial Statements:***
    a. Ratio analysis – meaning and purposes
    b. Ratios applicable to Non-profit making organizations

7. ***Financial Planning and*** **Control:**

Budgets and budgetary control

8. ***Use of Computers in Accounting:***
    a. Computerised ledger systems
    b. Spreadsheets & Excel based accounting

9. ***Accounting and Audit Procedures in Health Care Sector:***
    a. Accounting System in hospital
    b. Purpose of an audit and auditing principles
    c. What the auditor does?
    d. The audit report – "True and Fair View"
    e. Legal requirements: layout, audit and filing of accounts

10. ***Health Insurance and Third Party Payers.***

Health Insurance:

- Definition and history of Health Insurance
- Concepts in Health Insurance
- Issues in Health Insurance
- Effective Health Insurance
- Good & Bad in Health Insurance
- Reasons for lack of coverage
- Denial of claims
- Contracts or Memorandums of Understanding
- Health Insurance in India
- Health Insurance & Third Party Administrators
- Insurance Regulatory Development Authority & its role
- Billing & Health Insurance Billing

MEDICAL LAB TECHNOLOGY

1 st Year

PAPER – 1 ENGLISH

Placement – First year Time: Theory – 60 hours

Course Description:
The Course is designed to enable students to enhance ability to comprehend spoken and written English (and use English) required for effective communication in their professional work. Students will practice their skills in verbal and written English during clinical and classroom experiences.

Unit	Time (Hrs)	Learning Objectives	Content	Teaching Learning Activities	Assessment methods
I	10	• Speak and write grammatically correct English	• Review of Grammar • Remedial study of Grammar • Building Vocabulary • Phonetics • Public Speaking	1.Demonstrate use of dictionary 2.Class-room conversation 3.Exercise on use of Grammar Practice in public speaking	• Objective Type • Fill in the blanks • Para phrasing
II	30	•Develop ability to read, understand and express meaningfully the prescribed text	• Read and comprehend prescribed course books	• Exercise on : • Reading • Summarizing • Comprehension	xxv. Short Answers xxvi. Essay Types

III	10	• Develop writing skills	• Various forms of composition Letter writing Note taking Precis writing, Resume/CV	• Exercises on writing Letter writing Story writing Resume/CV • Essay writing Discussion on written reports/ documents	• Assessment of the skills based on the check list
IV	6	• Develop skill in spoken English	• Spoken English Oral report Discussion Debate Telephonic conversation	• Exercise on: Debating Participating in Seminar, panel, symposium Telephonic conversation	• Assessment of the skills based on the check list
V	4	• Develop skill in listening comprehension	• Listening Comprehension Media, audio, video, speeches etc.	• Exercise on: Listening to audio, video tapes and identify the key points	• Assessment of the skills based on the check list

Prescribed Text Book:
English for B.Sc., Nursing by Ms. P. Angela Vanaja Kumari
& Prof. Mrs. R.S. Caroline
Front line Publications, Hyderabad.

1st Year
PAPER – 2
HUMAN ANATOMY

The students of B.Sc. M.L.T. will not be doing the dissection of cadaver. Demonstrations should be given in such a way that they have as clear understanding of the human anatomy as possible.

I. THE HUMAN BODY AS A WHOLE:

Definitions, Subdivisions of Anatomy, Terms of location and positions, Fundamental Planes, Vertebrate structure of man and organisation of the body cells and tissues.

II. LOCOMOTION AND SUPPORT:

THE SKELETAL SYSTEM:

Types of bones, structure of bone, divisions of the skeleton, Appendicular skeleton, Axial skeleton - names of all the bones and their parts; joints - classification, types of movements with examples.

PRACTICALS - Demonstrations of all bones - showing parts. Joints - X-rays of all normal bones and joints.

III. ANATOMY OF THE NERVOUS SYSTEM

CENTRAL NERVOUS SYSTEM:

Spinal cord; Anatomy, functions reflex actions, Meninges, Main and Fundamental parts of Brain: Hind Brain, Midbrain – Forebrain – Brain, location, functions, coverings of brain. Injuries to spinal cord and brain - excluded

IV. ANATOMY OF CIRCULATORY SYSTEM:

Heart size, location, coverings, chambers, blood supply, Blood vessels, General plan of circulation, pulmonary circuit - Names of arteries and veins and their positions Only histology of lymphatic system - included

PRACTICAL:

Demonstration to illustrate.

