NARAYANA
COLLEGE OF ALLIED HEALTH SCIENCES
CHINTHAREDDYPALEM, NELLORE - 524003, ANDHRAPRADESH, INDIA.
Recognized by Govt..A.P. India.
Affiliated to Dr. YSR University of Health Sciences, Vijayawada (A.P.). India.
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LIST OF COURSES:

- B.Sc. NEURO PHYSIOLOGY TECHNOLOGY
- B.Sc. ANAESTHASIOLOGY TECHNOLOGY & OPERATION TECHNOLOGY
- B.Sc. CARDIAC CARE TECHNOLOGY & CARDIO VASCULAR TECHNOLOGY
- B.Sc. IMAGING TECHNOLOGY
- B.Sc. RENAL DIALYSIS TECHNOLOGY
- B.Sc. OPTOMETRY
- B.Sc. PERFUSION TECHNOLOGY
- B.Sc. EMERGENCY MEDICAL TECHNOLOGY
- B.Sc. RESPITIRATORY THERAPY TECHNOLOGY

COURSE ELIGIBILITY:

The Candidate shall have passed Two-years of Intermediate Course from Board of Intermediate Education, Andhra Pradesh with Science (Physics, Chemistry and Biology) and English as compulsory subject.

(or)

10+2 passed out from recognized board under AISSCE/ CBSE/ ICSE/SSCE/HSCE/NIOS/APOSS or other equivalent board with Physics, Chemistry and Biology, recognized by Board of Intermediate Education, Andhra Pradesh.

(or)

Intermediate Vocational with Bridge Course in Biological and Physical Sciences of Board of Intermediate Education, Andhra Pradesh.

MINIMUM AGE:

a) Candidates should have completed the age of 17 years

b) Age shall be calculated on the basis of date of birth as Indicated in the

Board of Secondary School Certificate Examination (SSC) or Equivalent Examination.

c) No upper age limit.

DURATION OF COURSE:

The duration of B.Sc. Allied and Healthcare course is 3 academic years + 1year Compulsory Rotatory Internship.

❖FIRST YEAR SYLLABUS:

➢ ANATOMY

(where possible, integration may be done among anatomy, physiology, biochemistry departments to facilitate learning and avoid redundancy)

Broad Objective – Understand the basic anatomy of the human body and important applied aspects

Key Objectives – At the end of the course the student should be able to

TERM – 1 (40 theory hours)

Cell - (2 hours)

1. **Describe the human cell and its organelles**
2. Describe the types of cell division and give examples

Tissues - (2 hours)

3. **List out the types of tissues & describe their basic structure**
4. Describe briefly the types of connective tissue including specialized connective tissue
5. Describe the types and functions of epithelium

Introduction to Histology – (2 hours)

6. Describe the procedure of tissue processing and staining
7. **Describe the functioning and parts of a binocular microscope**

Limbs - (6 to 8 hours)

8. **Name the important bones, muscles, blood vessels & nerves of the upper limbs**
9. **Name the important bones, muscles, blood vessels & nerves of the lower limbs**
10. **Describe briefly the actions of the important muscles of the limbs**
11. **Describe the location and course of the major blood vessels & nerves of the limbs**

Neurology (8 to 9 hours)

12. List out the types of nervous system
13. **Describe briefly the structure of spinal cord** & blood supply and coverings, its tracts and spinal nerves
14. **Describe briefly the parts and structure of the brainstem** and the functional aspects of the various parts – nuclei, tracts, etc.
15. **Describe briefly the brain and its parts , and its blood supply, and the functional areas**
16. Describe briefly the circulation of CSF

Heart & blood vessels (4 to 6 hrs) -

17. **Describe the principal external and internal features of the heart**
18. Describe briefly the blood supply of the heart
19. **Describe the circulation of blood and types of circulation**
20. **Describe the aorta and its branches**
21. **List out the major veins that join into the SVC & IVC**
22. Describe briefly the lymphatic system and its function

Lungs (3 to 4 hrs) -

23. **Describe the features of the lungs & the bronchopulmonary segments**
24. Describe briefly the relations of the lungs
25. Describe briefly the pleura and its disposition
26. **Describe briefly the mechanism of respiration**
27. Describe briefly the muscles & bones that help in respiration

TERM – 2 (20 theory hours)

Endocrines (4 to 5 hrs) -

28. **List out the various endocrine glands and an overview of their secretions**
29. Describe briefly the anatomy and functions of the pituitary, thyroid, adrenal, pancreas,

Reproductive system (2 to 3 hrs) -

30. **Describe briefly the male reproductive system**
31. **Describe briefly the female reproductive system**
32. List out the hormones released by the reproductive system

GIT (7 to 8 hrs) -

33. **Describe briefly the extent, important anatomical features, and relations of various parts of the gastrointestinal tract**
34. **Describe the important anatomical features, surface anatomy, relations and functions, and blood supply of the liver**
35. Describe briefly the parts, important features and functions of esophagus, stomach, duodenum, small intestine, large intestine
36. Describe briefly the important anatomical features, position and relations and functions of pancreas and spleen
37. Describe briefly the blood supply of the GIT

Excretory System (2-3 hrs) -

38. **Describe the parts of the excretory system (kidney, ureter, urinary bladder)**
39. **Describe briefly the important anatomical features, relations, blood supply and functions of the kidney and urinary bladder**

Others – (2 to 4 hrs) -

40. Describe briefly the procedure of embalming
41. **Important Applied aspects in anatomy & clinical case discussion (for anatomic correlation)**

PRACTICAL SKILLS (20 hours in each term = 40 hrs)

1. Assist in the procedure of tissue processing and staining
2. Use a binocular / monocular microscope
3. Focus a given slide and show the various components
4. Identify the major tissues like cartilage, bone, liver, thyroid, kidney, lung in a given slide
5. Demonstrate the SURFACE ANATOMY of important anatomical parts of the body – e.g.
    a. Major arteries and palpate them
    b. Major veins
    c. Important muscles & bones
    d. Important nerves
    e. Important organs like heart, lungs, liver, spleen, kidney, stomach, intestine etc.
    f. Locate the intercostals spaces and identify the surface anatomy of sternum
6. Identify the principal bones – in a given specimen / model / x-ray
7. Identify the important bony landmarks in the body
8. Identify the important structures /organs in a given cadaver /specimen / model / CT scan / Ultrasound / MRI
9. Assist in the dissection on a given cadaver
10. Clinico- anatomical correlation in common diseases – e.g. goiter, swelling in the abdomen (full bladder, gravid uterus, hepatomegaly, splenomegaly etc.), cervical nodes, situs inversus, locating site for lumbar puncture, femoral artery / vein puncture, identification of cataract, tonsillar enlargement, nerve palsy & muscle involvement, identification of major fracture / dislocation etc.

Reference Books –

Human Anatomy & Physiology for Nursing – Mahindra Kumar Anand & Meena Verma
Understanding Human Anatomy & Physiology – William Davis (McGraw Hill)
Anatomy & Physiology – Kaarna Muni Shekhar
Textbook of Anatomy - Chaurasia
Textbook of Anatomy – TS Ranganathan
Human Anatomy- Fattana

➢ PHYSIOLOGY

(where possible, integration may be done among anatomy, physiology, biochemistry departments to facilitate learning and avoid redundancy)

Broad Objective – Understand the basic physiological functions of different organs and parts of the human body and important applied aspects

Key Objectives – At the end of the course the student should be able to

TERM – 1 (40 theory hours)

Cell physiology – (2 hrs) -

1. **Describe the structure and functions of cell**
2. **Describe the functions of the cell organelles**
3. **Describe briefly the types of transport across cell membrane and carrier systems**

Blood (6 to 8 hrs) -

4. **Describe the normal composition of human blood and its functions**
5. **Describe the normal plasma proteins & their functions**
6. **Describe the structure and functions of RBC and hemoglobin**
7. Describe the process of Erythropoiesis
8. **Describe the Structure, production, & functions of WBCs**
9. **Describe the structure, production & functions of Platelets**
10. **Describe the Types of blood groups and their importance,**
11. **Describe the Mechanism of coagulation**

Immunity (2-3 hrs) -

12. **Define immunity and describe the types of immunity**
13. **Classify antigen & antibodies**
14. Describe T cell immunity & B cell immunity

Digestive system (6 to 7 hrs) -

15. **Describe briefly the Physiological anatomy of G.I.T and its functions.**
16. Describe briefly the composition and functions of Saliva
17. **Describe briefly the physiological anatomy of the stomach and the composition, functions of gastric juice.**
18. **Describe briefly the functions of pancreas , and the composition & functions of pancreatic juice.**
19. **Describe briefly the functions of liver and gall bladder and the Composition, and functions of bile juice.**

Respiratory system (4 to 5 hrs) -

20. **Describe the physiological structure and functions of Respiratory tract.**
21. **Describe the Mechanics of respiration and its regulation**
22. **Describe the Fundamentals of oxygen and CO2 transport in blood**
23. Describe the lung volumes, spirometry & their importance

Cardiovascular system (5 to 6 hrs) -

24. **Describe the gross structure of heart and the normal circulation of blood**
25. **Describe the cardiac cycle**
26. **Describe the normal arterial pulse wave and the normal heart rate, and factors increasing and decreasing it.**
27. **Describe normal Blood pressure and its regulation,**

28. **Describe the normal Heart sounds**
29. **Describe the normal ECG and its importance**

Muscle & nerve & neurology (8 to 9 hrs) -

30. Describe the physiological structure of muscle tissue and its types
31. **Describe the parts of neuron and their functions, and the synapse and its function**
32. **Desribe the action potential, its basis, refractory period, latent period, etc. and neuromuscular transmission**
33. **Describe briefly the autonomic nervous system and the functions and effects of the sympathetic and parasympathetic nervous systems**
34. **Describe the physiological anatomy of the brain and functions of different lobes**
35. **Dscribe briefly the structure and functions of spinal cord**
36. **Describe briefly the subdivisions of brain stem and their functions**
37. **Describe briefly the special senses and their pathways – vision, audition (**& oflcation & taste)
38. **Describe the normal EEG,**
39. Describe briefly the CSF formation, circulation, properties, composition and functions

TERM – 2

Endcorine system (5 – 6 hrs)

40. **Describe the physiological anatomy of Thyroid gland, functions and its applied physiology**
41. **Describe the physiological anatomy of Adrenal gland, functions and its applied physiology**
42. **Describe the physiological anatomy of Parathyroid gland, functions and its applied physiology**
43. **Describe the physiological anatomy of Pancreas, its functions and its applied physiology**
44. Describe the physiological anatomy of hypothalamus and the Pituitary gland, their functions and its applied physiology

Excretory system (4- 5 hrs) -

45. **Describe the physiological structure of kidney and the nephron and its functions**
46. **Describe the GFR and factors affecting GFR**
47. **Describe the Substances absorbed and secreted from renal tubules**
48. **Describe the various Renal function tests**
49. Describe briefly the Urinary bladder and its functions and the physiology of micturition

Skin (1 hr) -

50. Describe the Structure and functions of skin

Reproductive system (6-8 hrs) -

51. Describe the Physiology of Puberty
52. **Describe the process of menstruation, normal menstrual cycle, menarche and menopause.**
53. **Describe briefly the process of Ovulation and methods of determination of ovulation**

54. **Describe briefly the normal physiology of pregnancy and mention the diagnostic tests for pregnancy and their physiological basis**
55. **Describe briefly the functions of placenta and pregnancy diagnostic tests**
56. List out the Contraceptive methods in male and female
57. Describe the Spermatogenesis

Bone & Joints – (2 hrs)

58. Describe the structure and formation of bone
59. Describe the structure and formation of cartilage
60. Describe the types of joints.

PRACTICALS

1. Estimate Hemoglobin in given blood sample
2. Estimate bleeding time & clotting time
3. Measure ESR of given blood sample
4. Perform RBC count of given blood sample
5. Perform WBC count of given blood sample
6. Perform a differential WBC count of the given sample
7. Calculation of blood indices
8. Measure pulse rate, heart rate
9. Measure BP
10. Measure respiratory rate & temperature
11. Demonstrate examination of heart – inspec JVP, localize apex beat, look for any abnormal pulsations, percuss cardiac dullness, auscultate heart for normal sounds
12. Demonstrate examination of respiratory system – inspect the chest for symmetry, movements, localize apical impulse and trachea, measure chest expansion, percuss the chest for lung resonance, liver dullness, auscultate lungs for breath sounds
13. Demonstrate examination of the cranial nerves
14. Demonstrate examination of the motor system – bulk, tone, power of different groups of muscles, coordination, gait
15. Demonstrate the various sensory and motor reflexes - abdominal, plantar, biceps, triceps, supinator, knee, ankle
16. Demonstrate examination of sensory system – fine touch, pain, vibration
17. Record an ECG
18. Determine blood group of a given sample
19. Measure weight and height and calculate Body Mass Index
20. Assist in the recording of an EEG
21. Perform spirometry in a given individual and interpret the values

Reference Books –

Human Anatomy & Physiology for Nursing – Mahindra Kumar Anand & Meena Verma
Understanding Human Anatomy & Physiology – William Davis (McGraw Hill)
Anatomy & Physiology – Kaarna Muni Shekhar
Textbook of Physiology for BDS students - Dr Jain
Textbook of Physiology for BDS students – Dr Sambulingam
Handbook of Human Physiology – Vidya Ratan
Concise Medical Physiology – Sujith K Choudhari

➢ BIOCHEMISTRY

(where possible, integration may be done among anatomy, physiology, biochemistry departments to facilitate learning and avoid redundancy)

Broad Objective – Understand the basic principles of biochemistry and the biochemical processes that take place in the human body and their applied aspects

Key Objectives – At the end of the course the student should be able to

TERM – 1 (20 theory hours)

Carbohydrates (2-3 hrs) -

1. **Describe the biochemical properties of carbohydrates and classify them**
2. **Describe the processes of glycolysis, Kreb's cycle and gluconeogenesis**
3. **Describe normal glucose homeostasis and the principal abnormality of diabetes mellitus**

Proteins (3-4 hrs)

4. **Describe biochemical properties and structure of proteins and amino acids and classify them**
5. **Describe the process of digestion and absorption of proteins and their functions**
6. Describe the properties and color reactions of proteins and their fractionation
7. **Describe the synthesis and excretion of urea and creatinine**

Lipids (3-4 hrs) -

8. **Describe the biochemical properties of fats and their functions, their classification and their digestion and absorption and metabolism**
9. **Describe the synthesis, role and degradation of cholesterol**
10. Describe briefly the phospholipids and lipoproteins and their role
11. **Describe the normal lipid profile and its principal abnormalities in atherosclerosis**

Nucleic acids (2 hrs)

12. **Describe briefly the biochemical properties of nucleic acids, nucleosides, nucleotides (purines & pyrimidines) and nucleoproteins**
13. **Desccribe briefly the structure and types of DNA & RNA**
14. Mention the disorders of purine and pyrimidne metabolism

Enzymes (2-3 hrs) -

15. **Classify enzymes and explain their nomenclature**
16. **Describe the mechanism of action of various enzymes and the factors that affect their activity**
17. **Describe the mechanisms of enzymes and coenzymes**
18. **Describe briefly the concept of clinical enzymology and importance**

Vitamins (2-3 hrs) -

19. **Classify vitamins and describe briefly the sources and principal role in humans**
20. **Describe briefly the features of deficiency of various vitamins and important vitamin excess disorders**

Hormones (3-4 hrs) -

21. **Define and classify hormones**
22. **List out the various pituitary hormones and describe briefly their functions**

23. **Describe briefly the synthesis, production and secretion and regulation of important hormones like insulin, glucagon, thyroid hormones, adrenal cortical hormones**

TERM -2 (20 hrs)

Minerals & trace elements (2 hrs)

24. **List out the principal minerals (Ca, P, Mg,) and trace elements (I, Fe, Zn, Cu, Cr, Co) and briefly describe their role in health and list out their role in diseases**

Water & Electrolyte & Acid Base Balance (4-5 hrs)

25. **Describe briefly the principal electrolytes and their normal regulation and mention the principal abnormalities (Na and H2O balance, K, Cl, HCO3)**
26. **Describe pH and the normal pH of blood, buffers and measurement of pH**
27. **Describe the maintenance of normal pH, the role of kidney and lungs and list out the important abnormalities**

Hemoglobin (2 hrs)

28. **Describe briefly the normal structure and function of Hemoglobin, its synthesis and breakdown, and list out the important abnormal hemoglobins and their effect**

Function Tests (2-3 hrs)

29. **Describe the biochemical functions of kidney and the principal Renal Function Tests**
30. **Describe the biochemical functions of liver and the principal Liver Function Tests**
31. **Describe briefly the Thyroid function tests**

Biochemical techniques & instrumentation (5-6 hrs) -

32. **List out the various laboratory apparatuses and their uses and their maintenance**
33. **Describe the principles and uses of important biochemical lab techniques like electrophoreisis, colorimetry, spectophotometry, chromatography, ELISA, RIA**
34. **Describe briefly the various instrumentation techniques like centrifugation, ultra-centrifugation, Geiger counter, Scintillation counting, RIA, turbidometry, Electrochemistry, Immunochemistry, Blotting techniques**
35. **List out the common hazards in the laboratory and preventive measures and list out the measures to dispose of radioactive waste material**
36. **Describe briefly the methods of sample collection**
37. **Describe the role of quality assurance in laboratories and the use of reference values**
38. Describe briefly about colloids, Gibbs- Donnan equilibrium and Van der Waal forces and surface tension and osmosis
39. Good laboratory practice
40. Quality assurance
41. Safety in laboratories

PRACTICALS (40 hrs)

1. Handling & maintenance of glassware
2. Use of centrifuge, balance & weighing
3. Blood chemistry – estimation of glucose, urea, creatinine
4. Blood chemistry – lipid profile, electrolytes
5. Blood chemistry- thyroid hormones
6. Blood chemistry – liver function tests and liver enzymes
7. Blood chemistry – serum total protein, albumin estimation
8. Perform urine analysis - protein, sugar, specific gravity, urobilinogen, bile salts & bile pigments, ketones, hemoglobin, etc.
9. Perform or assist in performing CSF & other body fluid analysis
10. Perform a Dipstick test and interpret it
11. Use an auto analyser and write a report
12. Point of Care tests and interpretation
13. Perform ABG analysis and interpret the report
14. Case based clinical biochemistry & interpretation of reports

Reference Books

Biochemistry for medical students – Vasudevan & Sreekumari
Biochemistry – U Satyanarayana
Textbook of Biochemistry – Debajyothi Das
Biochemistry – Dr D Prabhakara Rao

➢ ENVIRONMENTAL SCIENCES

1. **Define envirionment, ecology, ecosystem and mention the components of environment**
2. **Mention the natural and Man-made changes on environment & disasters – give example**
3. **Describe briefly about air pollution, primary air pollutants, origin and control measures and air quality norms**
4. Describe briefly about land pollution, types of land pollution, their sources and control measures
5. **Describe briefly about solid waste disposal measures**
6. **Describe briefly about water sources, water pollution, types of water pollution, control measures**
7. **Describe briefly about water quality standards, water treatment, water recycling**
8. Describe briefly about noise pollution, and control measures, and acceptable noise levels
9. **Describe briefly about radiation and types, sources of radiation, biological effects of radiation**
10. **Describe briefly about the use of radiation in health care and protective measures**
11. **Describe briefly the impact of humans and society on environment and on food and natural resources**
12. Describe briefly the concept of sustainable development
13. **Describe briefly the conventional and non conventional energy resources and about energy conservation**
14. **Describe briefly about the role and uses of forests and the effects of deforestation and a note on the Forest Conservation Act**
15. Describe briefly about wildlife conservation

Environmental Studies for undergraduate courses – Erach Bharucha

➢ PSYCHOLOGY

At the end of the training program, the student should be able to
Cognitive Psychology -

1. **Describe the process of attention and learning and mention the theories of learning**
2. Mention briefly the theories of signal detection and perception
3. **Describe briefly memory and its models**
4. Mention the concepts of thinking, reasoning and creative thinking

Physiological Psychology

5. Describe briefly physiological basis of consciousness and sleep and stages of sleep
6. **Describe briefly the physiological basis of emotions, anxiety, stress**
7. **Describe briefly the role of stress in human disease**
8. Describe briefly about cognitive development and emotional development
9. **Describe briefly the psychosocial development in childhood, adolescence & adults**

Social psychology

10. **Describe briefly about social perception, social cognition, attitude formation, and interpersonal relationship and interdependent relationship, social facilitation, social influences,**

Psychopathology

11. **Define personality and List the personality disorders and their principal features**
12. **List the psychosomatic disorders and their principal features**
13. **List the mood disorders and their principal features**
14. **Describe briefly about suicide, theories, and prevention**
15. Describe briefly the psychotic disorders and the underlying psychopathology
16. Mention the important childhood and developmental disorders and their principal features including mental retardation, autism, ADHD, Disruptive Behaviour Disorder, Eating disorders, etc.
17. List the methods of assessment in psychology
18. **Describe briefly the basics of psychotherapy and counseling and relaxation and CBT and their role in medicine**

Reference Books
Psychology for nurses – K Madhavi

➢ ENGLISH

Objectives –
The student would be able to

1. Understand and communicate in simple English, written and verbal
2. Understand and practise the basic principles of English grammar
3. Comprehend and summarise a given English essay / paragraph
4. Translate between English & Telugu
5. Understand common English terms used in the medical / health care field

1. Basic English Grammar
2. Grammar - 8 parts of speech. Structure of sentence. Sentence writing. Paragraph writing. Summarizing / précis writing. Reading & comprehension (a small paragraph followed by questions)
3. General English Vocabulary & Use of dictionary
4. Common Medical Terminology
5. Spoken & Written English
6. Listening & Reading skills
7. English comprehension & summarizing & inference
8. Translation from Telugu to English
9. Writing skills – Questions based on prescribed prose / poetry, Letter, Summary, Case history, Medical Report, Documentation, Note taking
10. Verbal communication – discussion & summarizing. Taking minutes of meeting & writing the minutes.

Prescribed Prose –

1. Rabindranath Tagore - Kabuliwalah
2. Sarathchandra - Lalu
3. Jerome K Jerome - Chapter 1 of Three Men in a Boat
4. Premchand - Thakur's Well
5. Leo Tolstoy - How much land does a man need?
6. O' Henry - The Last Leaf
7. TS Arthur - An Angel in Disguise
8. Frank Stockton - The Lady or the Tiger

Prescribed Poetry –

1. William Shakespeare - The Seven Ages of Man
2. Rabindranath Tagore - Where the Mind is without Fear
3. Robert Frost - The Road not Taken
4. Rudyard Kipling - If
5. John Milton - On his Blindness
6. John Donne - Death Be Not Proud
7. Sarojini Naidu - Palanquin Bearers
8. Sarojini Naidu - Indian Weavers

Reference Books –
English for BSc Nursing – Angela Vanaja Kumari & Prof RS Caroline
Current English for Nurses – Rupinder Pannu & Kirtan PK Tandon
English for nurses – B Reddy Prasad

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❖PARENT DEAPARTMENT

➢ NEURO PHYSIOLOGY TECHNOLOGY

1. Describe the basic anatomy of the brain and its parts
2. Describe the blood supply of the brain
3. Describe the basic functions of various areas of the brain
4. Describe the basic anatomy of the spinal cord
5. Describe briefly the cranial nerves and their supply and actions
6. Describe briefly the spinal nerves and the brachial and lumbosacral plexuses
7. Desccribe briefly the motor and sensory pathways
8. Describe briefly about membrane potential & action potentials
9. Describe the normal EMG and its genesis and method of recording
10. Describe the types of nerves and their connections responsible for the phenomena in the EMG
11. Describe the normal EEG and its genesis and method of recording
12. Describe briefly about Stroke, the various types of stroke and its risk factors
13. Describe the principle of CT scan and the principal findings of a CT scan of the brain
14. Describe the principle behind MRI scan and the principal findings of a normal MRI of the brain
15. Describe briefly the pathogenesis of ischemic and hemorrhagic stroke and the principal CT / MRI findings
16. Describe the common types of seizures and the important clinical features and list out the common drugs used in their treatment
17. Describe the important EEG findings in seizures

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➢ ANAESTHASIOLOGY TECHNOLOGY & OPERATION TECHNOLOGY

1. Describe briefly the anatomy of respiratory system and its functions
2. Describe briefly the anatomy of the heart and its functions
3. Describe briefly the scope of anesthesia and its uses
4. Describe briefly the common local anesthetic used
5. Describe briefly about inhaled anesthetics
6. Describe briefly about spinal anesthesia and epidural anesthesia
7. Describe about pre anesthetic checkup, pre-operative preparation of patient, informed consent and premedication
8. Describe briefly about gases supply in the OT
9. Describe briefly about choice of anesthesia and plan
10. Describe briefly about asepsis and hand washing technique
11. Describe about the preparation and maintenance of operation theatre
12. Describe briefly about laparoscopic machine and its energy sources and CO2 cylinder
13. Describe the maintenance and preparation of Anesthesia Chart
14. Describe the methods of providing CPR (including recognizing cardiac arrest, COLS, BLS & ALS)
15. Describe briefly about balanced anesthesia and maintenance of GA
16. Describe briefly about postoperative care and recovery room
17. Describe briefly about mechanical ventilation, indications, modes, and weaning off

➢ CARDIAC CARE TECHNOLOGY & CARDIO VASCULAR TECHNOLOGY

Basic anatomy / physiology of heart (3-4 hrs)

1. **Describe the Chambers & valves etc. of heart**
2. **Describe the Path of human circulation**
3. **Describe briefly the Conduction system of heart**
4. **Describe briefly the anatomy of the Coronary arteries**

Normal ECG

5. **Describe the Normal ECG & its components**
6. Describe briefly the Genesis of different complexes in ECG
7. Describe the basics of interpreting an ECG and write an ECG report
8. Describe how to record a 12 lead ECG
9. *Describe briefly the Hexaxial system and Einthoven's Law*

Normal Echo

10. *Principles of echocardiography / ultrasound*
11. **Different types of echocardiography & their uses**

    Different views in routine trans thoracic echo (apical 4 & 5 chamber, parasternal short axis (great artery level, mitral valve level, papillary muscle level, apex level), parasternal long axis view)

Stress testing / Treadmill test

12. **Define Stress testing & mention the different types and describe briefly its uses**
13. **Describe briefly about the Treadmill test – its indications, contraindications, procedure interpretation of result, and when to stop a TMT, etc.**

Acute Coronary Syndrome

14. **Acute coronary syndrome – definition, types**, *brief etiopathogenesis*, **key clinical features and investigations**, *treatment concepts*

CPR & other emergency procedures

15. **Describe the process of CPR and how to perform it Definition, diagnosis of cardiac arrest, BLS & ACLS & COLS, procedure of performing CPR.**
16. **Describe and differentiate defibrillation from cardioversion – and mention its uses and describe briefly the method of performing CPR, including procedure of administering DC shock – for elective / emergency cases**
17. **Temporary pacing – definition, uses, description of procedure, complications, settings in the pulse generator, post procedure care. ECG in temporary pacing. Use of Fluoroscopy in TP**

Hypertension

18. **Define Hypertension and Normal BP, and describe How to measure BP, and mention the complications of hypertension,** *and list out the ommon drugs used in hypertension,* and describe briefly the ECG & Echo changes in hypertension

Heart Failure

19. Chronic Heart failure – definitions, *types of heart failure*
20. **Mention the Common causes of HF and Key Clinical features of HF**
21. **Describe briefly the X-ray / ECG / Echo findings in HF**

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➢ IMAGEING TECHNOLOGY

Topic & Main points

1. Introduction to Electromagnetic Waves & Radioactivity

Describe Electromagnetic waves and their properties
Describe briefly the quantum theory of radiation
Define radioactivity
Describe briefly about natural and artificial radioactivity
Describe briefly the radiation sources

2. Introduction to X-rays

Describe briefly the production and properties of x-rays
Describe briefly the interaction between x-rays and matter
Describe briefly the transmission, attenuation, absorption, etc.of x-rays in body tissues

3. Radiation Effects & Protection

Describe briefly the effects of radiation on the human body
Describe briefly the measures to reduce radiation exposure
Describe the various protective materials against radiation
Describe briefly the recommendations and practice for protection of personnel against radiation

Principles of routine X-rays

Describe briefly the routine projections for –
Upper limb
Lower limb
Thorax & Chest
Abdomen
Pelvis & hip
Spine
Skull
Nasal sinuses

Radiographic photography and image processing

Describe briefly about

Dark Room
X-ray films
X-ray cassettes
Intensifying screens
Image formation
Processing methods
Developing, Rinsing & Fixing & Washing & Drying

Principles of Ultrasound Imaging

Describe briefly the properties of ultrasound

Describe the transducer and types

Describe the various display modes – A mode, B mode, M mode, real time

Describe the Doppler methods – Pulsed Doppler, Continuous wave Doppler, Color Doppler, Duplex

Duties & practical aspects of radiography

Describe the duties of radiographer during common procedures

Describe the preparation of patient for common procedures

Describe the precautions to be taken for radiation protection

➢ DIALYSIS TECHNOLOGY

1. Describe the basic anatomy of the kidney and urinary bladder and genitourinary system
2. Describe the basic structure of the nephron and glomerulus and its functions
3. Describe the principal functions of the kidney
4. Define and explain the concept of GFR and methods to estimate GFR
5. Describe the concepts of glomerular tubular feedback and tubular function and counter current multiplier mechanism
6. Describe the process of urine formation
7. List out the renal function tests and their normal values and their role in diagnosis
8. Describe the tests done in urine analysis, normal values and their role in diagnosis
9. Describe the role of ultrasound in diagnosis of renal disease and normal ultrasound findings
10. Define Acute Kidney Injury and list out its common causes and important clinical and laboratory features
11. Define Chronic Kidney disease and list out its common causes and important clinical and laboratory features
12. Describe the principle behind dialysis and list the types of dialysis
13. Describe the procedure of peritoneal dialysis and preparation of the patient and monitoring
14. Describe the procedure of hemodialysis and preparation of patient and monitoring
15. Describe the process of water treatment and R-O process and R-O plant and maintenance
16. List out the common complications of peritoneal dialysis and management
17. List out the common complications of hemodialysis and management
18. Describe briefly blood transfusion, indications and procedure and monitoring and complications
19. Describe briefly about bllood groups and cross matching
20. Describe briefly about HIV, HBV, HCV, the modes of transmission and important clinical features
21. Describe the vaccination procedures used in CKD patients
22. Deseribe the universal precaution measures

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➢ OPTOMETRY TECHNOLOGY

Basic Principles of Light

1. Describe briefly about light, its wave nature, speed, frequency, wavelength
2. Describe briefly about refraction by spherical surfaces – convex & concave
3. Describe briefly about lens and types and basic properties

Basic anatomy of eye

4. Describe the Gross anatomy of Eye, including anatomy of lens and functions and changes with ageing
5. Describe the normal Intraocular pressure and factors influencing it and the measurement of IOP

Basic Physiology of vision

6. Describe the normal visual pathway, visual acuity, accommodation, convergence, color vision, night vision, contrast sensitivity and binocular vision

Ophthalmic instruments and procedures

7. Describe the properties and principles of operation and application of the following – Binoculars, Retinosope, Standard Test Charts, Auto-refractometer, Ophthalmoscopy (direct & indirect), Slit lamp

Refractory errors

8. Mention the types of refractory errors and the basic abnormality
9. Describe methods for detection /diagnosis of refractory errors
10. Describe methods of correction for myopia, hyperopia and astigmatism and presbyopia and aphakia and pseudo-aphakia

Common ophthalmic problems

11. Describe briefly the key clinical features, etiology, diagnostic tests and treatment options for common problems of the eye – including conjunctivitis, corneal ulcer, cataract, glaucoma etc.
12. Describe briefly about cataract identification, evaluation of cataract patient and post operative care after cataract surgery

➢ PERFUSION TECHNOLOGY

Basic Anatomy & Physiology

1. Describe the Basic anatomy of heart
2. Describe the Basic anatomy of coronary arteries
3. Describe the normal Pathway of blood circulation

Cardiopulmonary bypass

4. Explain the basic principles of Extracorporeal Circulation and the principles of Extracorporeal gas exchange
5. Describe the Heart lung machine, its principle, components, and functioning
6. Describe briefly about Pumps and an ideal pump; Types, design & function
7. Describe briefly about Oxygenator and types, design, and function
8. Describe briefly about Heater cooler unit / Blood cardioplegia device / ACT machine
9. Describe briefly about connection of vascular system with extracorporeal circulation including art & ven canulae, connecting tubes & connectors, vents & suckers, venous drainage, etc.
10. Describe briefly about Filters and about Arterial filters / Cardiotomy filters / Gas line filters / Leukocyte filters

Monitoring

11. Describe about ECG monitoring
12. Describe about Pressure transducer & Pressure monitoring
13. Describe briefly about temperature probes and thermoregulatory monitoring
14. Describe briefly about hemodynamic monitoring, hemostatic monitoring, hematological monitoring, neurological monitoring

CPR

15. Describe briefly about CPR – its Definition, diagnosis of cardiac arrest, and describe briefly the procedure of BLS & ACLS & COLS, and the procedure of performing CPR and use of defibrillator

Coronary Artery Disease – an Introduction

16. Describe briefly about coronary artery disease, its pathogenesis and risk factors
17. Describe briefly about principal clinical features of CAD and important investigations, including Coronary Angiogram and treatment principles, including CABG

Congenital Heart Diseases

18. Define CHD & mention the types / classification of CHD
19. List out the common CHDs (ASD, VSD, PDA, TOF) and describe briefly the disease, important clinical features and investigations and treatment options including surgical measures

Basic Investigations

20. Describe briefly the normal features in a chest x-ray PA view
21. Describe briefly a normal ECG
22. Mention the important x-ray features of common disorders in CTVS
23. Mention the important ECG features of common / important cardiac disorders like acute MI, VT, Complete Heart Block, AF, etc.

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➢ Emergency Medical Technology

1. History of emergency medicine
2. Evolution of emergency medicine as a specialty
3. Role of emergency department
4. The emergency patient (critically ill patient)
5. Introduction to emergency medical services
6. Evolution of EMS
7. Existing EMS in India
8. Future trends in emergency medical services
9. Roles and responsibilities of EM technician
10. Role of EMT in hospital
11. Role of EMT in ambulance and field
12. Ambulances
13. Basics of patient transport
14. The primary survey
15. Secondary survey
16. General physical examination
17. Systemic examination- cardiovascular, respiratory, abdomen and pelvis, CNS, genitourinary, musculoskeletal
18. Basic life support
19. Pre-hospital communications
20. Hospital and prehospital simple triage
21. Mass casualty and multiple casualty
22. Personnel protective equipment
23. Wound preparation
24. Emergency department equipment
25. Prehospital equipment
26. Basic techniques and devices of splinting
27. Decontamination in emergency department
28. Gastric lavage
29. Obtaining a 12 lead ECG
30. Lifting, moving and Stretcher operations
31. Spinal immobilization
32. Helmet removal
33. Application and use of spine board
34. Intrahospital patient transfer
35. Documentation of case record

➢ Respiratory Therapy Technology

Lectures
Patient contact techniques
Nonverbal Communication
• Aspects of verbal and nonverbal communication
• Definitions
• Characteristic
Universal Precautions
• Handwashing
• Isolation procedures
Assessment of vital signs
• General appearance
• Sensorium
• Pulse
• Blood pressure
• Respiration
• Pain – Visual Analogue Scale
Chest topography
• Identification of surface marking lines
• Topographical landmarks of thorax,Lungs & Pleura
Assessment of respiratory system
• Inspection Palpation, percussion and auscultation of respiratory system
• Definition and significance of the presence altered resonance abnormal breath sounds and
adventicious sounds
Assessment of cardiovascular system
• Topography of the heart
• Examination of the procardium
• Overall cardiovascular functions
• Symptoms of cardiovascular disease
• Cardiovascular pain
Segment of other body System
• Skin
• Neurological system
• Abdomen
Gas Physics
• State of matter
• Temperature conversion
• Humidity

• pressure measurement
• Gas flows and diffusion
• Gas laws
• Discellaneous concepts such as density and specific gravity

Medical Gas supply

• Compressed gas cylinders
• Colour coding
• Cylinders and Cylinders valves
• Cylinder storage
• Diameter index safety system
• Medical gas pipeline system and station outlets
• Air components
• Oxygen concentrators
• Alarms and safety revises

Gas Administration devices (Reducing valves, flow meters and regulators).

• Simple oxygen administration devices
• Methods of controlling gas flow
• Reducing valve
• Flow meters
• Regulators
• Flow restrictors

Oxygen therapy (rationale for oxygen therapy, precautions assessment of need and adequacy and therapy and the relevant devices)

• Definition
• Humidity therapy Definition
• Aerosol therapy definition
• Small volume nebuliser therapy - definition, physiological rationale

ECG - basic principles, normal ECG, interpretation in disease

Introduction, value and limitation of chest X-ray, conventional and special radiological views

Pulmonary function testing - Definition

PFT - in disease and their significance

Provocative tests and postbronchodilator tests of lung function

❖SECOND YEAR SYLLABUS:

➢ MICROBIOLOGY

(TERM - 3 & TERM - 4)
Theory (63 hrs) & Practical (42 hrs)
(Theory – 40-50 for common topics; 10-20 for B.Sc subject related)
(Practical – 20-30 for common topics; 10-20 for B.Sc subject related practicals)

General Bacteriology
Introduction & Microscopy
Morphology of Bacteria
Growth & Nutrition of Bacteria
Sterilization techniques
Brief - Culture media & Methods
Universal precautions

Immunology
Infection
Immunity
Antigen
Antibody
Antigen – Antibody reaction
Cells of Immune System
Brief - Immune Response
Immunohematology

Bacteriology
Bacteriology – Common bacteria - Staph, Strep, Pseudomonas, Meningo, Gono, Gram negative bacteria, tetanus, Tuberculosis & leprosy, etc.

Parasitology
Common parasites - Entameba, Malaria, Helminths, including Cysticercosis

Mycology
Candida & Cryptococcus

Virology
Common viral diseases (DNA & RNA)
HIV
Blood transfusion
NABH accreditation & procedures
Good laboratory practices

Practical

Microscopy
Specimen collection & handling
Sputum exam
Stool exam
C/S techniques
Slide preparation
Staining & examination
Serology
Virology
ELISA
Agglutination tests
Rapid tests
Others / elective
Record of practical exercises

➢ PATHOLOGY

(TERM - 3 & TERM - 4)
Theory (63 hrs) & Practical (42 hrs)
(Theory - 40-50 for common topics; 10-20 for B.Sc subject related)
(Practical – 20-30 for common topics; 10-20 for B.Sc subject related practical)
Introduction (2-3)
Cell injury & death (1-2)
Shock (1-2)
Inflammation (2-3)
Neoplasia – (3-4)
Malignancy of – thyroid, breast, stomach, kidney, prostate, ovary, cervix, endometrial, lung, bone, soft tissue, skin (12-15)
Hematology – anemia, polycythemia, leukemia, aplastic anemia, lymphoma (5-7)
Kidney – Glomerulonephritis, carcinoma, CKD (3-4)
Thyroid – goiter, tumor (2-3)
Cardiac – MI, rheumatic fever, hypertension (3-4)
Infections – Abscess, tuberculosis, HIVAIDS, Amoebiasis, malaria, meningitis, septic shock, UTI, etc. (8-10)
Others / electives – 4-6
Practical -
Microscopy (1)
Specimen collection & handling (1-2)
Peripheral smear (1-2)
Automated cell counter (1-2)
Urine microscopy (1-2)
Stool microscopy (1-2)
CSF, body fluid analysis (3-4)
Histopathology techniques (3-4)
Reception of specimens & handling (1)
Tissue processing (1-2)
Mounting & staining (H&E) (1-2)
Cytology (2-3)
Blood group (1)
Important & common histopathology – Malignancy, tuberculosis, leukemia, etc. (6-9)
Others / elective – 4-5
Record of practical experiments, etc. – 4-5

➢ PHARMACOLOGY

B.Sc PARAMEDICAL PHARMACOLOGY (TERM 3 & 4) SYLLABUS

Theory (60 hours) Practical (20 Hours)

Theory (60 hours)

Common topics - 50 hours & Subject specific - 10 hours(For Renal dialysis Technology 15 hrs)

(Many subject specific topics will be covered in hours for common topics but they will be discussed in depth in subject specific hours)

Common topics for theory (50 hours)

Unit 1. (6 hours) General Pharmacology 1. Introduction & Routes of drug administration 2.Pharmacokinetics. 3. Pharmacodynamics 4. Pharmacovigilance 5&6 Clinical trials

Unit 2. (9 hours) ANS & Autocoids 7&8. Sympathomimetic drugs. 9&10. Sympatholytic drugs 11. Parasympathomimetic drugs 12&13. Parasympatholytic drugs 14. Anti-histamines 15. NSAIDs

Unit 3. (8 hours) CNS 16. Opioids. 17. Hypnotics. 18. General anesthetics. 19. Antiparkinsonism drugs 20. Antiepileptics 21. Anti-psychotics 22. anti-depressants 23. Alcohols

Unit 4. (2hours) Peripheral nervous system 24. Local anesthetics 25. Skeletal muscle relaxants

Unit 5. (2 hours) CVS 26. Anti-Hypertensives 27. Anti-anginal & Drugs for Myocardial infarction

Unit 6. (4 hours) Blood 28. Anti-platelet drugs. 29. Antianemics 30. Anticoagulants & fibrinolytics 31. Hypolipidemic drugs

Unit 7. (1 hour) Renal System 32. Diuretics & antidiuretics.