V. ANATOMY OF THE RESPIRATORY SYSTEM:

Organs of Respiratory System – Nose-nasal cavity, Trachea, Bronchial Tree.PNS & Larynx topics - excluded. Pleurae and lungs, brief knowledge of parts and position.

PRACTICAL: Demonstration to illustrate.

VI. ANATOMY OF THE DIGESTIVE SYSTEM:

Components of Digestive system, Alimentary tract, Anatomy of organs of Digestive System, Mouth, Tongue, Salivary glands, Liver, Biliary apparatus, Pancreas, Spleen-positions and brief functions.

PRACTICAL: Demonstration to illustrate

VII. ANATOMY OF EXCRETORY SYSTEM AND REPRODUCTIVE SYSTEM

Kidneys - location, gross structure;
ureters, Urinary bladder, Urethra.

Male Reproductive System : Testis, duct system.
Female Reproductive System: Ovaries, Duct system, Accessory organs.

PRACTICAL: Illustrations

VIII. ANATOMY OF THE ENDOCRINE SYSTEM:

Names of all endocrine glands and their positions;
Only Hormones of endocrine glands - included.
(Thyroid, Parathyroid, Pituitary and Adrenal glands, Gonads and Islets of pancreas)
Functions of endocrine glands - excluded

HISTOLOGY

IX. General Slides:

1. Hyaline Cartilage
2. Fibro Cartilage
3. Elastic Cartilage
4. T.S & L.S.Bone
5. Blood Vessels
6. Tonsils
7. Spleen
8. Thymus
9. Lymph node
10. Epithelial Tissue
11. Skeletal and Cardiac Muscle - Excluded
12. Peripheral nerve and optic nerve - Excluded

X. Systemic Slides:

1. G.I.T – Fundamental structure of G.I.T. & Liver, Stomach, Small intestine
2. R.S. - Lung, Trachea
3. Kidney
4. Endocrines - Pituitary, Thyroid and Parathyroid
   - Adrenal
   - Pancreas.
5. Reproductive System: Ovary, Testis
   Uterus - Excluded,

1 st Year

PAPER – 3 PHYSIOLOGY

1. HEMATOLOGY (16 hrs):

1. BLOOD: Composition, properties and functions of Blood.

2. RBC: Size, shape, functions, count, Physiological variations of RBC count Polycythemia, Erythropoiesis.

3. HAEMOGLOBIN: Function, concentration, Physiological variation of concentration; methods of determination of Hb.

4. WBC: Functions, production, life span, count, leukocytosis, Leukopenia, Leukemia, DLC.

5. PLATELET: Size, Shape, count, production, Functions, Thrombocytopenic Purpura, bleeding time, clotting time.

6. BLOOD GROUPS: ABO and Rh grouping, criteria of classification, Antigen and Antibodies, percentage of distribution, Determination of Blood groups. Landsteiner's Law, significance of Blood groups.

7. BLOOD TRANSFUSION: Indication, general qualities of a donor, matching of donor's blood with recipient's blood, universal donor and recipient concept. Blood grouping or typing, cross matching, mismatched blood transfusion: causes and complications. Rh factor and Rh factor incompatibility – transfusion and erythroblastosis foetalis.

8. HAEMOSTASIS: Vasoconstriction, platelet plug formation, blood coagulation – Definition, clotting factors – Mechanism of blood clotting – Intrinsic and Extrinsic. Intra vascular blood blotting, disorders of clotting, Vit.K deficiency bleeding, purpura, Haemophilia.

9. ANTICOAGULANTS: Classification, example and uses.

10. BLOOD BANK

11. BLOOD INDICES: Color index, MCH, MCV, MCHC.

12.ESR and PCV: Determination, definition, values, variations, factors affecting, significance.

13.BLOOD VOLUME: Normal value, determination of blood volume and regulation of blood volume.

14.LYMPH - Lymphoid tissue formation, circulation, composition and functions of Lymph.

2. CARDIOVASCULAR SYSTEM (12 hrs):

1. Heart –brief description of function.
2. BLOOD PRESSURE: Definition, Normal values, physiological variations, factors affecting regulation of BP, Hypotension and Hypertension, Determination of BP.
3. PULSE: Jugular pulse, radial pulse.
4. HEART SOUNDS: Cause, characteristics and significance – and phonocardiogram.
5. ECG: Definition, determination, significance, coronary circulation.