Unit 8. (2 hours) Respiratory system 33. Anti-asthmatics 34. Drugs for Cough

Unit 9. (8 hours) Chemotherapy 35. General considerations & Antiseptics 36.B-lactum & macrolides 37. Aminoglycosides & fluroquinolones 38. Anti TB & Anti- leprotic 39. Anti-malarial & anti- amoebic drugs. 40. Anti-retroviral drugs 41. Anti-fungal & anthelmintics 42. Anti-cancer drugs.

Unit10. (6 hours) Endocrine system 43. Antidiabetics 44. Glucocorticoids 45. Estrogens, Progestins. OC pills 46. Thyroid &. Anti-thyroid drugs 47. Drugs acting on uterus. 48. Androgens & anti androgens

Unit 11. (2 hours) Miscellaneous 49. Immunosuppressants 50. Chelating agents.

Subject related specific topics - Theory (10 hours)

1. B.Sc. (Neurophysiology) theory 10 hours

Neurotransmitters Of nervous system 2 hours, Drugs for myasthenia 1 hour, Drugs for neuralgia 1 hour, Anti-epileptics 1 hour, Drugs for neurodegenerative disorders 2 hours, Neuromuscular blockers 1 hour, Ganglion blockers 1 hour, CNS stimulants 1 hour.

2. B.Sc. (Anesthesia & Operation Theatre Technology) theory 10 hours

Mechanism & pharmacokinetics of general anesthetics 2 hours, Preanesthetic medicaments 1 hour, I.V anesthetics 1 hour, Local anesthetics 1 hour, Drugs for shock 2 hours, IV fluids 1 hour, Skeletal muscle relaxants 1 hour, Anti-arrhythmic drugs 1 hour

3. B.Sc. (Cardiac Care & Cardiovascular Technology) theory 10 hours

Anti-arhythmic drugs 2hours, Anti-coagulants & fibrinolytics 2 hours. Antiplatelets 1hour Drugs for shock 2 hours, Hypolipidemic 1 hour, Drugs for CHF 2 hours.

4. B.Sc. (Imaging Technology) theory 10 hours

Radiocontrast media & radiopaque substances 2hours, Echo contrast agents 1hour, Radio nucleoids 1hour, Local anesthetics 1 hour, IV anesthetics 2 hours, IV fluids 1 hour, Drugs for shock 2 hours

5. B.Sc. (Renal Dialysis Technology) theory 15 hours

Nephrotoxic drugs 2 hours, Pharmacokinetic & pharmacodynamic changes in renal failure 2 hours, Drug prescription in renal failure 1 hour, Diuretics 2 hours, Antidiuretics 1 hour, Anti-coagulants 2 hours, Anti-anemic drugs (including bone marrow stimulants) 1 hour, Hemodialysis concentrates (acetates & bicarbonates) 1 Hour Peritoneal dialysis fluid 2 hours. IV fluids 1 hour.

6. B.Sc. (Optometry Technology) theory 10 hours

Mydriatics 1 hour, miotics 1 hour, Drugs for Glaucoma 2 hours, Local anesthetics 1-hour, Antibiotic eyedrops & ointments 2 hours, Tear drops for dry eye 1 hour. Drugs for anaphylactic shock & cardiogenic shock 2 hours

7. B.Sc. (Perfusion Technology &Emergency Medical Technology) theory 10 hours

Drugs for Cardiogenic shock, Hypovolemic shock, neurogenic shock, septicemic shock 4 hours, I. V. fluids 1 hour, Plasma expanders 1 hour, anticoagulants, fibrinolytics & antifibrinolytics 2 hours. Drugs for fluid & electrolyte imbalance (NaHco3, KCl, etc.) 2 hours.

8. B.Sc. (Respiratory Therapy Technology) theory 10 hours

Bronchodilators 1-hour, Inhalational glucocorticoids 1 hour, Antitussives & expectorants 1 hour, Mast cell stabilizers & Lt antagonists 1 hour, Antihistamines 1 hour. Anti-TB drugs 2 hours. Drugs for Empyema 1hour, Anti-influenza antiviral drugs 2 hours.

Practicals 20 hours

1. Dosage forms (shall be kept as Spotters) 5 hours
2. Routes of drug administration 5 hours (DOAP session on i.minj, IV inj, Use of Inhaler, nebulizer, I.V. set, etc.)
3. Dose calculations for drugs (I.v. drip rate, dose for children etc.) 2 hours
4. ADR reporting 2 hours
5. Demonstration of effect of drugs (using CAL, total 6 hours), Effect of drugs on Rabbit eye 3 hours, Antagonism between dTc& Ach 1 hour. Effect of drugs on BP using CAL 2 hours

Sd/-
(Dr. K. Sanakr)
REGISTRAR

➢ SOCIOLOGY

Dr. NTR UNIVERSITY OF HEALTH SCIENCES: AP: VIJAYAWADA- 520 008

Sociology (TERM 3)
theory – 21 hours

Society (1-2)
Culture & Diversity (1-2)
Socialisation (1-2)
Social Groups & Control (1-2)
Social Institutions (1)
Family (1-2)
Urban sociology (2-3)
Rural sociology (2-3)
Slums (1-2)
Disparities in Health (1-2)
Social change (1-2)
Social determinants of Health (1-2)

Soft skills (TERM 3)

Communication – types, principles, good communication skills (written & oral) (8-10)
Communicating at work place – with colleagues, superiors, patients, attendants, (8-10)
Team work & group dynamics (4-6)
Professionalism (3-4)
Ethics (3-4)

❖PARENT DEAPARTMEN

➢ NEUROPHYSIOLOGY TECHNOLOGY

TERM 3 AND TERM 4 (21+ 63 CLASSES)

PAPER-II

Neuro-Pathology:

A. **Neuron – pathology of nerve cell injury, generation of epileptiform activity**
B. **Nerve – types and pathology of nerve fibre injury, demyelination and remyelination**
C. **Muscle – pathology of primary muscle disease, types of muscle injury (metabolic, inflammatory, nutritional, endocrine, toxic, drug induced, traumatic etc.), neurogenic muscle involvement,**
D. **Brain – encephalitis, encephalopathy, meningitis**

1. **Technical Aspects:**
   A. **Different parts of EEG and ENMG machines and their functions, i.e. montage, electrodes, filters, calibration, sphenoidal electrodes, depth electrodes, electrode impedence, identification of wave patterns (spike, sharp wave, slow wave and others), artefacts (eye movement,muscle, pulse), normal laboratory values**

   B. **Basic Principles of Nerve Conduction Studies (NCS) – Motor NCS, Sensory NCS, F-wave, H-reflex, Blink reflex and others, Repetitive Nerve Stimulation (RNS), normal laboratory values**

C. Electroencephalographic monitoring (in-patients and ambulatory), EEG patterns - normal EEG in children and adults, awake and sleep EEG records, neonatal EEG, Normal variants in EEG, Activation Procedures in EEG recording (hyperventilation, photic, sleep deprivation, and others), EEG reporting, ENMG reporting, Record Keeping

2. **Clinical Aspects:**
   A. **Diseases affecting Cranial and Peripheral nerves – nutritional, metabolic, inflammatory, immune mediated, hereditary etc.**

B. Diseases affecting muscles - nutritional, metabolic, inflammatory, immune mediated, hereditary etc.Diseases affecting brain and meninges - nutritional, metabolic, inflammatory, hereditary, degenerative etc., Seizure disorder and its differential diagnosis

➢ ANAESTHASIOLOGY TECHNOLOGY & OPERATION TECHNOLOGY

Term 3 (21 classes)

S. No	Topic	Number of classes
1	Oxygen, Nitrous oxide, Air cylinders	**2**
2	Cylinders, central Pipeline and liquid oxygen maintenance	**1**
3	Diathermy	**1**
4	Physical principles of vaporiszation,Vaporisers	**2**
5	Multi Para monitor	**1**
6	Suction apparatus	**1**
7	Stylet, Bougies, Magill's forceps	**1**
8	Airways	**1**
9	Supraglottic airway devices	**1**
10	General surgical instruments	**2**
11	Laparoscopy instruments	**2**
12	Endotracheal tubes, NM monitor	**1**
13	Defibrillator, AED and Manual	**1**
14	Ventilators	**2**
15	OT cleaning, fumigation, Autoclave and instrument sterilization	**2**

Term 4: 63 classes

S. No	Topic	Classes allotted
1	Autonomic nervous system (ANS)	**3**
2	Burns – Classification and management	**3**
3	Leg Ulcers – Classification and management	**3**
4	Thyroid diseases	**3**
5	Obstructive Jaundice Diagnosis and management	**3**
6	Breast diseases	**3**
7	Swelling treatment	**2**
8	Hernia	**2**
9	Local Anesthetics	**2**
10	Inhaled anesthetics, Uptake and distribution of inhaled anesthetics	**2**
11	Newer inhaled anesthetics: Halothane, iso, sevo and desflurane	**2**
12	Concentration effect, second gas effect, diffusion hypoxia	**1**
13	Intravenous anesthetics	**2**
14	Opioid receptors, Opioid	**2**
15	Preparation for C V line & Arterial line	**1**
16	Pre operative care of patients in ward	**1**
17	Anatomy and physiology of neuromuscular junction	**2**
18	Neuromuscular blocking drugs, Monitoring	**3**
19	care of patient in post operative ward	**1**
20	Spinal Anesthesia, Epidural Anesthesia	**6**
21	Peripheral nerve blocks	**2**
22	Fluid management, electrolytes	**3**
23	Blood and Blood components	**3**
24	Intercostal drainage preparation	**1**
25	Dressings and care of operation wound	**2**
26	CSS Department functioning	**1**
27	Record keeping	**1**
28	Pre and post operative Investigations	**1**
29	Care of new born	**1**
30	Oxygen therapy and toxicity	**1**

➢ CARDIOVASCULAR TECHNOLOGY

Term - 3 and Term - 4
PAPER-II (21+ 63 CLASSES) - Applied Anatomy & Physiology of Heart
1. Describe briefly the applied anatomy of the heart & major blood vessels of the body correlating with Echo images

2. Describe the cardiac cycle

3. Describe & draw the normal pressures & pressure waveforms in different cardiac chambers and major blood vessels Basic pharmacology of common cardiac drugs -

4. Classify the important and commonly used groups of cardiovascular drugs

5. List out the commonly used drugs in cardiology – and for each of them – list out the - main cardiovascular effects - common / chief indications- dose, administration - major side effects & contraindications

6. Antiplatelets – Aspirin, Clopidogrel, Prasugrel, Ticagrelor
a. GpIIb/IIIa inhibitors – Abciximab & Tirofiban

b. Anticoagulants - Heparin & LMWH

c. Diuretics – Frusemide, Hydrochlorthiazide and Spironolactone

d. Antihypertensive – ACEI (Ramipril, Enlaparil), ARB (Losartan,

Telmisartan), CCB (Nifedipine & Amlodipine) Hydralazine, Clonidine etc
e. Antianginal – ISDN, ISMN, beta blockers (Metoprolol, Carvedilol & Atenolol)

f. Antiarrythmic – Amiodarone, adenosine, digoxin, metoprolol, diltiazem & verapamil

g. Others – Statins (atorvastatin) VKA (warfarin, acenoucomarol) etc.

Cardiac Investigations -
1. ECG - Describe briefly the ECG features and emergency treatment of common cardiac problems – (including defibrillation, temporary pacing, etc. & role of technician) Acute MI (anterior, inferior, Posterior, etc.); Arrhythmias like sinus tachy& brady, APCs, VPCs, PSVT, Atrial flutter / fibrillation ; AV block (3 degrees); VT, VF

2. Echocardiography – Describe briefly the Principles & uses of various types of Echo - 2D Echo, M-mode, Pulse Wave Doppler, Continuous Wave Doppler, Color Doppler, Tissue Doppler, & Report writing

3. Describe briefly the indications & procedure of Transesophageal Echo & basic views and preparation of patient

4. Describe briefly the Echo features of common cardiac diseases and their recording - MS, MR, AS, AR, PS, ASD, VSD, PDA, Tetralogy of Fallot, Coarctation, Acute MI, Old MI, DCM, HCM, pericardial effusion, etc.

5. Holter monitoring – Describe the principles, indications, procedure, interpretation

Cath. Lab. Procedures -

1. Cardiac catheterisation – Define cardiac catheterisation, describe the principles and the basic techniques/ procedures, indications, pre-cath evaluation and patient preparation. Describe briefly the vascular access, left heart catheterisation, right heart catheterisation, adverse effects, pressure recording, oximetry procedure, etc.

2. Describe briefly coronary angiography – indications, patient preparation, technique, views, lesion identification, quantitative coronary angiography, report writing & prep. Etc. Describe the procedure of computerization of data and archiving and retrieval

3. Coronary Angioplasty – Describe the principles, indications, patient preparation, basic Technique, patient monitoring.

4. Cath. Lab. Equipment / hardware – Describe the various components in a cath. lab. incl. Fluoroscope, image intensifier, image acquisition, processing, storage, retrieval, monitors, Console room, pressure monitoring system & transducers

5. Cath. Lab. Disposables – Describe the various commonly used sheaths, catheters and Guidewires and other accessories and their sterilization

Common Cardiovascular Diseases –

1. Valvular Heart diseases - MS, MR, AS, AR, TR, PS, (PR,TS) – for each of them - Define what it is, Describe the common and important causes, Mention briefly the hemodynamic consequences, chief symptoms and important basic clinical signs, Important X-ray and ECG features; Describe the echo features and points to be recorded during echo; describe the important catheterisation features. List out the Basic treatment principles and describe any interventional procedure and role of technician

2. Arrhythmias - AV block incl. CHB, Sinus node dysfunction, AF, PSVT, VT For each of these, define the abnormality, mention briefly the common causes, mention the important symptoms and any clinical signs, describe the ECG features and role of Echo. Describe briefly the treatment principles, emergency treatment, use of DC shock if any, role of technician, etc. Describe briefly the use of EPS in diagnosis and management if any. Describe any interventional treatment procedure (e.g. pacemaker, etc.)

➢ IMAGING TECHNOLOGY

PAPER II SYLLABUS - TERM 3 & TERM 4 (21+ 63 CLASSES)

PHYSICS OF RADIOLOGY (21 CLASSES)

➢ Applied Mathematics:

Elementary Use of Algebraic Symbols and Signs. Indices: Power of 10 Simple Equations. Graphical Representation of a Data. Measurement of Angles. Geometry of Triangles. Proportion, Inverse Square Law, Elementary Explanation of Exponential Law. Electromagnetic Radiation, Atomic Structure & Radioactivity Electromagnetic Waves & Their Properties, Inverse Square Law, The Quantum Theory of Radiation (Planck's Concept of Quanta. Photon and Its Characteristic Properties), The Electromagnetic Spectrum, Spectrum of White Light, Spectra: - Emission Spectra-Continuous, Line & Band Spectra, Absorption Spectra, Fluorescence and Phosphorescence, Photoelectric Emission, Photocell, Intensity & Quality of Electromagnetic Radiation. The Structure of The Atom Nucleus, Atomic Number (Z), Mass Number (A), Ionization& Excitation, Isotopes, The Periodic Table. Radioactivity, Properties Of Alpha, Beta, Gamma Radiation, Radioactive Transformation Process (Radioactive Displacement Law), Radioactive Decay (Radioactive Disintegration Law), Decay Constant, Half-Life, Units Of Radioactivity, Artificial Radioactivity Or Induced Radioactivity (Production Of Artificial Radioactive Isotopes), The Uses Of Radioactive Nuclides In Medicine.

➢ Fundamental of Electricity (Basic of Electronics)

Electric Charges & Units of Electric Charge, Coulombs Law, Electric Induction, Electric Potential & Potential Difference, Capacitance & Capacitors, Resistance. Conductors, Insulators & Semiconductors, Electric Current, Ohm's Law &Kirchhoff's Law, Circuit Laws (Combination of Potential Difference in Series & Parallel, Meters, Electrical Energy & Power, Heating Effect of a Current. The Magnetic Effects of an Electric Current (Electromagnetism), Electromagnetic Induction, Mutual Induction & Self Induction.
Alternating Current, The A.C. Transformer Theory, Construction, Types Of Transformers Its Practical Aspects, Transformer Losses and Regulation & Rating, Types of Transformers Used in X-Ray Equipment. Thermionic Emission, The Vacuum Diode, Variation of Anode Current with Anode Voltage and Filament Temperature in The Vacuum Diode, The Effect of Gas in The Diode, The Thermionic Gas Diode. Meaning of Rectification (Full Wave & Half Wave Rectification). Principles of Semiconductors, P-N Junction Diode, High Voltage Rectifier Circuits (Self Rectifying Circuit, Half-Wave Pulsating Voltage Circuit, Full-Wave Pulsating Voltage Circuits, Shock- Proofing

➢ X-Rays:

Conductivity of Electricity Through Gases at Low Pressure, Cathode Rays - Production & Properties. Sources of Electrons (Discharge Through Gases, Thermionic Emission & Photo Electric Emission), Discovery of An Electron, Concept of Electron Volt. Discovery of X-Rays, Production & Properties of X-Rays. Factors Influencing the Intensity & Quality of X-Rays, Construction & Working of Modern X-Ray Tube (Fixed Anode & Rotatory Anode Tubes), The Physics Of X-Spectra I.E. The Spectrum of Radiation from An X-Ray Tube (Continuous Spectrum & Line or Characteristic Spectrum), Factors Upon Which the X-Ray Emission Depends, Soft& Hard X-Rays, Distribution of X-Rays in Space, The Diagnostic X-Ray Tubes (Inserts and Shields), Filament Design, Anode Design (Fixed & Rotatory), Methods Of Cooling, Basic X-Ray Circuit.
Basic Interactions Between X-Rays And Matter > Coherent Scattering, Photoelectric Effect, Compton Scattering, Pair Production & Photodisintegration, Attenuation And Absorption, Reduction In Intensity

Due To Absorption & Attenuation And The Inverse Square Law (Exponential Formula), Filtration, Attenuation Coefficients And Half Value Layer. Energy Absorbed From X- Rays, Factors Affecting Transmission Of A Homogenous Beam Through An Object (Geometry, Thickness, Wavelength Of Beam, Composition Of An Object), Transmission Of A Heterogeneous X- Ray Beam, Transmission Of X-Rays Through Body Tissues: Relative Amount Of Scattered Radiation In An X-Ray Beam During Its Passage Through A Patient. The Practical Aspects Of X-Ray Absorption And Transmission In Body Tissues. The Physics Of The Radiograph. The Basic Of The X-Ray Measurements. The Units Of Exposure And Absorbed Dose Simple Principles Of Dosimeters. The Fluorescent Effect Of X-Rays. The Photographic Film As A Dosimeter, X-Ray Quality Specification & Measurement, Kilovoltage Peak, Half Value Thickness. Routine Methods Of Checking Quality.

? Radiation Quantities & Units:

Radiometric Quantities (The Fluence Of Photons & Fluence Rate, The Energy Fluence And Energy Fluence Rate).
Interaction Quantities (Interaction Cross Section, Linear Attenuation Coefficient,
Mass AttenuationCoefficient, Stopping Power, Linear Energy Transfer, The Radiation Chemical Yield, The Mean Energy Expended In A Gas Per Ion Pair Formed.
Dosimeteric Quantities (Mean Energy Imparted, The Specific Energy, Exposure & Exposure Rate, Absorbed Dose And Absorbed Dose Rate, Concept Of Karma.
Protection Quantities (Dose Equivalent & Effective Dose Equivalent).