3. DIGESTIVE SYSTEM (8 hrs):

1. Functions of Digestive system. Physiological Anatomy of G.I.T. T.S. of Intestine, Nerve supply.
2. Saliva composition and Functions. Structure and functions of stomach. Properties, composition and functions of gastric juice. Functions of pancreas, composition, properties and functions of Pancreatic Juice. Functions of Liver, Properties, Composition and functions of bile. Gall bladder functions and its emptying; Jaundice. Functions of large intestine – composition and functions of succus entericus.
3. Defaecation – stool, normal.

4. RESPIRATORY SYSTEM (10 hrs):

1. Functions of Respiratory system, stages of Respiration.
2. Transportation of Respiratory Gases.
3. Transportation of O_2: Direction, pressure gradient. Forms of transportation, Oxygenation of Hb. Quantity of O_2 transported.
4. Transportation of CO_2. Direction, pressure gradient, modes of transportation.
5. Spirometry: Spirogram, Spirometer.
6. LUNG VOLUMES: Tidal Volume, Inspiratory Reserve Volume, Expiratory Reserve Volume, Vital Capacity, Forced Expiratory Volume 1, Forced Expiratory Volume 2, Forced Expiratory Volume 3,

5. ENDOCRINE SYSTEM (12 hrs):

1. HORMONE: Definition, Local and General Hormones, properties of Hormones, Endocrine glands of the body and their location.

2. PITUITARY: Situation, Master Endocrine Gland; Anterior and Posterior Parts, Anterior pituitary Hormones, functions and regulation of secretion of each of them, Dwarfism Acromegaly, Gigantism.

3. POSTERIOR PITUITARY: ADH, and Oxytocin-source, functions, diabetes insipidus.

4. THYROID GLAND: Physiological Anatomy and location, Hormones secreted, Physiological functions, endocrine disorders – Hypo and Hyper secretion – Goitre, Cretinism, Myxedema, Grave's disease.

5. ADRENAL GLAND: Adrenal Cortex - Hormones secreted: Gluco corticoids, Mineralocorticoids, sex steroids, functions of cortisol and Aldosterone.

6. Endocrine Disorders – Addison's disease, Cushing's syndrome, Conn's syndrome, Adrenogenital syndrome.

7. ADRENAL MEDULLA: Functions of adrenaline and Nor-Adrenaline.

8. PANCREAS: Hormones of Pancreas: Insulin-functions and actions, Glucagon - functions and actions. Regulation of blood glucose level; Diabetes Mellitus.

9. PARATHYROID GLAND: PTH functions and actions. Hypo and Hyper secretion of PTH, tetany.

10.CALCITONIN: Functions and actions, Regulation of blood calcium level.

6. NERVOUS SYSTEM (12hrs):

1. Functions of Nervous System in brief : of all parts of CNS

2. EEG

3. CSF: formation, circulation, properties, composition and functions; lumbar puncture.

7. SPECIAL SENSES (6hrs):

1. VISION: functions of different parts of the eye. Refractive errors of eye and correction. Field of vision. Structure and functions of retina, Pupillary reflexes, color vision: color blindness, tests for color blindness.

2. HEARING: functions of outer, middle and inner ear, Deafness and Tests for deafness. Rinne's test. Weber's test.

8. Excretory System: Excretory Organs (10 hrs):

1. KIDNEYS: Functions of kidneys,

2. Functional unit nephron.

3. Mechanism of Urine Formation: GFR,

4. Selective Reabsorption, substances reabsorbed, glucose, urea, amino acids, chlorides, H ions etc.

5. Properties and composition of normal urine, urine output. Names & Abnormal constituents in urine, Micturition, Cystourethrogram.

6. Diuretics, Renal Function Tests

7. Actions of ADH, aldosterone, PTH on kidneys.

9. REPRODUCTIVE SYSTEM (6 hrs):

1. Functions of Reproductive system in male and female.

2. Semen secretion, composition, factors influencing, abnormalities, Oligozoospermia.

3. Ovulation, Menstrual cycle, Menstrual Fluid.

4. Pregnancy, Pregnancy tests.

5. Lactation – factors affecting- composition of breast milk.

10. Muscle & Nerve Chapter - Included

PRACTICALS

Study of Microscope and its uses

Collection of blood and study of haemocytometry

Haemoglobinometry

Determination of specific gravity of blood

White Blood Cell Count

Red Blood Cell Count

Determination of Blood Groups

Leishman's staining and differential WBC count

Determination of Erythrocyte Sedimentation Rate

Determination of packed cell volume

Calculation of Blood Indices

Fragility Test for R.B.C

Determination of Bleeding Time

Determination of Clotting Time

Blood Pressure Recording

Examination of arterial pulse - included

Artificial Respiration

Determination of Vital Capacity

References:

1. Text book of Physiology for BDS students by Dr. Jain

2. Text book of Physiology for BDS students by Dr. Sambulingam

1st Year
PAPER – 4
Clinical Laboratory Practices

1. Laboratory Services : levels of laboratories – Primary level, Secondary level and tertiary level. Reference laboratories, Research laboratories and specific disease reference laboratories.