RADIATION PHYSICS - (20 HOURS)

Principles of Radiation Detection and Measurement:
Gas-Filled Detectors (Ion Chambers, Proportional Counters and Geiger Muller Counters) Scintillation Detectors, Thermoluminescent Dosimeters (Tld). Reasons For Choice of Airionization Roentgen And Rad. Simple Principles of Dosimeters.
Biological Effects of Radiation:
Chemical Effects Of Radiation - Radiolysis Of Water; Production Of Free Radicals, Radicals Reactions, G-Valve. Effects Non-Stochastic Effects, Chromosome Aberrations And Mutations. Radiation Effects On Whole Body (Early Effects And Late Effects). Concept Of Doubling Dose. Risk Factors.
Radiation Protection:
Philosophy Of Radiation Protection - Historical Development, Maximum Permissible Exposure Concept ; Annual Dose Equivalent Limits (Adel) Alara Concept ; International Recommendations And Current Code Of Practice For The Protection Of Persons Against Ionizing Radiation's From Medical And Dental Use.
Protective Materials:
Lead, Lead - Impregnated Substances, Building Materials, Concept Of Barriers, Lead Equivalents And Variations With Quality. Design Of X-Ray Tubes Related To Protection. Structural Shielding Design (Work-Load, Use Factor, Occupancy Factor, Distance) Departmental Protection. Radiation Protection Of Staff Members, Patients And Public. Protection Instruments & Personnel And Area Monitoring.
Suggested Books For Reference:
1. J. Meredith & J.B. Massey. Fundamental Physics Of Radiology (Varghese Publishing House).

2. Robin J.Wilks. Principles Of Radiological Physics. (Churchill Livingstone).

3. George A. Hay & Donald Hughus First Year Physics For Radiographer (Elbs).

MEDICAL PHYSICS - (20 HOURS)

Mains Supply:

Generation Of Electrical Energy, Distribution Of Electrical Energy, Use Of Electrical Energy, Polyphase Supplies, Availability Of Different Voltages, Feeder Cables, Line Voltage Drop; Mains Switches, Fuses, Circuit Breakers. Earthing, Insulation, High Tension Cables Construction, Design.

Diagnostic High-Tension Circuits:

Self-Rectified, Half-Wave, Full-Wave, 4 Rectifier, 3 Phase, Capacitor Discharge, Constant Potential. Main Voltage Compensation, Mains Resistance Compensation, Compensations for Mains Frequency Variation. Control of Tube Voltage, Kilovoltage Compensation; Filament Circuit, Control of Tube Current, Space Charge Compensation. High Tension (Tube Selector) Switch. Meters- Function; Use of Shunts. Meters Commonly Found in Diagnostic X-Ray Equipment, Position in Circuits, Reading Meters.

Switching and Timing:

Exposure Timers, Spring Activated, Synchronous, Electronic, Auto Timers, Exposure Switching - Mechanical Contractors, Electronic Switching in Low Tension andHigh-Tension Circuits. Interlocking Circuits - Use of Relays, Tube Overload Protection. Circuit Diagrams - Simple Circuit Diagrams as Illustration of Sequence from Mains Supply to Controlled X-Ray Exposures, Block Diagrams.

X-Ray Tubes:

Rotating Anode X-Ray Tubes, Design, Rating, And Use of Rating Charts, Care of The X-Ray Tubes; Inherent Filtration and Additional Filtration; Practical Considerations in The Choice of Focus; Speed of Anode Rotation; Angle of Anode Inclination. Grid-Controlled X-Ray Tube.

Control of Scattered Radiations:

Cones, Tube Diaphragms, Single andMultileaf Grids, Structure and Materials; Grid Ratio and Lines /Cm. Parallel AndFocussed Grids, Stationary Grids, Crossed Hatched Grids. Gridded Cassettes, Grid Movements, Potter-Bucky Diaphragms ; Single Stroke, Reciprocating And Oscillating Mechanisms; Beam Centring Devices - Centre Finders, Optical Centring Devices, Light Beam Collimators.

EQUIPMENTS:

i. Fluoroscopy and Image Intensifiers:

Direct Fluoroscopy, Fluoroscopy Image, Fluoroscopic Screen, Explorators (Serial Changers, Spot Film Devices) And Accessories. Radiation Protection Including Integrating Timer. Tilting Tables. Principles And Construction Of Image Intensifiers, Television Camera Tubes And Cathode Ray Tubes. Recording The Intensified Image, Methods Of Viewing The Intensified Image, Equipment For Fluorography And Cine-Fluorography. Radiographic and Fluoroscopic Tables, Telecommand Tables.

ii. Equipment for Special Procedures:

Special Trolleys And Chairs, Portable And Mobile X-Ray Units, Cordless Mobile X-Ray Equipment, Capacitor Discharge Mobile Equipment, Equipments For O.T. Bi-Plane Radiography, Cranial And Dental Equipment, Skull Tables, Mammography, Mass-Miniature Radiography, Tomography, Multi Section Cassettes, Rapid Cassette Changer, Rapid Film Changer, Magnification Radiography, Subtraction Radiography.

iii. Care and Maintenance of X-Ray Equipment:

General Principles Of Cleaning Routines. General Care In Use And Special Care Of Mobile Equipments. Simple Test. Uses Of Spinning Top And Step Wedge, Checks On Generator Output; Check For Integrity Of Tomographic Equipment; Procedure For Obtaining Radiograph Of The Focal Area. Use Of Ma And Timer Wisconsin Test Tool, Test Of Kilo Voltage, Wisconsin Test Cassette, Use Of Focal Spot Test Tool, Testing Light Beam Diaphragm, Failures Of X-Ray Tubes And Ht Cables

Suggested Reference Books Of Radiation Physics & Medical Physics

1) Christinsen, Curry AndDowdey: An Introduction Of The Physics Of Diagnostic Radiology (Lea Febiger) 2nd Ed.

2) D.N. And M.O. Chesney, X-Ray Equipment For Student Radiographers (Cbs)

3) W.J. Meredith & J.B. Massey: Fundamental Physics Of Radiology. (Varghese Publishing House).
Faiz M. Khan, Physics Of Radiation Therapy (Williams & Wilkins) S.S. Kapoor &Ramamoorthy; Nuclear Radiation Detectors.

Radiography Techniques –I (23 HOURS)

Principles of Radiography:

Preparation of the Room, Apparatus And Instruments
Positions of the Patient: Erect, Sitting, Supine, Prone, Lateral, Oblique, Decubitus Etc.,
Relative Position Of X-Ray Tube And Patient, Relevant Exposure Factors. Use of Accessories Such As Radiographic Cones, Grid And Positioning Aids.
Anatomic And Physiological Basis Of The Procedure, Association With Theory With Practical Work.
Radiographic Appearances, Both Normal And Common Abnormal Conditions Where Elementary Knowledge Of The Pathology Involved Will Ensure The Application Of The Appropriate Radiographic Technique. Modifications In Technique For Various Disabilities And Types Of Subject.
Radiation Protection, Use Of Gonad Shield, Practical Methods Reducing Radiation Dose To The Patient.

Upper limb:

Routine Projections For The Whole Hand, Fingers, Wrist Joint, Forearm, Elbow Joint And Humerus.
Supplementary Projections For Scaphoid, Carpal Tunnel Ball Catchers Projections, Head Of The Radius, Supracondylar Fracture And Olecranon Process.

Lower limb:

Routine Projections For The Whole Foot, Toes, Calcaneum, Ankle Joint, Leg, Knee-Joint, Patella And Femurs.
Supplementary Projections ForTalo-Calcaneal Joint, Forced Projections For Torn Ligaments, Flat Feet, Club Feet, Intercondylar Projections For Loose Bodies In The Knee, Axial Projection For Patella.

Shoulder Girdle and Thorax:

Routine Projections For The Shoulder Joint, Scapula, Acromio-Clavicular Joint, Clavicle, Sternoclavicular Joint, Sternum And Ribs.
Supplementary Projections For The Axial Projection Of Clavicle, Bicipital Groove Carotid Process, Classification Of Tendons, Subluxation, Upper Ribs, Lower Ribs And Axillary Ribs.

Pelvic Girdle and Hip Region:

Routine Projections for the The Whole Pelvis, Sacro-Ileac Joints, Hip Joint And Neck Of Femur.
Supplementary Projections For The Greater And Lesser Trochanters Of Femur. Frog Leg Projection, Ischeum Symphysis Pubis, Ileum, Acetabulum And Congenital Dislocation Of Hip Arthrodesis.

Vertebral Column:

Routine Projections ForAtlanto Occipital Joint, Cervical Spine, Cervico Thoracic Junction, Thoracic Spine, Lumbar Spine, Lumbo Sacral Region, Sacrum And Coccyx.
Supplementary Projections For The Intervertebral Foramina, Posterior Arch Of Atlas, Flexion And Extension Of Cervical Spine, Scoleosis And Kyphosis, Sacro Ileac Joint.

Skeletal Survey:

Skeletal Survey For Metabolic Bone Diseases, Metastases, Hormonal Disorders, Renal Disorders.

Skull:

Routine Projections For Cranium And Facial Bones. Supplementary Projections For Trauma, Towne's & Method, Sella, Turcica, Optic Foramina, Jugular Foramina, Temporal Bones, Mastoids Petrous Bone, Zygomatic Arches, Orbits, Maxillae, Nasal Bones, Mandible, Temporomandibular Joints.

Nasal Sinuses:

Techniques For Frontal, Maxillary, Ethmoidal And Sphenoid Sinuses, Erect And Horizontal Projections For Fluid Levels.

Teeth:

Routine Projections Of All Teeth - Intra Oral And Extra Oral Projections.
Supplementary Projections ForLocalisation Of Roots, Children, Edentulous Subjects And Use Of Occlusals And Bitewings, Orthopantomography.

Chest:

Routine Projections For Lungs, Cardia And Diaphragm.
Supplementary Projections For Opaque Swallow, Thoracic Inlet, Soft Tissue Neck, Decubitus, 'Apicugrams, Paediatric Cases.

Abdomen:

Kub, Erect Abdomen and Decubitus Projection, Supplementary Projeaions For Acute Abdomen.

PRACTICAL RADIOGRAPHIC TECHNIQUE -I

Radiography - Plain Views of Upper Limb: Hands, Fingers, Thumb, Wrists,
Forearm, Elbow, Humerus
Radiography - Plain Views of Shoulder: Shoulder Joint
Acromio - Clavicular Joint, Scapula Various Views And Projections,
Clavicle, Sterno-Clavicular Joint
Radiography - Plain Views of Lower Limb: Foot & Toes, Tarsus & Oscalcis, Ankle,
Tibia, Fibula & Patella, Knee Joint, Femur, Hip Joint, Pelvis & Sacro-IlicJoit
Radiography of Vertebrae: Cervical Spine Upper, Cervical Spine Lower, Cervico-
Thoracic, Cervico-Middle, Thoraco Lumbar, Lumbo-Sacral
Sacrum & Coccyx, Ribs Upper & Lower

Radiography of Skull Plain Views:

Ap, Lateral & Towns
Sinuses, Mandible, Teeth Mastoids

Radiography of Chest:

Lungs & Trachea; Heart-Diaphragm
Radiography of G.I. Tract
Plain X-Rays Abdomen-Erect; Liver, Spleen.

Reference Books:

1) Philip W.Ballinger: Atlas Of Radiographic Positioning and Radiological Procedures (Mosby) Ra Swallow, E Naylor: Clarks Positioning In Radiography E J Roebuck, A S Whitley

2) Sante Lr: Roentgenologic Technique (Edwards Inc)

3) Goldman: A Radiographic Index

4) Ross AndGailway: A Handbook Of Radiography (Lewis)

5) Glenda J.Bryan: Diagnostic Radiography (Mosby)

6) Piles: Medical Radiographic Technique (Thoms)

➢ RENAL DIALYSAIS TECHNOLOGY

TERM - 3 & TERM - 4 (21+ 63 CLASSES)
CONCEPTS OF RENAL DISEASES CLINICAL MANIFESTATIONS EVALUATION & MANAGEMENT OF THEFOLLOWING DISEASES

1. Acute renal failure
2. Nephrotic syndrome-primary & secondary
3. Nephritic syndrome
4. Uti-urinarytract infections
5. Asymptomatic urinary abnormalities
6. Chronic renal failure
7. Renal stone diseases
8. Obstructive uropathies
9. Congenital & in herited renal diseases
10. Tumors of kidney
11. Pregnancy associated renal diseases
12. Renal vascular disorders & hypertension associated renal diseases

BASICS OF DIALYSIS TECHNOLOGY

1. Indications of dialysis
2. Types of dialysis
3. Principles of dialysis-definition
4. Haemodialysis apparatus-types of dialyser & membrane
5. Types of vascular access for haemodialysis
6. Introduction to haemodialysis machine
7. Priming of dialysis apparatus
8. Dialyser reuse
9. Common complications of haemodialysis
10. Monitoring of patients during dialysis

- Principles, techniques and complications of Acute Peritoneal dialysis
- CAPD, CCPD
- Homoperfusion, Hemofiltration/CRRT and extracorporeal remoKindly.
- Principles, techniques & complications of Acute Peritoneal dialysis, CAPD CCPD
- Homoperfusion, Hemofiltration / CRRT And extracorporeal removal of adruggs & poisons
- Water purification for HD the water plants &distribution
- Adequacy of dialysis
- Peritoneal dialysis Both Acute
- Over view of Transplantation
- Extracorporeal trt of poisonings

➢ OPTOMETRY TECHNOLOGY

TERM-3: 21 CLASSES
OPTICAL & OPHTHALMIC INSTRUMENTATION & PROCEDURE I

 Detailed study of principles of operation , types, optical properties, constructions, adjustments and applications of the following Instruments and Devices

 Binoculars, telescope and projectors.

 Simple and compound Micro scopes (with Huygens and Ramsden Eye pieces and oil immersion objectives).Spectrometer.

 Radiuscope

 Retinoscopes

 Standard Tests Charts

 Slit lamp Bio microscope

 Keratometer

 Lensometer

 Trail Case lenses-best forms

 Trail frame design

 Cross cylinder

 Auto refractometer-subjective and objective types

 Ophthalmoscopes-direct and indirect types

 Refractometers-Auto refractors, Dioptron

Books:

1. Introduction to Visual Optics,Alan H. Tumadiffe(1987)

2. Clinical Optics-2nd ed (1991)-A.R.Elington&H.J. Frank

3. Optics & Refraction-L.P. Agarwal

4. Clinical Optics – Borrish

VISUAL OPTICS (OPTICS III)

 Review of Geometrical Optics: From Geometrical Optics.

 Schematic and reduced eyes and their properties

 Optical constants of the eye and their measurement. Purkinje images. Corneal curvature and thick ness.

 Keratometry and pachometry.Indices of aqueous and vitreous.

 Optical Defects of the Eye-Shape of Cornea,Shape& RI of the lens, Opticalaxis

Visual axis (angle alpha,Fixation axis(angle gamma), Aberration of the Optical system of eye, Depth of focus,Diffraction and resolving power.

 Emmetropia and ametropia, Axial versus spherical ametropia, Myopia Hyper metropia (Hyperopial) Astigmatism.

 Accommodation- possible mechanism of accommodation- Schiener disc experiment – theories of accommodation- modern theory- changes in the lens during accommodation-the amplitude of accommodation- the measurement of the amplitude n of accommodation-depth of field, luminance and blur tolerance- amplitude of accommodation versus age.

 Presbyopia-near vision edition- estimate of addition –unequal near vision addition- effect of changing the spectacle distance – hypermetropia and accommodation.

BOOKS:

1. Principles & Practice of Refraction,Duke Elder

2. Ophthalmic Optics & Refraction (System of Ophthalmology- Vol.5)

3. Visual Optics & Refraction-A clinical approach, David D. Michaels

4. Borish's-Clinical Refraction.

LIGHTING & THE EYE

 Eye and Vision:Spectroradiometric curve –V- curve- photopic and scotopic vision CIE standard observes.

 Photometric quantities and units- Luminous flux,Lumen-Illuminance,Lux luminous intensity,Candela – Luminance,Candela/m2.Inverse square law and Cosine law of illumination (Illuminance)

 Photometry-LumerBrodhumphotometer,Guild Flicker photometer-Photo cells, photo multipliers-photo diodes-noise in physical photometers.Determination lighting of Polar curve of lamps.

 Calculation – Application of inverse square law and cosine law-Matt surfaces-Lumen method of lighting design-utilization factor,light loss factors,Glare and glare index-disability glare –discomfort glare-control of glare-contrast

 Light sources- Special energy distribution-Luminous efficacy –color rendering properties-Flicker contracts-Daylight,its properties-color lamp – Incandescent. Lamps - low pressure Hg-lamps-High pressure Hg-lamps-Low pressure NA – lamp – High pressure NA-lamps- Typical applications.

 Lighting Installation- Luminaries their design function up lighting – down lightning mounting position-Choice of lighting equipment – lighting system management.

 Recommended level of illuminance for various including those in optometry and ophthalmology driving etc.

 VDU-Design of work station – Flicker color contrast – Regulations regarding the use of VDU.

 Eye Protectors- their constructions standard relating to eye protection.

Books:
Illumination Engineering, J.B. Murdoch

PRACTICAL SYLLABUS

OPTICAL AND OPTHALMIC INSRUMENTATION
To study the operations of following instruments: -
 Focimeter of Lensometer

 Retinoscope

 Standard Test Charts

 Autorefractometer

 Slit lamp examination

 Keratometer

 Ophthalmoscope

LIGHTING AND THE EYE
1. Determine the unknown candle Power of the given clear incandescent lamps of different wattage (at least three) using a Lumer-Brodhum photo meter. Plot C.P vs. Wattage curve and determine the CP that would be another lamp of different watt of the same make from the curve.

2. Determine the mean horizontal candle power of a lamp using flicker photometer

3. Determine the surface luminance of the given. (Painted) incandescent lamp of different wattage by using L.B.Photo meter and extra polate the results to obtain the surface luminance corresponding to lamp of different watt of the same make.

4. Caliberate the given physical photometer consisting of a photo cell and micrometer for at least five luminous intensities and three external circuit resistences.Use calibrated photometer to determine C.P. of the given lamp.

5. Use a calibrated luxmeter to measure the levels of illumination at least 15 working places in the college. Identify the locations and note the measured levels at each location, indicating whether the measured values agree with the prescribed values for comfortable vision. If there are considerable deviations suggest what to do.

TERM - 4 OPTOMETRY SYLLABUS

Number of Classes

No.	Topic	No. of classes
2.	Myopia	1
3.	Astigmatism	1
4.	Aphakia and pseudophakia	1
5.	Accomodation	1
6.	Presbyopia	1
7.	Schematic eye and aberrations of the eye	1
8.	Visual acuity and subjective verification	1
9.	Retinoscopy	1
10.	Ophthalmic lens part-1	1
11.	Ophthalmic lens part-2	1
12.	Spectacles part- 1	1
13.	Spectacles part-2	1
14.	Eyelid-anatomy and congenital deformities	1
15.	Eyelid-inflammatory conditions	1
16.	Eyelid-injuries and neoplasms	1
17.	Dry eye	1
18.	Dacryocystitis	1
19.	Conjunctiva-bacterial conjunctivitis	1
20.	Viral and allergic conjunctivitis	1
21.	Vitamin a deficiency	1
22.	Bacterial and amoebic keratitis	1

23.	Viral keratitis	1
24.	Corneal degeneration & dystrophy	1
25.	Bacterial corneal ulcers	1
25.	Fungal corneal ulcer	1
26.	Keratoplasty	1
27.	Refractive corneal surgeries	1
28.	Injuries of conjunctiva and cornea	1
29.	Episcleritis and scleritis	1
30.	Scleromalacia perforans & Nanophthalmos	1
31.	Anatomy of iris and ciliary body	1
32	Anterior uveitis	1
33.	Intermediate uveitis	1
34.	Posterior uveitis	1
35.	Sympathetic ophthalmia & vkh syndrome	1
36.	Tumors of ciliary body	1
37.	Formation of aqueous and Iop	1
38.	Congenital glaucoma	1
39.	Poag	1
40.	Pacg	1
41.	Secondary glaucomas	1
42.	Medical management of glaucoma	1
43	Surgical management of glaucoma	1
44.	Lens-anatomy and congenital malformation	1
45.	Classification of cataract and congenital cataract	1

46.	Senile cataract	1
47.	Complicated cataract & traumatic cataract	1
48.	Secondary cataract	1
49.	Complications of cataract surgery	1
50.	Ecce & icce	1
51.	Phacoemulsification	1
52.	Types of iol	1
53.	Tonometer	1
54.	Pachymeter	1
55.	Color vision & testing	1
56.	Usg a scan principles and application	1
57.	Usg b scan	1
58.	Fundus fluorescein angiography	1
59.	Perimetry	1
60.	Laser introduction & principles	1
61.	Different types of lasers- excimer	1
62.	Lasik &nd:yag	1
63.	Argon,diode,he-ne gas laser & xenon laser	1

PRACTICAL SYLLABUS

Optics & ophthalmic instrumentation II

Clinical use of the following instruments & the findings:

- Tonometer
- Devices for color vision testing
- Auto perimeter – Normal HFA,printout.
- A – Scan: Normal printout out & analysis
- B – Scan Normal printout & analysis

Clinical Refraction (PRACTICAL)

- History writing
- Recording VA
- Practice of streak retinoscopy
- Direct ophthalmoscopy – Normal fundus
- Subjective refraction – fogging, clock dial, fan, JCC, prismbalance, TIB, duochrome, cycloidemia, slit refraction
- Measurement of amplitude of accommodation
- Presbyopic add
- Writing prescription.

Ophthalmic lens & dispensing optics (practical)

- Find out the menidean & optical center of ophthalmic lens
- Neutralization - manual & help of Lensometer
- Identification of lens – Spherical, cylindrical & spheno – cylindrical lenses.
- Lens- surfacing & edging, cutting & marking of single vision bifocal progressive.
- Frame measurement: the boxing system, the datum system, comparison of the two systems, lens position, segment specification.
- Frame selection: fashion, function & standard alignment
- Lens selection: Ground rule for selection, selection criteria.
- Facial measurements: the PD, visual axes & measuring inter- pupillary distance using P.D ruler. Common difficulties in measuring P.D, Measuring Monocular P.D, Measuring near C.D.
- Measuring heights: single vision, bifocal, multifocal, progressive.

➢ PERFUSION TECHNOLOGY

PAPER-II

Perfusion Technology

Term 3 and Term 4: (21 + 63 Classes):

INTRODUCTION TO PERFUSION TECHNOLOGY

Basics of diagnostic techniques:

Chest of X-ray
ECG
Echo
Angiography
Nuclear Cardiology
Laboratory investigations in relation to perfusion technology

Cardiopulmonary bypass and perfusion technology

History of Cardiac surgery and perfusion

1. Specific reference of Gibbon Lillehei, carrel
2. Pre CPB surgery
3. Azygous Flow principle.
4. Hypothermic/nonhypothermic non-CPB surgery including gross's Well technique and controlled cross circulation.

Monitoring and instrumentation

- Concepts of monitoring – instrumentation technology of ECG machine, pressure transducer, syringe and peristaltic pumps, monitors, ventilators, pulse oximeters, temperature probes and thermo regulatory monitoring, defibrillators and fibrillators. Piped and non-piped gas delivery systems and connections. Basic physics related to medically used gases.
- Haemodynamic monitoring
- Haemostatic monitoring
- Haemotologic monitoring
- Maintenance of oxygen, carbon dioxide and acid-base status and their monitoring
- Neurological monitoring (SSPE, EEG and cerebral function monitor)
- Aseptic technique.
- Cardiac surgery team, profession and terminology, scope of perfusion technology

Physiology of Extracorporeal circulation

Heart – Lung machine

- Principles of extracorporeal circulation
- Materials used in EC circuit
- Principles of extracorporeal gas exchange

Various types of oxygenators

- Bubble oxygenators
- Rotating spiral/cylinder/disc oxygenators
- Membrane oxygenators
- Mechanism of action components defoaming, rated flow.

Theory of blood pumps

- Ideal blood pump, pulsatile versus non-pulsatile flow, occlusive and non-occlusive pumps, various types of pumps roller, bellow, sigmamotor, diaphragm, ventricular and centrifugal pumps.

Element of extracorporeal circulation/hazards of:

a. blood failure
b. Bubble trap
c. Flow meters
d. Temperatures
e. Heat exchanger
f. Regulating devices

Connection of the vascular system with extracorporeal circulation:

- Arterial and venous cannulae.
- Connecting tubes and connectors
- Vents
- Suckers
- Cardioplegia delivery system
- Venous drainage.

Haemodynamic of arterial return, venous drainage, cardioplegia Delivery and venting.

Blood banking, handling of blood products and their management. Blood components and their use

PRACTICAL SYLLABUS

They have to Assist perfusionist and learn basic techniques like Assembling lines, Operate Heart Lung Machine, ABG, and other clinically related subjects must be learned practically.

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➢ EMERGENCY MEDICAL TECHNOLOGY

Dr. NTR UNIVERSITY OF HEALTH SCIENCES: AP: VIJAYAWADA- 520 008

EMERGENCY MEDICAL TECHNOLOGY

PAPER-II

TERM- 3 AND TERM- 4 21+ 63 CLASSES

LAW AND ETHICS

1. Understanding the definitions and differences of law and ethics
2. Roles and responsibilities of EMS
3. Limitations in EMS practice
4. Documentation
5. Duty to act, scope of practice
6. Self-protection
7. Protection of dignity and self-respect of patients
8. Standard of care
9. General and informed consent
10. Consumer protection act
11. Reporting including information to police and govt. authorities
12. Medical negligence
13. Death declaration
14. Handing over the dead body
15. Crowd control
16. Confidentiality

PRE-HOSPITAL

1. Assessment of the casualty
2. The Pre-Hospital environment
3. Scene Safety and Management.
4. Assessment of the Road traffic accident scene
5. Ambulances and their Management
6. Pre -hospital physical assessment
7. Patient rescue and extrication
8. Pre-Hospital equipment
9. Pre-hospital Wound Management
10. Pre-hospital Airway assessment and management
11. Pre-hospital management of fractures
12. Medical direction- On line and Off line
13. EMS systems design and organization
14. EMS Configuration and Response
15. Patient safety and wellness in pre-hospital

16. Pre-Hospital Communication
17. Disaster scene management
18. Multiple casualty management
19. Management of mass gatherings
20. Pre-hospital management of a poisoned patient, Heat illness, shock, critically ill patient, hypothermia, injured patient
21. Allergy and anaphylaxis
22. Bites and Envenomation's
23. Pre hospital transport pediatric patient transport
24. Wilderness emergency medicine services
25. Wilderness medical hits
26. Pre hospital ECG and transmission
27. Management of violent patient patients
28. Pre-hospital Pain management
29. Pre-hospital procedures and interventions

Su books

1. ABC of Pre- hospital emergency medicine –by Wiley Blackwell.
2. Pre-hospital emergency care secrets –by Peter T.Pons.

COMMON MEDICAL EMERGENCIES

1. Airway assessment and management including endotracheal intubation under controlled environment, use of airway adjuncts
2. Assessment of circulation and management- securing an IVor IO access, IV fluid administration, use of vasopressors
3. Hemorrhage control and hospital wound management
4. Assessment of breathing and artificial breathing
5. Assessing GCS or AVPU and management of a patient with altered sensorium
6. Assessment of severity of pain and initial management
7. Adjuncts to patient assessment- SPo2, cardiac monitor, blood pressure, temperature, GRBS, ECG, FAST
8. Application of C-collar, usage of spine board
9. Immobilization and splinting
10. Advanced triage
11. Intra hospital patient transfer under monitoring
12. Ventilator management

13. Identifying equipment failure and management
14. Advanced cardiac life support
15. Pediatric BLS and PALS
16. Equipment management
17. Approach to chest pain
18. Approach to a patient with breathlessness
19. Approach to a patient with fever
20. General management of a poisoned patient
21. Approach to a patient with abdominal pain
22. Simple suturing techniques
23. ECG interpretation
24. Collecting and performing ABG
25. General management of an injured patient
26. Lifting & transporting of injured person
27. Complete physical examination
28. Disaster preparedness, planning and management
29. Rhythm identification and management of cardiac arrhythmias
30. Approach to a patient with shock- identifying different types of shock and their emergency management

REGISTRAR

➢ RESPIRATORY THERAPY TECHNOLOGY

Dr. NTR UNIVERSITY OF HEALTH SCIENCES: AP: VIJAYAWADA- 520 008

RESPIRATORY THERAPY TECHNOLOGY
PAPER II

TERM- 3 AND TERM- 4 21+ 63 CLASSES

COMMON CARDIO AND RESPIRATORY DISEASES

Respiratory Diseases

1. Assessment & Classification of Pulmonary diseases
2. Hypoventilation & Hyperventilation
3. Diffusion Defects, Acid Base Disorders
4. Ventilation & Perfusion Abnormalities
5. Airway diseases COPD
   (Chronic Obstructive Pulmonary Diseases), Asthma, Chronic Bronchitis, Emphysema, Bronchiectasis and their management
6. Restrictive lung disease – Interstitial lung disease, chest wall and spine deformities
7. Asthma and Management
8. Chronic Bronchitis and Management
9. Emphysema and Management
10. Bronchiectasis and management
11. Acute chest trauma, Pulmonary fibrosis
12. Atelectasis and pulmonary collapse
13. Acute Respiratory distress Syndrome
14. Ventilator Associated Pneumonia
15. Community Acquired Pneumonia, Hospital acquired pneumonia (HAP)
16. Interstitial Lung disease
17. Neuromuscular disorders (GBS, Myasthenia Gravis) Management
18. Pulmonary embolism and management
19. Pulmonary Tuberculosis and management
20. Pleural diseases – Pneumothorax, Pleural effusion, Empyema
21. Lung cancer
22. Sleep disordered breathing Obstructive sleep apnea (OSA), Obesity hypoventilation syndrome (OHS)

Cardiovascular Diseases

1. Shock Cardiogenic
2. Heart Failure
3. Systolic Failure
4. Diastolic Failure
5. Right ventricular Failure
6. Acute left ventricular failure
7. Pulmonary edema
8. Pulmonary hypertension
9. Pulmonary embolism

10. Ischemic heart disease
11. Myocardial ischaemia and Infarction
12. Valvular Heart Disease
13. Mitral Stenosis
14. Mitral Regurgitation
15. Endocarditis
16. Myocarditis and Cardiomyopathy
17. Pericardial disease Pericarditis, Pericardial effusion and tamponade
18. Congenital Heart Diseases
19. TOF
20. Atrial Septal Defect
21. Ventricular Septal Defect
22. Patent Ductus Arteriosus
23. Arrhythmias
24. Tachy Arrhythmias
25. Brady Arrhythmias

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1. George Mathew.K Medicine Prep manual 1st edition. B.I ChurchillLivingstone Pvt Ltd. New delhi1995
2.Scot Irwin, Jan Stephen tecklin, Cardiopulmonary Physical therapy, aguide to practice, 3rd edition, mosby, USA.
3.Donna Frownfelter, Elizabeth Dean (eds) Principles and practices ofcardiopulmonary physical therapy, 3rd Mosby, USA.
4.Craig L, Scanlan, Egan's Fundamentals of Respiratory care, 6th editionMosby,1995.
5.Stevansadowsky, H Ellan, A Hillegas, Essential of Cardiopulmonaryphysical therapy, W.B saunders company USA.
6.John F Murray, Jay A Nadel, Text book of Respiratory Medicine, 2nd edition W.B saunders company USA.
7.Braunwald (edr), Heart disease, A text book or cardiovascularmedicine, 4th edition, W.B saunders company, USA 1992.
8.Shoemaker, Ayres, Greenvik, Holbrook, Text book of critical care, 4th edition, W.B saunders company 1984

❖THIRD YEAR SYLLABUS:

➢ OBG

Theory 31 hours

Common OBG topics & problems

Obstetric – normal pregnancy, (3-4)

Antenatal care (2-3)

Normal labour (1-2)

Malpresentations (2-3)

Antepartum haemorrhage (1-2)

Postpartum haemorrhage (1-2)

Medical disorders complicating pregnancy –anaemia, hypertension, heart disease,(3-4)

Contraception (2-3)

Gynaec –

Abnormal uterine bleeding (2-3)

Chronic cervicitis (1-2)

Carcinoma – cervix, endometrial, ovarian (3-4)

Prolapse (1-2)

Others / elective topics – 4-6

Practical –

Eliciting & recording history of a woman in OBG (Obs & Gynaec)

Antenatal examination

Assisting in normal labour

Writing ultrasound scan reports

.

➢ PAEDIATRICS

Theory 31 hours

Common Paediatric problems

Normal child growth & development (3-4)

Nutritional disorders – malnutrition, PEM, vitamin deficiency, (2-3)

Infections – Resp inf, Skin inf, rheumatic fever, diarrhoea, (6-9)

CVS – congenital heart disease, rheumatic fever (2-3)

Neurological – chorea, cerebral palsy, meningitis, encephalitis (2-3)

Examination of children (1-2)

Drug administration in children (1)

Sedating children for minor procedures / tests (1)

Blood sampling (1)

Consent in paediatrics (1)

Ethical issues (1-2)

CPR in paediatrics – 1-2

Others – 5-6

Practical –

Eliciting & recording history in a paediatric patient

Recording vitals and important clinical findings in a paediatric patient

Paediatric CPR

➢ SURGERY

Surgery (TERM-4)& (TERM-5)
theory (62) & practical (21)

(introduction to common surgical problems – 62)
(21 hrs practical for basic surgical / assistant clinical skills &
To participate in Medicine practical hours for first aid, clinical skills)

Wounds, Abscess, gangrene (4-5)
Shock (2)
Trauma &Immediate care – including head injury (3-4)
Malignancy – stomach, lung, kidney, prostate, breast, skin, pancreas, liver, brain (6-8)
GIT – liver abscess, intestinal obstruction, appendicitis, GI perforation, parotid tumor (6-8)
Neck –lymph nodes, thyroid (goiter) (3-4)
Skin – lipoma, neurofibroma (1)
Hydrocele, hernia, filariasis (2)
Orthopedic – Fractures, tumors, osteoarthritis of knee, cervical / lumbar spondylosis, (5-6)
Eye – cataract, injury, corneal ulcer, glaucoma, (1-2)
ENT – tonsillitis, sinusitis, ASOM, CSOM (1-2)
General anesthesia (2-3)
Spinal anesthesia (1-2)
Local anesthesia (1-2)
Postoperative care (2-3)

Practical

Eliciting history of patient & recording (2-3)
Maintaining case records (1)
Writing requisitions (1)
Basic surgical skills of examining lump / ulcer & recording (2-3)
Recording vitals (1)
Initial care of trauma patient (3-4)
Communicating with patient (1-2)
Pre-op evaluation (1-2)
Post-op care (1-2)
Record of cases & exercises – 4-5
Assisting in basic surgical cases & basic surgical skills (suturing, suture removal, dressing etc.) – (6-8)
Others & elective – 4-6

➢ MEDICINE

Medicine - (TERM-4) & (TERM-5)
theory (62) & practical (63)

(introduction to common medical problems – 62)
(practical includes 21 hrs for medical clinical skills & 21+21 hrs for first aid & clinical skills with other departments)

Infections – viral (varicella, zoster, measles, rabies, mumps,) HIV, (4-6)
Bacterial (staph, strep, typhoid, tetanus, meningitis, pneumonia, tuberculosis, leprosy,) diarrhea dysentery (8-10)
Parasitic (amebiasis, malaria, helminthic inf) (3-4)
Nutritional – vitamin deficiency, malnutrition, iron deficiency, (2-3)
CVS - hypertension, acute MI and coronary artery disease, heart failure, rheumatic heart disease, atrial fibrillation, complete heart block, VT, (6-8)
Resp – asthma, COPD, respiratory failure, oxygen therapy (4-6)
GIT – acid peptic disease, malabsorption, cirrhosis, ascites, inflammatory bowel disease (4-6)
Kidney – acute kidney injury, chronic kidney disease, glomerulonephritis, nephrotic syndrome, UTI (6-8)
Endocrine – diabetes, hypo / hyper thyroidism, Addison's, Cushing's, osteoporosis, (6-8)
Neurology – Stroke, Epilepsy, Coma, Parkinsonism, Myasthenia gravis, Peripheral neuropathy (6-8)
Connective tissue – SLE, Rheumatoid arthritis (2-3)
Skin – impetigo, tinea corporis, psoriasis, scabies, drug reactions, (2-3)
Psychiatry – anxiety, depression, MDP, schizophrenia (2-3)
Others – poisoning, (organophosphorus, sedative, kerosene, drugs) snake bite, (3-4)

Practical – (including in postings)
Elicting history – 3-4
Recording history – 3-4
Recording vitals – 2-3
Writing & Maintaining records – 1-2
Heart examination & recognizing murmurs – 2-3
Lung examination & recognizing added sounds – 2-3
Basic examination of nervous system – 3-4
Case based discussion – 4-6
Record of cases /exercises – 4-6
First aid & CPR

❖PARENT DEPARTMENT

➢ ANAESTHESIA&OPERATION THEATRE TECHNOLOGY

Term5(3rdyear)57classes

SlNo	topic	Classes allotted
	ICU andpain management	
1	Mechanicalventilation indications, modes, Weaning sedationinICU, poisoninganddrugoverdosage, nutrition in ICU, Nebulization careofterminallyill	**20**
2	AnesthesiaforENTcases Ophthalmic anesthesia day care outsideoperationtheatreanesthesia, Difficultairway management	**20**
3	Painclinicandnerve blocks	**2**
4	Stabinjurychestorabdomen	**4**
5	Trauma–thorax,Liver,abdomen	**4**
6.	Drugs–antibiotics,Emergency	**7**

FINALYEAR:TERM6- 180CLASSES

SlNo	Topic:SystemicAnesthesia	classes
1	**Respiratory system**:Anatomy,Pul vascular resistance,VQmismatch,COPD,ThoracicSurgery andonelung ventilation	**30**
2	**Cardiovascularsystem:**anatomyandphysiology, cardiac output,inotropes, anti hypertensive, anti arrythmics,sympathomimetics, preop cv evaluation, all cardiac diseases anesthetic management, cardiopulmonary bypass, cardiac transplantationanesthesia	**45**
3	**Hepatic and renal systems:** anatomy and physiology,liverfunctiontests,Hydatidformliver, structure of kidney, anesthesia and acute renal failure, End stage liver and renal disease, transplantanesthesia	**20**
4	**Endocrines:**Thyroidglandanatomy,physiology thyroid function tests, Hyper and hypo thyroidism, Thyroid malignancy and investigations,Diabetes mellitus,Pheochromocytoma,morbid obesity, Bariatricsurgery	**20**
5	**Centralnervoussystem:**anatomy, physiology ,cerebral circulation ,intracranial pressure, posteriorfossasurgery,aneurismalsurgery,head injury	**40**
6	**Obstetrics and Gynecology:** uteroplacental circulation,placentaltransferofdrugs,anesthesia for cesarean section, neonatal resuscitation, labor analgesia,obs emergencies	**10**
7	**Pediatrics:**Apgar score, differences from adults, neonatalemergencies,cleftlipandpalatesurgery, burns,contractures	**5**
8	**Blood**:Coagulation,Hemostasis,blood transfusion,transfusionreactions,TRALI	**10**

Practical60 +120(Term5+Term6)

Sl.No	Topic	classes
1	Basiclifesupport,cardiacarrest simulation management	10
2	Equipment	50
3	Drugsidentificationanddosage	50
4	preparationforSpinalanesthesia, Epidural anesthesia, central venous cannulation, arterial line placementpreparation,intubation	50
5	DifficultairwaymanagementABG analysis,icumaintenance	20

SYLLABUSFORPAPER-III,IV&V

Paper–III

SlNo	topic	Classes allotted
	ICU andpain management	
1	Mechanicalventilation indications, modes, Weaning sedationinICU, poisoninganddrugoverdosage, nutrition in ICU, Nebulization careofterminallyill	**20**
2	Painclinicandnerve blocks	**2**
3	Trauma–thorax,Liver,abdomen	**4**
4	Stabinjurychestorabdomen	**4**
5	Difficultairway management	**4**
6.	Drugs–antibiotics,Emergency	**7**

Paper–IV

SlNo	Topic:SystemicAnesthesia	classes
1	**Obstetrics and Gynecology:** uteroplacental circulation, placentaltransferofdrugs,anesthesiaforcesareansection, neonatalresuscitation,laboranalgesia,obsemergencies	10
2	**Pediatrics:**Apgarscore,differencesfromadults,neonatal emergencies,cleftlipandpalatesurgery,burns,contractures	5
3	**Blood**:Coagulation,Hemostasis,bloodtransfusion ,transfusionreactions,TRALI	10
4	**Endocrines:**Thyroidglandanatomy,physiologythyroid function tests, Hyper and hypo thyroidism, Thyroid malignancy and investigations,Diabetes mellitus,Pheochromocytoma,morbid obesity, Bariatric surgery	20
5	**Hepatic and renal systems:** anatomy and physiology, liver function tests,Hydatidform liver, structure of kidney, anesthesiaandacuterenalfailure,Endstageliverandrenal disease,transplantanesthesia	20
6	Anesthesia for ENT cases, Ophthalmicanesthesia,daycare outsideoperationtheatreanesthesia	16