2. Infrastructure in the laboratories.

a) Laboratory space : Reception, specimen collection, quality water supply, power supply, work area, specimen / sample / slide storage, cold storage, record room, wash room, biomedical waste room, fire safety, etc.

b) Personnel in the laboratory : Qualifications as per NABL document.

c) Equipment : Listing, cleaning, maintenance, SOP, verification of performance :Internal quality control.

d) Reagents and materials : Purchase, maintenance, storage, use.

3. Specimen Collection, storage and Transport : General guidelines of collection, labeling, handling, transportation storage of specimens. Care in handling specimens.
Accession list,
Worksheet,
Reporting test results,
Specimen rejection record,

Recording of Laboratory data,
Maintenance of records.

4.Standard operating Procedure : :Definition, format, text of SOP, types of SOP.

5. Safety in Laboratories : General safety measures, biosafety precautions, levels of biosafety laboratories: BSL1, BSL2, BSL3, BSL4.

6. Ethical considerations : Non – maleficence, beneficence, risk minimization,institutional arrangement, ethical review, transmission of ethical values, voluntariness, compliance.

7. Quality assurance : Internal and external quality assessment.

8. Bio waste management.

9. Accidents and emergencies in the laboratory.

Practicals:-

1. Writing SOP of equipment maintenance, practical procedures done in the laboratory
2. Internal / External quality control
3. Sample collection, labeling, storage, transportation
4. Biowaste management
5. Biosafety

References: -

1. ICMR (2008) guidelines for good clinical laboratory practices.
2. Hospital waste Management : Chapter 13. Park's Text Book of Preventive and Social Medicine; 18th Ed.

3. NIH : DAIDS guidelines for Good Clinical Laboratory Practice Standards; 2011.
4. WHO : Good Clinical Laboratory Practice (GCLP), 2009.

2 ND Year

PAPER – 1

PATHOLOGY – I (Theory)

THEORY:

1. HISTOPATHOLOGY:

1. Introduction to Histopathology:
2. Structure and functions of normal cell
3. Reception of specimens
4. Various fixatives – Mode of action, Indications, Preparation.
5. Grossing techniques
6. Steps of tissue processing and embedding.

2. HAEMATOLOGY :

1. Bone Marrow

a) Techniques of aspiration, preparation and staining of films

b) Bone marrow biopsy.

3. CYTOLOGY:

Techniques of collection of samples

i) Exfoliative cytology - **deleted** ii) Interventional cytology

i) Exfoliative Cytology:

Female Genital tract, Anatomy, structure and Physiology of female genital tract and Ovarian hormones, Techniques of collection of sample.

Pap Smears:

a) Lateral Vaginal wall smears

b) Vaginal 'pool' or 'vault' smears

c) Cervical smears

d) Combined (fast) smears

e) Triple smears (cervical-vaginal-endocervical smears)

f) Endocervical and endometrial smears.

i) Respiratory Tract

Selection of material and making smears.

Bronchial Aspiration (Washings) and Bronchial Brushing..

ii) Urinary Tract:

Collection and preparation of samples

Urinary sediment Cytology

Bladder Irrigation (Washings) Cytology

Prostatic massage – Cytology

iii) Body Fluids:

a) Effusions in body cavities; and

b) Fluids of small volume.

i) Effusions – Ascitic, pleural etc.

ii) Cerebrospinal Fluid (CSF)

Normal CSF, CSF in non-neoplastic & neoplastic diseases

iv) Fixation and Fixatives in Cytology:

a) Routine Fixatives

b) Coating Fixatives

c) Special purpose fixatives

d) Preservation on fluid samples

v) Processing of samples in the Laboratory.

vi) Staining of smears:

a) Papanicolou's stain

b) H & E stain.

c) Romanowsky stains like Leishman's, May Grunwald-Giemsa (MGG) and Wright's stains.

ii) Interventional Cytology:

a) Fine Needle Cytology

b) Imprint cytology

c) Crush smear cytology

d) Biopsy sediment cytology

4. CLINICAL PATHOLOGY:

1) Urine examination. Physical, Chemical and Microscopic examination.

2) Examination of faeces for occult blood

3) Examination of body fluids, cell counts.

4) Semen analysis

5) Sputum examination

5. INSTRUMENTATION:

1. Microscope

2. Balances

3. Tissue weighing machines

4. Tissue Processor

5. Microtomes ,Knives

6. Knife sharpener

7. Automatic slide stainer - **deleted**

8. Instruments for grossing

9. Electric saw

PRACTICALS

1. HISTOPATHOLOGY:

Processing, Embedding, preparation of blocks, Section cutting, use and care of Microtome and Microtome knives and H & E staining.

2. CYTOLOGY:

Preparation of reagents, Wet film preparation, Fixation, staining (H&E, 'Pap', MGG and Shorr) of vaginal smears, cervical smears and sputum.

FNAC (Fine Needle Aspiration Cytology) - preparation of smears and staining.

3. CLINICAL PATHOLOGY:

Complete Urine Analysis

Cavity Fluids and miscellaneous samples

Cerebrospinal Fluid in Health & Disease

Semen analysis

Stool examination for Occult blood

4. HAEMATOLOGY

Complete Haemogram

Bone marrow smears - staining and examination

5. MOUNTING OF MUSEUM SPECIMENS:

1. Routine mounting of specimens

2. Mounting in glass jars.

3. special methods of mounting

Reference Books in Pathology:

Sl. No	Pathology books	Year of publication	Authors name	Publisher name
1	Histopathology Techniques	1974	C.F.A. Culling	Butter Worth
2	Lab Techniques WHO Manual Bio-Safety	2003	W.H.O.	W.H.O
3	Exfoliative Cytology Hand Book	1985	English M.c.Lure	Lippincott
4	Clinical Diagnosis in lab methods	1984	Todd & Sanford	Book Saunders
5	Hand book of pathology	2005	Harsh Mohan	Anshan
6	Practical Hematology	1984	Lewis & Davis	Churchill living stone
7	Histological Techniques	1982	Bancroft	Churchill living stone

2nd Year

PAPER – 2

MICROBIOLOGY – I (Theory)

GENERAL BACTERIOLOGY:

Historical Aspects

1. Structure of bacterial cell, growth and nutrition of bacteria
2. Bacterial metabolism, Bacterial genetics, Antibiotics & Drug resistance
3. Sterilization – Physical and Chemical methods, Antiseptics & Disinfectants.

IMMUNOLOGY:

1. Infection – Types, Sources, Modes of transmission, Pathogen and virulence of bacteria
2. Immunity: Types of Immunity
3. Antigens, Antibodies- Immuno globulins
4. Antigen - Antibody Reactions: Precipitation, Agglutination, Immuno fluorescence, Immuno enzyme assays, Radio Immuno assay, Complement and complement fixation
5. Immune system and Immune response, Auto immunity – Basic concepts
6. Immunodeficiency & transplantation immunology – Basic concepts.

SYSTEMIC BACTERIOLOGY:

1. Cocci (Gram positive & Gram negative) Staphylococci, Streptococci, Neisseria.
2. Gram-positive Bacilli : Anthrax, Diphtheria, and Clostridia.
3. Mycobacteria : Tuberculosis and Leprosy.
4. Gram Negative Bacilli : Enterobacteriaceae, Vibrios, Brucella, Bordetella, Haemophilus, Pasteurulla, Non-sporing anaerobic bacteria.
5. Spirochaetes : Leptospira, Borrelia and Treponema.

6. Bacterial Infections And Diagnosis:

- Wound infection, Postoperative infection
- Urinary tract infection
- Respiratory tract infection
- Diarrhoeas and food poisoning
- Infections of CNS
- Hospital acquired infections.

7. Newer techniques in mycobacteriology PCR Genxpert Nasba

1. Automated culture methods like Bactec
2. Hospital infection control
3. Health care associated infections like CLABSI cauti vap ssi, etc
4. Hand hygiene
5. Universal precautions

PRACTICALS

1. Microscopes – Types and Operation.
2. Study of Morphology of Bacteria:
   - Unstained – Hanging drop preparation
   - Stains: Simple staining, Gram staining, Ziehl Neelsens's staining.
   - Staining for capsule.
   - Culture media: Types and uses.
   - Inoculation methods.
   - Anaerobic culture methods
   - Antibiotic sensitivity methods.
   - Biochemical reactions in identification of bacteria.
   - Isolation and identification of bacteria from various clinical specimens.
3. Agglutation Tests: Slide & Tube, Widal.
4. Latex agglutination : RF, ASO, CRP
5. Precipitation: VDRL test.
6. Common Skin Tests: Tuberculin.