Paper–V

1	**Respiratory system**:Anatomy,Pul vascular resistance,VQmismatch,COPD,ThoracicSurgeryand one lung ventilation	30
2	**Cardiovascular system:** anatomy and physiology, cardiac output,inotropes, anti hypertensive, anti arrythmics,sympathomimetics,preopcvevaluation, all cardiac diseases anesthetic management, cardiopulmonary bypass, cardiac transplantation anesthesia	45
3	**Centralnervoussystem:**anatomy, physiology ,cerebralcirculation,intracranialpressure,posterior fossasurgery,aneurismalsurgery,headinjury	40

➢ NEURO PHYSIOLOGY TECHNOLOGY

TERM-5,57CLASSESANDTERM-6,180CLASSES

THIRD-YEARCOURSE SYLLABUS

1. **TechnicalAspects:**
   - A. **Different parts of EEG and ENMG machines and their functions, i.e. montage, electrodes, filter, calibration, sphenoidal electrodes, depth electrodes, electrode impedence, identification of wave patterns, artefacts, normal laboratory values**
   - B. **BasicPrinciplesofNerveConductionStudies(NCS)–MotorNCS,SensoryNCS,F-wave, H-reflex, Blink reflex and others, Repetitive Nerve Stimulation (RNS), Normal laboratory values**
   - C. **Electroencephalographic monitoring (in-patients and ambulatory), Video EEG, Intra-operative EEG recording, EEG patterns - normal EEG in children and adults, awake and sleep EEG records, neonatal EEG, Normal variants in EEG, Activation Procedures in EEG recording (hyperventilation, photic, sleep deprivation, and others), Abnormal EEG in Neurologic Diseases, Quantitative EEG, Brain mapping, Brain Death, Electroencephalographer's reporting, ENMG reporting, Record Keeping**
   - D. **Normal ENMG recording – Resting/Insertional activity, Volitional Recruitment, Interference Pattern**
   - E. **Abnormal ENMG – Myopathies, Neurogenic muscle involvement, Involuntary muscle contractions, NMJ disorders**
   - F. **NeedleEMG–Conventional,MacroEMG,SurfaceEMG,SFEMG**
   - G. **EvokedPotentialStudies(EPStudies)–VisualEvokedPotentials(VEPs),Brainstem Audotory Evoked Potentials (BAEPs), Somato-Sensory Evoked Potentials (SSEPs)**
   - H. **PolysomnographicStudies**

2. **ClinicalAspects**
   - A. **DiseasesaffectingCranialandPeripheralnerves–nutritional,metabolic,inflammatory, immune mediated, hereditary etc.**
   - B. **Diseasesaffectingmuscles-nutritional,metabolic,inflammatory,immune mediated, hereditary etc.**
   - C. **Diseases affecting brain and meninges - nutritional, metabolic, inflammatory, hereditary, degenerative etc.**

(SYLLABUSFORPAPER-III,PAPER-IVANDPAPER-V)

PAPER-III

EEG(Electroencephalography)andENMG(Electroneuromyography)

(Technical Aspects of EEG and ENMG)

DifferentParts/ComponentsofEEG/ENMGEquipments–

a. **EEG/ENMGMachine**
b. **Electrodes(surfaceelectrodes,needleelectrodes,SphenoidalEEGElectr odes Depth EEG Electrodes)**
c. **Amplifier**
d. **Gainand Sensitivity**
e. **FiltersinEEG/ENMGRecording(AnalogFilters,Analog-to-DigitalConversion, Digital Filters)**
f. **DigitalCircuitry**
g. **Display**
h. **FactorsthatReduceSignalFidelity[Noise(whitenoise,Impulsenoise,Mainsnois e, In-BandNoise Source, Synchronous noise, Signal-to-Noise Ratio{SNR}, Saturation, Aliasing, Quantization**
i. **Calibration**
j. **Electrodes(EEGandENMG)**
k. **ElectrodeImpedence**
l. **InstrumentMalfunction(Calibration,BadElectrodes,DamagedAcou stic Transducers**
m. **Signal-EnhancingTechniques(CommonModeRejection Ratio,Grounding{patient groundingandinstrumentgrounding},Isolation,InterferenceReduction,Nonli near Filtering, Averaging, Stimulus Rate.**
n. **Safety(Electricalandmechanicalsafety,ElectromagneticInterference and Susceptibility, Misuse of Equipment)**

PAPER-IV

EEG(Electroencephalography)andENMG(Electroneuromyograp hy) EEG (ELECTROENCEPHALOGRAPHY):

a. **DifferentWavePatternsinEEG**
b. **ElectroencephalographicMonitoring(in-patientsandambulatory)**
c. **VideoEEG**
d. **Intra-operativeEEGRecording**
e. **EEGPatterns:**
   NormalEEGinChildrenandadults
   Awake and Sleep EEG Records
   Neonatal EEG

   NormalVariantsinEEG

f. **ActivationProceduresinEEGRecording(hyperventilation,photic,sleepdeprivation, and others)**
g. **EEGinNeurologicDiseases**
h. **QuantitativeEEG**
i. **BrainMapping**
j. **Electroencephalographer'sReporting**
k. **RecordKeeping**

ENMG(ELECTRONEUROMYOGRAPHY):

1.
   a. **BasicPrinciplesofNerveConductionStudies**
   b. **MotorNerveConductionStudies**
   c. **SensoryNerveConductionStudies**
   d. **F-Wave**
   e. **H-Reflex**
   f. **BlinkReflex**
   g. **RepetitiveNerveStimulation(RNS)Test**
2.
   a. **Normal EMG Recording – Resting/Insertional activity, Volitional Recruitment, Interference Pattern**
   b. **Abnormal EMG:Myopathic,Neurogenicmuscleinvolvement,Involuntarymuscle contractions**
   c. **NeedleEMG–Conventional,MacroEMG,SurfaceEMG,SFEMG**
   d. **EvokedPotentialStudies(EPStudies)– VisualEvokedPotentials(VEPs),BrainstemAuditory Evoked Potentials (BAEPs), Somato-Sensory Evoked Potentials (SSEPs)**
   e. **PolysomnographicStudies**

PAPER-V

1. **DiseasesaffectingthePeripheralNerves(CranialandSpinal nerves)**
    a. **Nutritional(VitB12deficiency,Pellagra,Alcoholism{Beriberi}etc.,)**
    b. **Metabolic(Diabetes,Uremia,Porphyriaetc.,)**
    c. **Inflammatory/Immunemediated(AIDP,CIDPetc.,)**
    d. **Hereditary(CMTtypesetc.,)**
    e. **Toxic(Metals,Drugs,Toxinsetc.,)**
    f. **Paraneoplastic**
2. **DiseasesaffectingtheMuscles**
    a. **Nutritional**
    b. **Metabolic**
    c. **Endocrine**
    d. **Inflammatory/Immunemediated**
    e. **Hereditary(MuscularDystrophies,Hereditarymyopathiesetc.,)**
    f. **Toxic**
3. **DiseasesaffectingtheBrainandMeninges**
    a. **Nutritional**
    b. **Metabolic**
    c. **Inflammatory**
    d. **Hereditary**
    e. **Degenerative etc.,**

SYLLABUSFORPRACTICALS:

SYLLABUSFORPRACTICALCLASSES–TERMV-SIXTYCLASSES

1. **EEGInstrumentation -Demonstration**
2. **EEGElectrodes**
3. **EEGElectrodePlacement-Different systems**
4. **Derivation &Montages**
5. **EEGAnalysis-Technical Considerations**
6. **EEGCalibration&Time Constant**
7. **Reformatting Montages/TimeDisplay&Amplitudes**
8. **MorphologyofEEGWave Forms**
9. **Recordingof theEEG**
10. **Artefactsin EEG**
11. **EEGReporting**
12. **ENMGInstrumentation - Demonstration**
13. **ENMGElectrodes&Stimulators**
14. **Filters,Amplifiers, Averager&Display**
15. **Gain&Sweep time;SignaltriggerandDelaytime**
16. **PrinciplesofNerveConduction studies-Demonstration**
17. **MedianNerveStudies**
18. **Ulnar Nerve Studies**
19. **RadialNerveStudies**
20. **Common Peronealnerve studies**
21. **PosteriorTibialnerve Studies**
22. **TechniqueofEMG**
23. **Late response-F-waves, HReflex& Axon Reflexes**
24. **InterpretationofEMGStudy–Basic**
25. **ENMG Reporting**

SYLLABUSFORPRACTICALCLASSES–TERMVI-ONEHUNDRED & TWENTY CLASSES

1. **EEGActivation Procedures-Demonstration**
2. **EEGStudyinAdults**
3. **EEGStudyinPaediatrics**
4. **NeonatalEEGStudy**
5. **Sleep EEG Study**
6. **Demonstration of IctalEEG Patterns**
7. **Demonstrationof InterIctal EEGPattern**
8. **EEG–BenignEpileptiformPattern**
9. **EEGPatternsinFocalEpilepsy**
10. **EEG PatternsinEpilepticEncephalopathies**
11. **EEGPatternsin SpecificNeurological Disorder**
12. **EEGMonitoring in ICU**
13. **LongtermVideoEEG Monitoring**
14. **Video PolySonography**
15. **Presurgical Evaluation –EEG, ENMG**
16. **CTS-SpecialStudies**
17. **BrachialPlexusStudy**
18. **CervicalRadiculopathy & Nerve RootStudies**
19. **Lumbar Plexus Studies**
20. **Anastomosis/AberrantNerveConductionStudies**
21. **FacialNerve Study**
22. **BlinkReflexStudies**
23. **AutonomicNervousSystemStudies**
24. **EMGTechniqueinupperlimb muscles**
25. **EMGTechniqueinlowerlimbmuscles**
26. **EMGTechniqueinParaspinal&Facial Muscles**

27. InterpretationofNCVinAxonalNeuropathy

28. InterpretationinDemyelinationNeuropathy

29. EMGinMuscleDisorders

30. EMGin Anterior & Neurogenic Disorders

31. RepetitiveNerveStimulation

32. Single Fibre EMG

33. ENMG–IntraOperative Studies

34. VEP

35. BERA

36. SSEP

37. Motor Evoked Potentials

38. Cognitive EvokedPotentials

39. Demonstration ofBrainDeath– ElectrophysiologicalStudies

40. VEMP&OtherElectroPhysiological techniques

*****END*****

➢ IMAGINGTECHNOLOGY

Paper–III

Diagnostic ImagingTechniques

Imaging Technique:

Computed Tomography:

History

PrinciplesofComputedTomography
Generations - Spiral C.T.
Instrumentation.

Data
AcquisitionData
Presentation
ImageReconstructio
n 2D And 3D Images

ImageDisplayPixel andVoxel

C.T.Number

WindowLevelandWindowWidth
Scan Artefacts

PatientPositioninginComputedTomography
Contrast Materials and Administration.

Basic Diagnostic Aspects
InterventionalC.T.GuidedProcedures
Documentation.

SafetyConsideration-RadiationDose
Quality Assurance.

MagneticResonanceandImaging:

History

TheSpinningProton-Magnetisation,Precession,LarmorFrequency

Radio Frequency Pulse and Proton - Resonance, Free Induction Decay, Relaxation, T-L T-2
Instrumentation-Magnet,ShimCoils,GradientCoils,RadioFrequencyTransmitterandReceiverCoils,
Computer.

PulseSequences-SaturationRecovery,SpinEcho,InversionRecovery.
Image Production - 2d and 3d Pictures.

ImageQuality-SignaltoNoiseRatio,ContrasttoNoiseRatio.
Image Artefacts.

FlowTechniques-MagneticResonanceAngiographySpectroscopy.MrContrastAgents-Paramagnetic and Ferromagnetic Documentation. Safety Consideration Quality Assurance.

Ultrasound Imaging:

History

UltrasoundCharacteristics-Nature,Propagation,Frequency,Wavelength,Velocity,Amplitude, Intensity, Acoustic Impedance, Reflection, Refraction Etc.Interference with Media, Interface, Attenuation.

Transducer-PiezoelectricEffect,Construction,TypesOfArrays-Mechanical&Electronic.
Acoustic Coupling Media.

UltrasoundInstrumentation.

DisplayModes-AMode,BMode,MMode,RealTime. Grey
Scale Imaging

DopplerMethods-ContinuousWaveDoppler,PulsedDoppler,Duplex,RealTimeColourFlow Imaging.

UltrasoundArtefacts.

PatientPreparationandHandling
Basic Diagnostic Aspects

InterventionalTechniques-TransducerSterilisation,Needles,DiagnosticProcedures,Therapeutic Procedures.

Documentation

SafetyConsideration-EffectsofHealing, Cavitation.

QualityAssurance-Phantoms,Performance,Accuracy,Sensitivity,SpatialResolutionTests.
PCPNDT – Rules and regulations.

NuclearMedicineImaging:

History

IsotopesandRadionuclidesProductionofRadionuclides
Radio Activity

RadioActiveTransformations
Specific Activity

Radiopharmaceuticals and Their Preparation
PrecautionsWhileHandlingRadiopharmaceuticals
Principles of Tracer Techniques

Instrumentation-MultiholeCollimator,Crystal,Photomultiplier,Computer,Monitor.Scanning Technique

Resolution-SpatialTemporal
Gamma Camera

RectilinearScanner.

PositionEmissionTomography(Pet)

SinglePhotonEmissionComputedTomography(Spect)
Radio Immuno Assay (Ria)

Documentation

SafetyConsiderations-RadiationDose
Quality Assurance.

References:

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Cullinan:IllustratedGuideTechniques(Blackwell)
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Paper–IV

RADIOGRAPHICTECHNIQUES-II

Introduction:

ResponsibilityOfRadiographerDuringRadiologicalProcedures.
Preparation of Patient for Different Procedures.

Contrast Media - Positive and Negative, Ionic & Non - Ionic
AdverseReactionstoContrastMediaandPatientManagement
Emergency Drugs in The Radiology Department

EmergencyEquipmentintheRadiologyDepartment
Asepsis

RadiationProtection-TenDay Rule.

The FollowingShould BeDealt with Indication, Contraindications, PatientPreparation, ContrastMedia Used, Method of Administration of Contrast Media, Accessories Required, Technique to Be Adopted, VariationinNormalTechniqueinSpecificCircumstances,FilmsTaken,Complications,Precautionsand After-Care of The Patient.

Gastro -IntestinalTract:

BariumSwallow-Tracheo-OesophagealFistula,AchalasiaCardia Barium Meal - Single Contrast and Double Contrast
Hypotonic Duodenography
BariumMealFollowThrough Small Bowel Enema
Barium Enema - Gastrograffin Enema, For Reducing

IntussuceptionLoopogram
AdditionalInvestigation-ComputedTomography, Radio Isotope Scanning.

Biliary Tract:

Oral Cholecystography
Intravenous Choledochography
Pre-OperativeCholedochography
Post-OperativeCholedochography-
PercutaneousExtractionofRetainedBiliary Calculi Percutaneous
Transhepatic Choledochography - Biliary Drainage.

EndoscopicRetrogradeCholedochopancreatography
Additional Investigation: Ultrasound ScanningRadio
Isotope Scanning
ComputedTomography

Urinary System:

Excretion Urography
PercutaneousRenalPuncture
PercutaneousNephrostomyPercutaneousNephrolithotomy Lithotripsy
ReterogradePyeloureterography
MicturatingCysto-Urethrography-UrodynamicInvestigations Ascending
Urethrography
AdditionalInvestigation:UltrasoundScanning
Radio-Isotope Scanning
Computed Tomography
MagneticResonanceImaging

Reproductive System:

HysteroSalpingogram
Gynaecography
Pelvimetry
Vesiculography
AdditionalInvestigations:UltrasoundScanning Computed
Tomography
Magnetic ResonanceandImaging

Paper–V

Cardio-VascularSystem:

Angiography:

PercutaneousCatheterizationCatheterizationSites,Asepsi
s Guide Wire, Catheter, Pressure Injector and
Accessories Use of Digital Subtraction, Single Plane and
Biplane

HeadandNeckArteriography
Pulmonary Arteriography

CoronaryArteriographyAscendingAortography
Trans Lumbar Aortography

CeliacAxis,SuperiorMesentericandInferiorMesentericArteriography
Renal Arteriography

Trans Femoral Arteriography
InterventionalVascularRadiography

AdditionalInvestigations:EchoCardiogram(Doppler)
Radio-Isotope Scanning

Computed
TomographyMagneticResonanc
eandImaging

Venography:

Peripheral Venography - Lower Limb, Upper Limb
Central Venograph Superior
Venacavography Ascending Lumbar
Venography

IntraOsseousVenography
Percutaneous Splenoportography
Transhepatic Portography

SelectiveRetrogradeVenography-RenalVenography
Adrenal Venography

Hepatic
VenographyInternalJugular
Venography Orbital
Venography

Interventional Vascular Radiography
AdditionalInvestigation:UltrasoundImaging
Radio Isotope Scanning

Computed Tomography

CentralNervousSystem:

CervicalMyelography-CisternalPunctureandLateralCervicalPuncture Lumbar Myelography
MyelographyWithWaterSolubleandOilyContrastMedia Air Encephalography
Ventriculography
LumbarDiscography
AdditionInvestigations:ComputedTomography Radio Isotope Scanning
MagneticResonanceandImaging
Ultrasound Imaging

Respiratory System:
Nasopharyngography
Larynogography,Bronchography
Percutaneous Lung Biopsy

AdditionalInvestigations:RadioIsotopeScanning
Computed Tomography

UltrasoundImaging

MagneticResonanceandImaging

Miscellaneous:
Arthrography
Sialography
Lymphography
Sonography
Fistulography
Dacryo-
cystography
Mammography
Xeroradiograhy
Thermography

Kymography

Stereo- Radiography
DuplicationRadiograph
y Macro Radiography

HighKiloVoltageTechnique
Soft Tissue Radiography
Multiple Radiography
Subtraction Radiography
Foreign Body Localisation
Mobile Radiography

Theatre Radiography
DomiciliaryRadiography
Forensic Radiography
Tomography

PRACTICALS

PRACTICALRADIOGRAPHIC TECHNIQUE -I (60 HOURS)

Radiography-PlainViewsofUpperLimb: Hands
Fingers
Thumb
Wrists
Forearm
Elbow
Humerus
Radiography-PlainViewsofShoulder:
Shoulder Joint
Acromio-ClavicularJoint
ScapulaVariousViewsAndProjections
Clavicle
Sterno-ClavicularJoint
Radiography-PlainViewsofLower.Limb: Foot
Toes
Tarsals&Ossicles Ankle
Tibia,Fibula&Patella Knee
Joint
Femur
HipJoint
Pelvis & Sacro-Iliac Joint
RadiographyofVertebrae:
CervicalSpineUpper,CervicalSpineLower
Cervico-Thoracic, Cervico-Middle
Thoraco Lumbar

Lumbo-Sacral Sacrum
& Coccyx
RibsUpper&Lower
Sternum

RadiographyofSkullPlain Views:

Ap,Lateral&Towns
Sinuses, Mandible,
Teeth Mastoids

RadiographyOf Chest:

Lungs&Trachea;Heart-Diaphragm Radiography of
G.I. Tract
PlainX-Rays Abdomen-Erect;Liver,Spleen.

ReferenceBooks:

1) PhilipW.Ballinger:AtlasOfRadiographicPositioning And Radiological Procedures (Mosby) Ra Swallow, E Naylor: Clarks Positioning In Radiography E J Roebuck, A S Whitley
2) SanteLr:RoentgenologicTechnique(EdwardsInc)
3) Goldman:ARadiographicIndex
4) RossAndGailway:AHandbookOfRadiography(Lewis)
5) GlendaJ.Bryan:DiagnosticRadiography (Mosby)
6) Piles: MedicalRadiographicTechnique (Thoms).

RADIOGRAPHICTECHNIQUEII (PRACTICALS)(120 HOURS)

60 hours	**60 hours**
BariumSwallowExam(E)RadiologyTechniqueIi Barium Meal Exam (E) Barium Follow Through Exam Barium enema Exam (E) Hypotinic Duodenography BariumDoubleContrastStudy(E) Intravenous Pyeography (E) AngiographicStudies1.Arterial2.Venous Lymphangiographic Studies, Myleographic Studies. Ventriculographic Studies Bronchographic Studies MacroRadiographyStudies M.M.R. Mammography	**CTTechniques(40hours)** Brain PNS Chest Abdomen/KUB Joints **MRITechniques(20hours)** Brain Spine Joints

Note:(E)IndicatesPracticalsPrescribedforUniversity Examination.

TextBookPrescribed.