7. Bacteriological Examination : Water, Milk and Air
8. Processing and reporting of swabs received from operation theatre.

RECOMMENDED BOOKS: (For 2nd & 3rd Year):

1. Text book of Microbiology, Baweja 2002 Vikas
2. Text book of Microbiology, Satish Gupta, 2004 Jaypee
3. Medical Lab Technology, Dr.Raghavendra Rao
4. Medical Lab Technology, Sood, 1999 Jaypee

REFERENCE BOOKS:

1. Textbook of Microbiology: Anantha Narayan & Jayaram Panicker.
2. Medical Mycology: Jagadish Chandra.
3. Parasitology: S.C. Parija.
4. Nizam damani hospital infection control
5. Apurba Sastry Hospital Infection control text book

2nd Year

PAPER – 3

BIOCHEMISTRY – I

THEORY:

6) Introduction to apparatus, Chemical balance, principles and practice
7) Concepts of Molecular weight, Atomic Weight, Normality, Molarity, Standards, Atomic structure, Valency, Acids, Bases, and Salts.
8) Concepts of Acid Base Reaction and Hydrogen Ion Concentration.
9) Principles of photometry and spectrophotometry, laws of absorption, wavelength, turbidimetry, calibration, transmittance, absorption, standard, blank, Beer's law.
10) Flame photometry and Atomic absorption Spectrophotometry.
11) Carbohydrates chemistry – Reactions of Carbohydrates, metabolism of glucose – Glucose Tolerance Test – Normal and Diabetic patterns.
12) Chemistry of Proteins, Fats and Nucleic Acids.
13) Non-protein nitrogenous compounds: urea, creatinine and uric acid formation, significance and tests. Renal clearance tests, concentration and dilution tests.

PRACTICALS

4. Introduction to apparatus, instruments and use of chemical balance.
5. Preparation of normal solutions, molar solutions, percent solutions and reagents, dilution techniques.
6. Maintenance of Laboratory, Glassware and Apparatus.
7. Titration of simple acids and bases, measurement of hydrogen ion concentration - **deleted**
8. Practical aspects of Photometry, factors affecting wavelength: calibration and care of cuvettes. Reagent blank absorption curve, calibration curve, deviations of Beer's law.

9. Identification of sugars by qualitative tests; quantitative method for blood glucose estimation, qualitative screening test for urine glucose (Strip tests), qualitative test for reducing substances in urine.
10. Non protein nitrogenous compounds: determination of blood urea, ammonia, uric acid, creatinine. Creatinine clearance.

BOOKS:

5. Text book of Bio-chemistry - Debajyothi Das
6. Essentials of Biochemistry by U.Satyanarayana.
7. Varley's Clinical Chemistry-IV Edition.
8. Clinical Chemistry -Teitz

3RD YEAR

PAPER-1

PATHOLOGY – II

THEORY

12. **HISTOPATHOLOGY:**

1. Section cutting.
2. Mode of preparation and theory of H (Haematoxylin) & E (Eosin) staining
3. Various aspects of mounting and staining the slides
4. Theory of decalcification and various methods
5. Use of Microscopes – Light Microscope, Polarising Microscope
6. Phase contrast Microscope and Fluorescent Microscope.

13. **INTRODUCTION OF THE FOLLOWING:**

1. Flow and Imaging cytometry
2. Tissue Culture - **Excluded**
3. Cytogenetics

14. **IMMUNO HISTOCHEMISTRY**:

1. Introduction.
2. Overview of Immuno histochemistry.
3. Applications of Immuno histochemistry.

15. **IMMUNOCYTOCHEMISTRY**:

1. Introduction.
2. Basic concepts of Immunochemistry
3. PAP Technique – principle, preparation of reagents and procedure.
4. Immunocytochemical methods (immunoperoxidase and immunoalkaline phosphatase etc).

16. **SPECIAL STAINS**:

1. Mucicarmine
2. P.A.S.
3. Sudan Black
4. Oil Red "O"
5. Alcian Blue
6. Congo Red
7. Verhoeff's stain for Elastic tissue
8. Mallory's Phosphotungstic Acid Hematoxylin stain (PTAH)

9. Connective tissue stains.
    • Van Gieson stain 2) Masson's Trichrome Technique
10. AFB Staining –(for tissue sections of Tuberculosis and Leprosy)

17. **FROZEN SECTIONS AND CRYOSTAT**:

Frozen Sections:

- Freezing Microtome.
- Frozen Section Technique.

Cryostat:

- Types
- Operation of Cryostat
- Cryostat Cut Sections.

18. **HEMORRHAGIC DISORDERS**:-

1. Mechanism of coagulation
2. Collection and anticoagulants used in coagulation studies.
3. Bleeding time and clotting time.
4. Other coagulation studies PT, KPTT, TGT, etc.,
5. Platelet count.
6. Platelet function tests.

19. **BLOOD TRANSFUSION AND IMMUNOHAEMATOLOGY** :-

1. ABO Blood Group System.
2. Rh typing and weaker variants in Rh system.
3. Subgroups and weaker variants of A and B: Bombay Phenotype.
4. Coombs' test.
5. Blood grouping and cross matching in blood bank.
6. Investigations of transfusion reactions.
7. Care and selection of donors.
8. Screening for Australia Antigen(Hbs Ag)
9. HLA Antigens and their significance in Blood transfusion.
10. Preservation of blood, principles and its application in blood banking.
11. Screening blood for infective material
12. Blood Bank Administration.

20. **INSTRUMENTATION:**

1. Freezing Microtome.
2. Cryostat.
3. Automation in pathology (cell counters etc)
4. Application of Computers in Pathology.

21. **HAEMATOLOGY**

4. Blood collection
5. Anticoagulants used in Haematology
6. Normal values in Haematology
7. Basic Haematological Techniques
    - RBC counts
    - Haemoglobin estimation

- Packed cell volume
- Calculation of absolute indices, WBC counts-Total and differential
- Absolute eosinophil count
- Platelet count
- Erythrocyte sedimentation rate.

8. Preparation of blood films
9. Stains used in Haematology
10. Morphology of red cells
11. Morphology of leucocytes and platelets

5. Preparation of buffy coat smears
6. Reticulocyte count
7. Laboratory methods used in the investigation of deficiency anaemias
   - B12 and Folate assay
   - Schilling test
   - Serum iron and iron binding capacity (procedure not required: only application required).
8. Laboratory methods used in investigation of haemolytic anaemias
   - Osmotic fragility
   - Test for sickling
   - Estimation of Hb-F, Hb A2
9. Organization and quality control in haematology laboratory
10. Preparation of glass ware

22. **MUSEUM TECHNIQUES:**

Preparation of specimens for mounting, methods of mounting, preparation of mounting solutions and colour maintenance

PRACTICALS

Hisopathological Exercises:- Special Stains:

1. Mucicarmine.
2. P.A.S.
3. Sudan Black
4. Oil Red 'O'
5. Schmorl's reaction.
6. DOPA
7. Alcian Blue
8. Congo Red
9. Verhoeff's stain for Elastic tissue.
10. Mallory's phosphotungstic Acid Hematoxylin stain (PTAH)
11. Connective tissue stains.
    - Van Gieson stain 2) Masson's Trichrome Technique
12. Luxol Fast Blue Stain.

13. AFB Staining –(for tissue sections of Tuberculosis and Leprosy)

Cytological Exercise:-

Sex Chromatin: Buccal Smear Examination.

Haematological Exercises:-

26. L.E.Cells.
27. Bleeding profile
28. Blood groups.
29. Fever profile

REFERENCE BOOKS:

- Clinical Diagnosis & Laboratory methods by Todd & Sanford.
- Histopathology Techniques by Culling.
- Histopathology Techniques by Bancroft.
- Aspiration Biopsy cytology by Tilde Kline.
- Cytology by Koss.
- Practical Haematology by Davis & Lewis.
- 50 Diagnostic special stains for Surgical Pathology by Erwin Haaf.
- Text Book of Pathology by Harsh Mohan
- Lab Techniques WHO Manual.
- Exfoliative Cytology

3rd Year

PAPER - 2

MICROBIOLOGY – II

THEORY

4. **VIROLOGY**

General properties, classification and list of viruses -

RNA Viruses: Poliomyelitis, Coxsackie viruses, Rhino viruses, Influenza, Rabies, Arboviruses, Measles, Mumps, Rubella, HIV, Rotavirus.

DNA Viruses: Smallpox, Herpes simplex, Varicella Zoster, CMV, EBV, Adenoviruses, Hepatitis Viruses.