VRNarayana,SharmaStrengthenYourWriting,OrientLongman,NewDelhi.

ReferenceBooks:

1) Piles: MedicalRadiographicTechnique (Thomas)
2) Santel.R.:RoentgenologicTechnique(Edwards Inc)
3) PhilipWballiger:MerilsAtlasofRadiographic andRadilogical procedures (Mosby)
4) Goldman:Radiographic Index
5) Patesson:Printed NotesforRadiographersin India (Cmai)
6) Ahwaz: UnitstepRadiography(Thomas)
7) Ross&Galloway: AHandbookofRadiography (Lewis)
8) GlendaJ. Bryan:Diagnostioc Radiography (ChurchillLivingstone)
9) Jacobi&Paris:TextbookofRadiologicalTechnology(Mosby)
10) Scarrow: ContrastRadiography(Schering Chemicals)
11) Vanderplasts:MedicalX-RayTechnique(Mac Millan)
12) StephenChapman&RichareNakienly:AGuidetoRadiologicalProcedures(Jaypee Brothers)

TERM5(3rdYEAR) 57CLASSES:

S.NO	TOPIC	CLASSESALLOTED
1	ComputedTomography	22
2	MagneticResonanc e Imaging	20
3	Ultrasound	8
4	Nuclear Imaging	7

TERM6(3rd YEAR)180CLASSES:

S No.	Topic	Classes allotted
1	Introduction to Radiographictechnique s.	25
2	GastrointestinalTract	30
3	BiliaryTract	20
4	ReproductiveSystem	20
5	CardiovascularSystem	30
6	CentralNervousSystem	20
7	RespiratorySystem	15
8	Miscellaneous	20

PRACTICALCLASSESforTERM5&TERM6(60+120)

S NO	TOPIC	CLASSES ALLOTTED
1	RadiographsofAppendicular skeleton	25
2	RadiographsofAxialskeleton	15
3	ChestRadiography	20
4	BariumstudiesofGIT	15
5	ContrastexamofGUT	15
6	Angiographicstudies/DSA	15
7	Mammography	15
8	Miscellaneous(lymphangiography, myelography, bronchography etc)	10
9	CT	20
10	MRI	20
11	NuclearMedicine	10

Paper – III

- Diagnosticimagingtechniques:
  - Ultrasound
  - Computed tomography
  - MagneticimagingResonance
  - Nuclearimaging.

Paper – IV

- RadiographicTechniquesPartI
  - Introduction-basics.
  - GIT.
  - Biliarytract.
  - Reproductivesystem.

Paper –V

- RadiographictechniquesPartII
  - CVS
  - CNS
  - Respiratorysystem
  - Miscellaneous.

*** END***

➢ RENAL DIALYSIS TECHNOLOGY

Term – V 57 Classes Term – VI 180 Classes

ConceptatdiseaseandoutlineatclinicalevaluationrelatedtoDialysisTechnology (DT)

Unit-I.

1. Nephroticsyndrome
2. Nephriticsyndrome
3. Glomerular diseases
4. Tubulointerstitialdiseases
5. AcuteRenal Failure
5. ChronicRenal Failure

Unit–II Acid–BaseDisorders

[[

1. Metabolic acidosis and alkalosis
2. Respiratoryacidosisandalkalosis
3. Approachandmanagementofoedema
4. Disorderofsodium:
   i. Hyponatremia
   ii. Hypernatremia
5. Disorderofpotassium
   i. Hypokalemia
   ii. Hyperkalemia
6. Disorderof Magnesium
7. DisorderofCalciumand phosphorous

Unit-III

1. RenalfunctioninCongestivecardicfailure
2. Renalfunction inLiverDisease
3. Renalfunctioninsystemicvasculitis
4. Renalfunctioninconnectivetissuedisorder

Unit-IV DiabeticNephropathy

Epidemiology
Pathophysiology
Diagnosis Management
Followup Prevention

Unit-V-RenalHypertension **Unit- VI - ** Infectious Diseases **Unit-VII -** Drugs and Kidney Diuretics

Antihypertensives Vit D
Analogue Steroids

I.VAntibiotics

Chemicalsusedindialysisandtheiraction PDFluids

ReplacementFluidsinCRRT Heparin

Unit-VIII-RenalBiopsy

Indications

Contra–Indications Procedures

Preand PostBiopsycare

Unit-IX-IntroductionofHemodialysis History of Hemodialysis Principles of Hemodialysis Indications of Hemodialysis Types of Hemodialysis

DialysisTeam(Doctor,Nurse,technician,RenalDietician)

Unit-X-Water Treatment

Purposeofwatertreatment Filtration

SoftenerandcarbonFiltration Deionizer

R.O System Ultrafiltration

Unit-XI-Hemodialysisequipment

1. Componentand function
2. Dialyser
3. Anticoagulation
4. Compositionof dialyser
5. Hemodialysisadequacy
6. Dialyse reuse
7. DisinfectionofHDmachine
8. Complicationsduringhemodialysis

Unit-XII-Vascularaccess

1. Historyof access
2. Types ofaccess
3. Techniqueof cannulation
4. Access Management
5. Complications
6. Vascularaccessrecirculation

Unit-XIII– UniversalPrecautions

- Drugsanddialysis

Unit-XIV– PeritonealDialysis

- HistoryofPeritonealDialysis
- TypesofPeritonealDialysis
- IndicationforPeritonealDialysis
- AppliedphysiologyofPeritonealDialysis
- Peritonealaccessdevices
  Types of catheters
- InsertionTechniques
- Complications

Unit-XV–AdequacyofPeritonealDialysis PET Test

Unit-XVI– InfectionsinPeritoneal Dialysis

-Diagnosisand treatment

Unit-XVII–NoninfectionsacutecomplicationofPeritonealDialysis

Unit-XVIII–ChroniccomplicationofCAPD **Unit- XIX**-Management of cyclers - CCPD **Unit- XX -**Dialysis in special situations

- HBSag+ve,HCV+ve,HIV+ve
- Incongenitalheartfailure
- InAdvancedLiver diseases
- In bleeding disorder
- Inheadinjury
- Postsurgicalcases
- Poisoning
- Pregnancy
- PostRenalTransplant

Unit-XXI-DialysisIninfantsandchildren

Unit-XXII-Nonrenalindicationsfordialysis

Unit-XXIII–Specialdialysis modalities

CRRT(continuousrenalreplacementtherapy)-inICUsetting.

1. Hemodiafiltration.
2. Isolatedultrafiltration
3. Hemoperfusion.
4. SLED
5. MARS
6. Plasmapheresis.
7. HighFluxDialysis

Unit-XXIV-Psychologyandrehabilitationindialysis patient.

Unit-XXV -Recentadvances inHemodialysis(HD)

NocturnalHD On
line HD

Unit-XXVI -settingupofaHDunit

Unit-XXVII-RenalTransplantation

Live Cadaver

ReferenceBooks

- Hand bookofdialysis
  (I.TDaugirdas)
- Oxfordhandbook ofdialysis
- DialysisTherapybyNissenson

<u>Practical schedule</u>

1. Settingupdialysismachinefordialysis.
2. A-VFistulacannulationtechniques.
3. Settingupof dialysistherapythoroughcentralvenouscatheter
   -Internaljugular vein

   -Femoralvein

   -subclavianvein

4. PackingandsterilizationofDialysistray.

5. MonitoringofHDmachinesatdialysiscentre.

6. PreparationofDialysateasperpatientrequirementandprescription

7. Monitoringofperitonealdialysis

-ManualexchangesofPDfluid

-Managementofcyclers

PAPERIII

- UNITITOUNITVIII

PAPERIV

- UNITIXTOUNITXVIII

PAPERV

- UNITXIXTO XXVII

*** END***

➢ OPTOMETRY TECHNOLOGY

Term5(3rdyear)-57classes

5th TERMTHEORY (Syllabus)

1. **VITREOUS**

Appliedanatomy
Vitreous opacities
- asteroid hyalosis
- synchysis scintillans
- inflammatoryvitreous opacities
- parasites in vitreous
- amyloidosis
- PHPV

Vitreous degenerations
- synchysis
- syneresis

Vitreous hemorrhages
Vitreous detachments
Vitrectomy
Vitreous substitutes

2. RETINA

Appliedanatomy
Congenitaland developmentaldisorders ofretina
Retinal inflammations
- retinitis
- retinal vasculitis

Retinalvasculardisorders
- retinalvascularocclusions
  - CRAO, CRVO

Retinopathies
diabeticretinopathy
hypertensiveretinopathy
sicklecellretinopathies
retinopathyofprematurity
pregnancyinducedretinopathy
retinopathyofblooddisorders
Retinal detachments
rhegmatogenous
exudative

tractional

Retinal degenerations

Latticedegeneration

pathological myopia

Retinal dystrophies

retinitispigmentosa

macular dystrophies

Retinal tumors

retinoblastoma

Phakomatosis

3. NEURO EYEDISEASE

Appliedanatomyofvisualpathway

lesionsofopticnerve

optic neuritis

papillitis

Retrobulbarneuritis

opticneuropathies

AION

PION

TOXICON

TraumaticON

Nutritious ON

Papilledema

opticatrophy

lesionsofoptic chiasma

lesionsofoptic radiation

3.2.7.lesionsofvisualcortex

Cortical blindness

Malingering

3.2.8.lesionsofhighercorticalcenter

Visual Agnosia

Alexia

Aphasia

Visual illusions

Visualhallucinations

Night blindness

Day blindness

pupillaryreflexesandtheirabnormalities Amaurotic light reflex

Horner'ssyndrome

Adie`s tonic pupil

Wernicke`shemianopicpupil

Argyll Robertson pupil

Hutchinson`spupil
Ocularmanifestationofintraoculardisease
Hemorrhage
Tumors
Demyelination
Infection
lesionsofIIIcranial nerve
lesionsofIVcranial nerve
lesionsofVIcranial nerve

4. BINOCULARSINGLEVISIONANDOCULAR MOTILITY DISORDERS

Theoriesofbinocularsinglevision
Pannum`sarea
Horopter
Development of BSV
GradesofBSV
TestsforBSV

AnomaliesofBSV
Suppression
amblyopia
ARC
Confusion
4.7.5. diplopia

TestsforBSV anomalies
Worthfour DOT test
4.0Dbase outprism test
Bagolini`s striated glasstest
After image test
Synoptophore

5. ANATOMY OF EXTRAOCULARMUSCLES

Actionof extraocularmuscles
Typesofocular movements
Ductions
versions
vergences
Lawsgoverningocularmovements
Hering law
Sherrington`slaw
Supranuclearcontrol ofocularmovements
saccadic system
smoothpursuitsystem
vergence system

5.4.5vestibularsystem

Ocularmisalignment

pseudostrabismus
heterophoria
heterotropia
concomitant strabismus
Incomitant strabismus
restrictivemyopathies

Estimationofangleofdeviation

Management ofstrabismus

correctionof refractive errors
prescriptionofprisms
orthoptic exercises
occlusiontherapy
penalization
managementofdiplopia
Occluders
Chemicaldenerves

5.7.8surgicalcorrection

Nystagmus

Definition
pathogenesis
causes
Types
clinicalfeatures
Management

Ocularmyopathies

Migraine

6. CONTACTLENS I

historyofcontactlenses

6.1**Introductiontocontactlenses**

advantages over spectacles

appliedanatomyoflacrimal functionalunit (LFU)
physiology oflacrimalfunctional unit
opticsofcontact lenses

Back/front vertex power
vertexdistance
DK value

Typesofcontactlenses

RGPlenses
soft contact lenses
bandage contactlenses
therapeutic contact lenses

Workup forcontactlenses fitting

visual acuity
refractive examination
ocular movements
HVID,VVIO,Tearfilm
Keratometry
cornealtopography

InsertionandremovaltechniquesofRGPlenses Soft contact lenses

Careand maintenance of contact lens

cleaning
Disinfection
Lubrication

Followup evaluation

Complicationswithcontactlens

7. LOW VISION AND VISUALREHABILITATION

Introductiontolow vision

Grades/categoriesof low vision

Reviewofocularpathogenesiscausinglow vision

Definitionofblindness,visualdisabilityandvisual handicap

Preliminarycounselling

patients
relatives
Hobbiesandleisureactivities
visual demands
expectations

Opticsoflowvision aids

Typesoflowvisionaids

Magnifiers

Types
Angular magnifications
Magnificationbyapproach
Projection Magnification
Cortical Magnification

Telescopes

Hand held
Clip on
Gallilean
Keplarian

Examinationof patientswith lowvision

history
visual acuity
refractiveexamination

Colourvision
contrast sensitivity
peripheralvisualfieldloss
centralvisualfield loss

overallblurring ofvisual field
oculomotorproblems
perceptionalimpairment
fundusexamination
selectionoflowvisualaids

magnificationneeds
workingdistance
durationof activity
physicalandcognitionlimitations
monocularorbinocularnystagmus
dominant eye
glareandcontrast sensitivity

PrescriptionofLVAS
Training ofpatients
counsellingandgenetics
rehabilitationservices
legalaspects oflow vision

8. CLINICAL REFRACTIONII

Geriatricoptometry

IntroductiontoGeriatricoptometry
Age relatedchangesinocularsystem

anatomical
physiological
functional

Ocularproblemspecific toGeriatricpeople

accommodation
lightandcontrast sensitivity
agerelatedcataract
agerelatedmacular degenerations
hypertension
diabetesmellitus
COPD
atherosclerosis

Optometricexaminationofgeriatricpeople

9. CLINICAL REFRACTIONII

Pediatricoptometry

Introductionanddefinitionof pediatricage
Appliedaspectofocularandvisualdevelopment
Reviewofcongenitalanddevelopmentaldefectscausing decreased visual function
Examinationof visualfunctioninchildren
visual acuity
refraction
BSV
ocular movements
sensoryandmotoradaptability
Nystagmus
amblyopia

10. OCULARTRAUMA

ICDclassification of ocular injuries
Mechanical injuries
Blunttrauma
Open globe injury
Nonmechanicalinjuries
chemical
thermal
radiational
electrical
Intraocularforeign bodies

11. SPORTS VISION

Introductionofsportsvision
Roleof optometristin sportsvision
visualrequirementsofdifferentsports
generalocularhealth
Staticvisualacuity
Dynamicvisualacuity
contrast sensitivity
stereopsis
Accommodation
Eye movements
Visualmotorrequirement
Visionenhancementtechniquesfor sports person
Sportsvision aids
contact lens
11.5.2. protectiveeyewear
sunglasses

swimming goggles

Sports training

Waynesaccadicfixatorforeyehandcoordination

Bassinanticipationtimer foreye body coordination

Rotationalpeg boardfor dynamicvisual acuity

sports injuries and preventive measures

5thTERMPRACTICALS(Syllabus)-**60classes**

1. **Assessmentofvisualacuity inchildren(5-15yrs)**
   Snellen visual acuity charts
   LogMARvisualacuitycharts
2. **Assessmentofcontrast sensitivity**
   PelliRobsonlettercontrastsensitivity
   Cambridge low contrast gratings
3. **Refractiveexaminationin**
   children
   olderadults
4. **AssessmentofBinocularvision**
   Worth 4 dot test
   Maddox rod test
   Maddoxwingtest
   4.0DBaseoutprismtest After
   image test
   Titmusflytest
   TNO test
   Lang`s2pencilTest
   Lang`s stereo Test
   Random dot test
   Diplopiacharting
   Hess screen test
   Convergence,Ac/Ameasurement
   Forced duction testSynaptophore
5. **Workupof strabismus patient**
   history
   visual acuity
   refractive examination
   evaluation ofmotor system
   evaluationof sensorysystem
6. **Orthopticexercises**
   balltracking
   dot cardexercises

7. **ContactlensI**

preliminary evaluationand measurement
Slitlampexaminationoflids,ocularsurface,tearfilm
Spectacle refraction
Cornealplanerefraction
HVID, VVID, Pupil size
TBUT, Schirmer`s test
Keratometry
Triallensfittingof
RGP lenses
Softsphericalcontactlens
Soft Toric contact lens
Insertion and removaltechniques
prescription ofcontact lenses
Aftercareregimenand follow up

8. **Low visionexamination**

Categorizingpatients withlow vision
Workshopofpatientswithlowvision
History
Visual acuity
Refractiveexamination
Colour vision
Contrastsensitivity
Visual field
Dominant eye
Determining typeof LVAneeded
direct comparison method
calculated method
Magnifiersfornearandintermediatevision
Telescopes for distance vision
Changeinfieldofvisionwithdifferentmagnification
And different working distance
visualfieldenhancementdevices
Fresnelprisms
Hemianopic mirrors
Prescriptionoflowvisualaidsandtrackingthepatientsin LVA
usage
Nonoptical devices

9. **Sports vision**

identifyingvisualrequirementsofvisual sports

prescriptionofsports vision aids

- contact lens
- protectiveeyewear
- sunglasses
- swimming glasses

sports vision tracking

- Waynesaccadicfixator
- Bassin anticipationtimer
- rotationalpegboard

6thTERMTheorySyllabus-180classes:

1.	**OcularManifestationsinSystemicDiseases:**
1.1	**Hypertension:**
1.1.1	Epidemiology,Classification, Clinical featuresandComplications
1.1.2	HypertensiveRetinopathy
1.2	**DiabetesMellitus:**
1.2.1	Epidemiology,Classification, ClinicalFeaturesandComplications
1.2.2	DiabeticRetinopathyDiagnosisandManagement
1.3	**AcquiredHeartDiseases:**
1.3.1	Thrombosis,Embolism,RheumaticHeartDiseases,SubAcuteBacterial Endocarditic
1.3.2	Ocular Implications
1.4	**Cancer:**
1.4.1	Introduction,Nomenclature, ClinicalFeaturesandComplications
1.4.2	Ocular Implications
1.5	**ConnectiveTissue Diseases:**
1.5.1	Types,Clinical FeaturesandComplications
1.5.2	Ocular Manifestations,DiagnosisandManagement
1.6	**Thyroid:**
1.6.1	FunctionsofThyroidanditsDisorders
1.6.2	ThyroidEyeDisease
1.7	**Tuberculosis:**
1.7.1	Epidemiology,Pathogenesis,Types, ClinicalFeatures,Complications, DiagnosisandTreatment
1.7.2	NationalTBControlProgram
1.7.3	OcularManifestationsofTuberculosis
1.8	**OcularComplicationsofViral Diseases:**
	HerpesSimplex,HerpesZoster,Rubella,CMV,Measles,Mumps,HIV, Carona.