- Newer and emerging Viral infections like Covid19, Zika virus Monkey pox virus and Nipah virus, Chandipura virus,

5. **MYCOLOGY:**

Introduction about Fungi. Names of the fungi and the diseases caused by them. Superficial mycoses, Candida, dermatophytes, opportunistic fungi, subcutaneous mycoses, Cryptococcus.

- Anti fungal susceptibility testing

6. **PARASITOLOGY:**

- Introduction & Classification
- Names of the parasites

Protozoology: Entamoeba histolytica, Trichomonas vaginalis, Giardia lamblia, Hemoflagellates (in brief), Malarial Parasites, Opportunistic protozoan infections in AIDS.

Cestodes: D.latum, E.granulosus, T.saginata, T.solium, H.nana, H.diminuta.

Nematodes: Ascaris lumbricoides, Ancylostoma duodenale, Necator americanus, Strongyloides stercoralis, Trichuris trichiura, Enterobius vermicularis, Dracuriculus Medinensis, Wuchereria boncrofti.

PRACTICALS

1. **VIROLOGY:**

II atex agglutination

III Tests for HIV, HBs Ag

2. **MYCOLOGY:**

Preparation, identification and interpretation of samples from skin, hair and nail, sputum, vaginal secretions, oral secretions.

3. **PARASITOLGY:**

II Microscopic examination of faeces

III Saline, iodine preparation

IV Concentration methods for faeces examination.

V Blood smear and staining for haemoflagellates, malarial and filarial parasites.

3rd Year

PAPER – 3

BIOCHEMISTRY – II

THEORY

I) Enzyme definition, classification, coenzymes, cofactors and inhibitors affecting enzyme activity, units of measurement, Isoenzymes, Normal values of different serum enzymes and their variation in diseases.

II) Proteins - Chemistry, structure, plasma protein concentration and biochemical changes in disease, fractionation techniques, interpretation. Principles of Electrophoresis and Chromatography.

III) Lipids - Chemistry of fatty acids, triglycerides, Cholesterol, Phospholipids, serum Lipoprotein pattern – normal and alterations in disease.

IV) Inorganic Ions.

Concepts of inorganic ions – Bicarbonate, phosphate, calcium, sodium and potassium and trace elements.

V) Sample collection, Preservation and preparation of protein free filtrates - Theoretical aspects.

VI) Liver function tests.

VII) Gastric Analysis.

Composition of gastric juice, concepts of free and bound acid, Gastric stimulants.

VIII) Accuracy, precision, quality control, error in laboratory tests, quality control charts. Normal values

Statistics – classification of observations, frequency distribution, definition of terms – deleted.

IX. Blood gases, bicarbonate buffering system.Henderson Hasselbach reaction, Blood pH, pCO_2 – calculations, normograms.

X. Calculi formation.

XI. Automation, Micro techniques - Theory.

Ultra micro techniques - deleted

PRACTICALS

I. Proteins: Determination of total protein in Serum plasma, CSF and Urine, Determination of Albumin, Globulin and Fibrinogen, Electrophoretic separation of proteins.

II. Lipids: determination of serum lipids, cholesterol ester, triglycerides and lipoprotein fractionation.

III. Inorganic Ions, Determination of calcium in serum and urine, serum phosphates, iron, copper, chloride, sodium, and potassium.

IV. Sample collection, preservation and preparation of protein free filtrate.

V. Enzymes: Simple enzymatic reaction, demonstration of factors affecting enzyme action, determination of Acid and Alkaline Phosphatases, LDH., SGOT, SGPT, Amylase - Salivary and Pancreatic, determination of LDH Iso enzymes

VI. Estimation of Bilirubin-total and conjugated, urobilinogen, Urobilin and Bile Acids.

VII. Gastric analysis. Determination of free and total acid, gastric stimulation. Specimen collection.

VIII. Accuracy, precision, and quality control. Demonstration and preparation of quality control sera. Comparison of two methods. F. Test and Bartels test. Normal values.

IX. Isotope and ELISA techniques for determination of CEA, AFP, T3, T4, TSH and HCG

X. Laboratory methods used in the investigation of deficiency anaemias

   i. B_{12} and Folate assay

   ii. Serum iron and iron binding capacity

XI. Automation, micro and ultramicro techniques.

REFERENCE BOOKS:

1) Text book of Biochemistry - Debajyotidas.
2) Essentials of Biochemistry by U.Satynarayana
3) Varley's Clinical Chemistry-IV Edition.
4) Clinical Chemistry - Teitz.
5) Clinical Chemistry - Kaplan.