1.9	**OcularComplicationsduetoParasites:**
	Acanthamoeba,Toxoplasomosis,TaeniaSodium,TaeniaEcchemococas, Toxocare,Orchocerciases,Malaria,Filaria
1.10	**OcularManifestations of BloodDisorders:**
	Anaemia,Leukemia,Lymphoma
1.11	**OcularComplications duetosystemicDrugusage:**
	Corticosteroids,AntiTuberculardrugs,Anti Malarial drugs,Hormones, Antibiotics, Antimetabolites
1.12	**Genetics:**
	IntroductiontoGenetics,GeneticdisordersandTransmissions,Common Ocular GeneticDiseases ColourBlindness, Trisomy 13, 18, 21 Albinism,Nystogmus,RetinitisPegomentosis,GeneticCounselling

2.0	**Public HealthandCommunityOptometry:**
2.1	WHOdefinitionofHealth
2.2	IntroductionofPublicHealth
2.3	HealthIndicatorsandDeterminantsinIndia
2.4	PrinciplesofPrimary,SecondaryandTertiaryHealthCare
2.5	HealthCareDeliverySystems
2.6	HealthCareInfrastructure,Man PowerandEconomics
2.7	QualityAssurance
2.8	IntroductiontoCommunityOptometry
2.9	RoleofOptominCommunityOptometry
2.10	EpidemiologyandDemographyofBlindness
2.11	Definition ofBlindness,VisualimpairmentandVisualDisability
2.12	MagnitudeofBlindness
2.13	CategoriesofVisualImpairment
2.14	CausesofVisualImpairment
2.15	NationalandInternational agenciesinEyeCare
2.16	ProgramsfortheControl ofBlindnessWHO,Vision2020, RIGHTTO SIGHT, VISIONFORTHEFUTURE,NPCB
2.17	NPCB–Relevance,Organization, Activities -CentralLevel -StateLevel -DistrictLevel -PrimaryLevel
2.18	RoleofEyeCamps PreventionofBlindness
2.19	Eye Banking IntroductiontoOrganDonation,EyeDonation,EyeTransplantation HistoryofEyeBanking FunctionsofEye Bank OrganizationofanEyeBank

3.0	**Biostatistics**:
3.1	IntroductiontoBiostatistics
3.2	UsesofBiostatistics
3.3	SignificanceofStatisticalAnalysis
3.4	QualitativeAnalysis
3.5	QuantitativeAnalysis
3.6	SourcesofData
3.7	SamplingSize
3.8	SamplingDesign SimpleRandomSampling SystematicRandomSampling StratifiedRandomSampling ClusterSampling
3.9	DataPresentation
3.10	MeasuresofCentralTendencyMean,Mode,Median
3.11	MeasuresofDispersionRange,Meandeviation ,Standarddeviation
3.12	TheoreticaldistributionBinomial,Normal
3.13	TestsofSignificance Z test,t test,ANOVA,ChiSquaretest
3.14	HospitalStatistics
3.15	ExperimentalDesign andApplication

4.0	**ContactLenses II:**
4.1	Reviewoftypes,materialsandmanufacturingtechniquesofContact Lenses
4.2	CalculationandfittingParametersofSoftSphericalandSoftToxic ContactLenses
4.3	CalculationandfittingParametersofRGPLenses
4.4	CalculationandfittingParametersfordisposable,daily wearandextended wearContactLenses
4.5	BandageContactLensesTherapeuticContactLenses
4.6	FittingofContactLensesinChildren
4.7	ContactLenscareandMaintenanceRegimen
4.8	ComplicationsofContactLenses
4.9	FollowupVisitExamination
4.10	OrthoKeratology
5.0	**ProfessionalPracticeManagement:**
5.1	Law andOptometry IntroductiontoMedicalEthicsandcodeofconduct
5.2	NationalMedicalCommission (NMC)
5.3	LawsGoverning Medical andParaMedicalProfession

5.4	LawsGoverningManufactureanddispersionofOpticalProducts
5.5	BasicPrinciplesofMedicalEthics
5.6	Congeniality, Patientsrights,Autonomous
5.7	InformedConsent
5.8	MedicalNegligence,Mal Practice
5.9	ProfessionalIndemnity
5.10	MedicalInsurance
5.11	CareofTerminallyillpatients
5.12	Euthanasia
5.13	HOTA
5.14	MedicoLegalAspectsofMedicalRecordsandDocuments
6.0	**BasicAccountancy:**
6.1	IntroductiontoAccountancy
6.2	PrinciplesofAccountancy
6.3	Sales,Purchase
6.4	RevenueExpenses
6.5	ProfitLoss
6.6	Assets,Liabilities
6.7	RecordsofAccountancy GeneralLedger,CashBook,PurchaseRegister,SalesRegister,FixedAssets Register, Journal Register
6.8	PreparationofAccounts TradingAccounts, Profitlossaccount, Income account, Expenditure account
6.9	Public Relations Introduction,Publicity,Propaganda,Advertising,PublicRelationPhases, Public Relation Methods, PublicRelationswithinOrganisation,NGOs,Media,CustomersandHospital Agencies.
7.0	**Occupational Optometry:**
7.1	IntroductiontoOccupationalHealth andSafety
7.2	Visualstandardsandrequirementsindifferentoccupations Industries, Railways,Airlines,Army, Navy, Air Force
7.3	OccupationalOcular hazards Mechanical,Chemical,Electrical,Radiational, Thermal
7.4	PreventionofOccupational OcularHazards VisionScreening,Preplacement,Periodic
7.5	OcularProtectiveEquipment
7.6	RoleofOptominOccupationalVisionsafetyandHealth

6thTERMPracticalSyllabus-120classes

1.0	**VisualAcuity Assessment** PreVerbalChildren PreSchoolChildren ChildrenwithMultipleDisabilities ChildrenwithLowVision GeriatricsAgePatients
2.0	**RefractiveAssessmentin** PreVerbalChildren PreChildren ChildrenwithMultiple Disabilities ChildrenwithLowVision GeriatricsAgePatients
3.0	SoftToxicLensFitting
4.0	RGPLenses Fitting
5.0	ContactLensFittingin Children Astigmatism Keratoconus
6.0	Synaptophore ExercisesforAmblyopia Supression AIZE
7.0	Synoptophore EstimationofBSVGrades AngleofDeviation Ac/A ratio
8.0	Ortho Keratology
9.0	Low VisionAidsPrescriptionandTraining
10.0	CounsellingSessions

(SYLLABUSFORPAPER-III,PAPER-IVANDPAPER-V)

PAPER–III

SL. NO.	TOPIC	CHAPTERSTO BECOVERED
1	POSTERIORSEGMENT VITREOUS RETINA	5THSEM1.1 – 2.10
2	NEUROEYE DISEASES	5THSEM3.1 – 3.2.13
3	BINOCULAREVISION AND OCULAR MOTORDISORDERS	5THSEM4.1 – 5.9.1
4	OCULARTRAUMA	5THSEM10.1 – 10.6
5	OCULAR MANIFESTATIONSIN SYSTEMIC DISEASES	6THSEM1.1 – 1.12

PAPER-IV

SL. NO.	TOPIC	CHAPTERSTOBECOVERED
1	CONTACT LENS- I &CONTACT LENS-II	5THSEM6.1 –6.12
2	LOWVISIONANDVISUAL REHABILITATION	5THSEM7.1 –7.20
3	CLINICALREFRACTIONII &GERIATRIC ANDPAEDIATRICOPTOMETRY	5THSEM8.1 –9.4.7

PAPER-V

SL. NO.	TOPIC	CHAPTERSTO BECOVERED
1	PUBLICHEALTHANDCOMMUNITY OPTOMETRY	6THSEM2.1 – 2.19
2	BIOSTATISTICS	5THSEM3.0 – 3.15
3	PROFESSIONALPRACTICE MANAGEMENT	6THSEM5.1 – 7.6
4	SPORTSVISION	5THSEM11.1 – 11.7
5	OCCUPATIONALOPTOMETRY	6THSEM7.1 – 7.6

*** END***

➢ PERFUSION TECHNOLOGY

Term5(3rdyear)57classes

PAPER-IIIPERFUSION TECHNOLOGY CLINICAL

1. PharmacokineticsandPharmacodynamicsofCardiopulmonarybypass
2. Drugs(includingaestheticdrugs)usedincardiopulmonarybypass
3. ConductandmonitoringofCardiopulmonarybypass
4. Adequacyofperfusion–Generalconsiderations,specificaspectsofperfusion,monitoring,other concomitants which may affect its adequacy
5. Pulsatileperfusion–Introduction,theory&physiologyofpulsatileflow,hemodynamic, metabolic effects, Clinical use, haematological effects
6. Cannulationtechniquesduringcardiopulmonarybypass
7. Terminationofcardiopulmonarybypass–principlesandmethodology
8. Myocardial protection and cardioplegia- pre-treatment of the Myocardium, cardioplegia, hypothermia,controlledreperfusion,myocardialprotectionforspecificclinicalproblems, Complications of cardioplegia. Non cardioplegic methods during cardiac surgery on cardiopulmonary bypass
9. Oxygenation–generalconsideration,bubble&membrane(includingassessmentand comparison of oxygenator function)
10. Heatexchangers-principlesfunctionofheatexchangers&theirassessment.Complicationsrelated to heat exchange and their management
11. Primingfluidsandhemodilution.

Term6 (3rdyear)- 180 classes

Paper–IVPerfusionTechnology–Applied

1) Blood cell trauma – analysis of forces of fluid motion, effects of physical forces o blood cell, clinical effect. Complications of blood transfusion.
2) Anticoagulation on bypass, its monitoring, its reversal and complications. Heparinless bypass. Platelet aggregation and platelet dysfunction. Coagulopathies due to cardiopulmonary bypass and its management.
3) Inflammatory response to cardiopulmonary bypass & its clinical effects. Methods to minimise the same. Immune response, neuroendocrine, renal, metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass.
4) Blood conservation hemofiltration & dialysis during cardiopulmonary bypass including modified ultra-filtration reverse autologous priming and other methods.
5) Microemboli-gaseousandparticulate,filtersusedincardiopulmonarybypasscircuit.
6) Microporefiltrationduringcardiopulmonarybypass
7) Counterpulsationtechniquesandassistdevices

1. PerfusiontechniquesforPaediatriccardiac surgery
2. ECMO- special perfusion techniques for special cardiac surgeries and medical conditions (includingthoracicaorticsurgeriesdeephypothermiaandcirculatoryarrest).Perfusionfor non-cardiac surgery, invasive cardiology and outside the operation suite.
3. Perfusionasamethodofcardiopulmonarybypass
4. Complications and safety during cardiopulmonary bypass – bypass safety, organizational aspects, accidents, coagulopathies, mechanical and electrical failures, perfusion management,perfusionsystems,safetyfortheperfusionistandsurgicalteammanagement of perfusion accidents
5. Minimallyinvasivesurgeryandthe perfusionist
6. Recentadvancesinperfusion techniques
7. Experimentalperfusion

PRACTICALSYLLABUS

DISEASESANDCLINICALEVALUATION

GROSSANATOMYAND STRUCTURAL FEATURES OF HEART

1. Location,size,surfacefeatures, venousarea,septumandatrialappendage.
2. Rightatrium-structural features, venous area, septum andappendage.
3. Left atrium-structural features venous area, septum and appendage.
4. Rightventricle-structuralfeatures inflow andoutflow characteristics.
5. Leftventricle- structuralfeatures inflow andoutflow characteristics.
6. Valves-location,structureandfunctionsof eachvalve.
7. Bloodsupplyof Heartinbrief:Coronary arteries.
8. Innovation:Sympatheticandparasympathetic sensory.

GREATVESSELS:

1. Structureof bloodvesselsandits organization.
2. Example:Aorta,pulmonaryartery,pulmonaryveins.

AdvancedPerfusion Technology-

1. CalculationofPCVonCPBandamountofbloodto beaddedto bringthePCVonCPBto particular level

2. Interpretationand correctionofagiven arterialblood gas
3. Interpretationandcorrectionofagivenelectrolyte abnormally
4. Calculationof body surface area
5. PerforminganACTestimationandinterpretationof results
6. Settingof a dummyCPBcircuit
7. Managing a simulated perfusion accident on a dummy CPB circuit including changing oxygenators when on CPB, managing falling/leaking reservoir levels, venous airlocks, air in the arterial line, cardioplegia delivery failure, increased arterial line pressure, recognitionof a possible dissection, run a way pumphead, recognition of heat exchanger water leak into the CPB circuit,
8. IdentificationofvariousCPBcircuitcomponentsandtheiruses,methodof sterilization and complications related to them
9. Identificationof drugs andtheir pharmacology
10. CalculatingvascularresistanceonCPBandmanagementofincreasedperfusion pressure on bypass
11. Adult perfusion,
12. Paediatric perfusion,
13. Assessmentofpatient(viahistory) beforebypass,
14. Assessmentofpatientpostbypass,
15. Calculationofprimecomponents,
16. Selection ofcannula,
17. Assemblyof equipment,
18. Primingofoxygenator,
19. Going onandcoming off bypass,
20. Adverseeffects of CPB;
21. Assistingopenheartsurgeries andmaintenance oflogbook minimumof15 cases

*** END***

➢ RESPIRATORY THERPHY TECHNOLOGY

DISTRIBUTIONOFTEACHINGHOURSINTHIRDYEAR B.Sc. (RESP.THERAPY) THEORY FOR TERM-5 & TERM-6 (57 CLASSES& 180 CLASSES)			
Sl. No.	**TOPICS**		**CLASSES ALLOTED**
1.	BASIC SCIENCE	**Diagnostictechniques** PulseOximeter,ECG,ABG,PFT,PSG,Imaging **Equipments:** Medicalgas,O2flowmeter,O2deliverydevices,Ambu bag, Humidifier,HME,Capnography and Defibrillators,CPAP,BiPAP,Ventilators	50hrs
		AssessmentofCriticallyIll Monitoring in Critical Care-Resp,CVS,CNS Diagnostic Tests in Critical Care Resuscitation in ICU Ethicsin CriticalCareMedicine	20hrs
2.	APPLIED SCIENCE	Endo tracheal intubation Tracheostomy–careOxygen therapy AerosolTherapy Humidification ICT drainage	50hrs
		Noninvasive mechanical ventilation Mechanical Ventilation ExtraCorporealMembraneOxygen(ECMO)	47hrs
3.	LIFE SUPPORT SYSTEM	BasicLifeSupport Advanced Cardiac Life Support Advanced Trauma Life Support Respiratory Emergency Cardiac Emergency Neurological Emergency Trauma emergency Poisoningandtoxicology	30hrs
4.	PULM. Rehabili-tation	Pulmonary rehabilitation Chest physiotherapy Bronchial hygienic therapy ICUcalculations	40hrs

PRACTICALSYLLABUSFORTERM-5&TERM-6 (60 CLASSES& 120 CLASSES)

Sl.No.	Topic	classes
1.	Triage,Initialsystemicexamination andphysical examination	10
2.	Basic life support, Advancedlifesupport Advancedtraumalifesupport	20
3.	Equipment, Sterilisation & disinfection Techniques	20
4.	Drugsidentificationanddosagecalculationin ICU	10
5.	Aerosoltherapy	10
6.	Airwaymanagement&Airwaycartpreparation	15
7.	Oxygentherapy	20
8.	Noninvasivemechanicalventilation	20
9.	Invasivemechanicalventilation	30
10.	Chestphysiotherapy	10
11.	Pulmonaryrehabilitation	10
12.	InterpretationofImaging	5

PAPERIII

DIAGNOSTICTECHNIQUESANDEQUIPMENTSUSEDIN CARDIO-RESPIRATORY DISEASES

DiagnosticTechniquesinCardio-RespiratoryDiseases

- ArterialBlood Gas interpretation
- Pulseoximetry
- Capnography
- Systematicinterpretationof chest xray
- PulmonaryfunctionTest
- DLCO
- FRC
- Spirometry
- Respiratorydrive
- FeNO
- VentilatorGraphy
- SleepStudyPolysomnography,Limitedchannelstudy,PAPtitration

- BodyPlethysmography
- ECG interpretation
- EchoCardioGraphy
- TreadmillTest
- CT / MRIChest

EquipmentsinRespiratoryCare

- MedicalgasandMedical GasPipelines
- OxygenFlowmeters
- Humidifiers
- Heat & MoistureExchanger
- Heated Humidifier
- Defibrillators
- Capnography
- PulseOximeter
- CuffPressuremanometer
- PeakExpiratoryflowmeter
- AMBU,BAINScircuit
- Spirometer
- Artificial airways – Basic&Advanced
- Variousroutes ofO2administration
- Aerosol therapy
- Nebulizer–Jet, Ultrasonic
- ICD System
- NIV
- Ventilator
- O2 Analyser
- Laryngoscope, Bronchoscope
- Ultrasound

PAPERIV-RESPIRATORYTHERAPYTECHNIQUES

Respiratory TherapyTechniques

- Mechanical Ventilation
- Initiation of Mechanical ventilation
- Modesofmechanicalventilation
- Different typesofventilation
- Monitoringduringmechanicalventilation
- Care ofpatientswith mechanicalventilation
- Troubleshootingduring mechanicalventilation
- Complicationsduringmechanical ventilation
- Weaningduringmechanical ventilation
- PEEP,AutoPEEP

- Weaning criteria
- Post extubationcare
- Lungrecruitmentmanoeuvres
- ProneVentilation
- Non-InvasivemechanicalventilationContinuouspositiveairwaypressure (CPAP),
  Bilevel positive airwaypressure(BiPAP)
- Indication
- Contraindication
- Modes
- Monitors
- Complication

Oxygentherapy

- High flow oxygentherapy
- Lowflowoxygentherapy
- AerosolTherapy
- Indication
- Procedure
- Complication

Humidification

- Different typesofhumidification
- HME vs. heatedhumidifier
- Suctioning method
- Indication
- Contraindication
- Types
- Procedure
- Complication

- Intercostaldrainage(ICD)–Indications,Procedure,complications
  ICD bottle system

ENDOTRACHEALTUBEINTUBATION

- Indication
- Route ofintubation
- Difficultintubation
- Complications
- Careoftracheostomypatients

Transport of Critically ill patients

ExtraCorporealMembrane Oxygen(ECMO)Therapy

RespiratoryMonitoring:Compliance,Resistance,Volumes,Pressures,respiratory muscle strength assessment, maximum inspiratory and expiratory pressures

Cardiovascular monitoring:InvasiveandNon-invasiveBPmonitoring

Centralnervoussystemmonitoring:Glasgowcomascale,AVPUscale,sedationand analgesia scoring

PAPERV-LIFESUPPORTSYSTEMANDCARDIO- PULMONARY REHABILITATION

BasicLifeSupport

RecognitionofCardiacarrest
Respiratory arrest
AED
LayrescuerResuscitation

AdvancedCardiacLifesupport
Tachyarrhythmia
Bradyarrythmia
Pulselessarrest
Differencebetween SynchronizedCardio version/ Defibrillation

AdvancedTraumaLifesupport
Primary Survey
A, B, C, D, E
SecondarySurvey
Headtotoe
evaluation
Completehistoryandphysicalexamination
Reassessment of all vital signs
Postresuscitationcareand monitoring

CARDIOPULMONARYREHABILITATION

Pulmonary Rehabilitation

- DefinitionandAims
- Selectionofpatients
- Pulmonaryrehabilitationteam
- StructureofPulmonaryrehabilitation
- Patientassessmentforpulmonaryrehabilitation

◎ Assessment of dyspnoea

Definition

Exertionalbreathlessness– modifiedBorg scale,Visual analoguescale.

Breathlessnessassociatedwithactivities–modifiedMedical Research Council scale

Assessmentofexerciseperformance–Fieldtests

Self paced – the six minute walktest

Externally paced – the incremental shuttle walk testAssessment of exercise performance – Laboratory test

Incrementalexercisetesting–Cardiopulmonaryexercisetesting

Indications and contra indications

Assesssmentofqualityoflife

Definition

Questionnairemeasuresofhealth–relatedqualityoflife Assessment of anxiety and depression

Hospitalanxietyanddepressionquestionnaire

Bronchial hygiene therapy

Broncho–pulmonarysegments

Surface anatomy of lung

Postural drainage

Chestphysicaltherapy

- Definition,indication/Contraindication
- techniquesofchestphysicaltherapy

Chest percussion

Forced expiratory technique

Positiveairwaypressureadjuncts

Acapella

Flutter

Calculations:

Drugdose calculations

Infusioncalculations

Gascylindercalculations

Flowcalculations

Lungvolumes and capacities

PRACTICALEXAMINATION

Onecommon practical forallthe three paperswithequal weight age ofmarks.

*** END***

Medical Emergencies

1. Hypoglycemia
2. Hyperglycemia, DKA, HONK
3. Poisoning
4. Anaphylaxis
5. Hypothermia
6. Hyperthermia
7. Mentalillness
8. **Fluidsand electrolytes**
    a. Fluid administration
    b. Formulas
    c. Dehydration
    d. Fluid therapy
    e. Electrolyteimbalanceandtheirmanagement-hypoorhyperkalemia, hypo or hypernatremia, hypomagnesemia, hypocalcemia

9. Acidbase emergencies:

10. **RespiratoryEmergencies:**
    a. Foreign body obstruction
    b. Chronicobstructivepulmonarydisease (COPD)
    c. Asthma
    d. Pneumonia,Pulmonaryedema
    e. Commonmedicationinrespiratoryproblems
    f. Meterdoseinhaler,nebulizer
    g. Mechanical ventilator

11. GastrointestinalEmergencies:
    a. Abdominalpain
    b. Pepticulcer disease
    c. Pancreatitis
    d. Bowel obstruction
    e. Hernias
    f. Gastrointestinalbleeding

12. **CardiovascularEmergencies:**

- **a.** Angina pectoris
- **b.** Myocardialinfarction (MI), ThrombolyticTherapy
- **c.** CongestiveCardiacFailure(CCF)
- **d.** AorticAneurysm
- **e.** HypertensiveEmergencies
- **f.** CardiacArrhythmias
- **g.** 12 lead ECG
- **h.** HeartBlock

13. CentralNervousSystem Emergencies:

a. Meningitis
b. Stroke
c. Seizures
d. Statusepilepticus
e. Syncope
f. Subarachnoidhemorrhage
g. Epidural hemorrhage

14. Genitourinaryemergencies:

a. Renal failure
b. Urolithiasis
c. Urinarytractinfection
d. Haematuria

15. HematologicalDisorders:

a. Redblood cell disorders:
b. Anemia – Aplastic, Hemolytic,Hypochronic/Microcytic, Megaloblastic.Normochromicnormocytic
c. Hemoglobinopathies(Sickle celldisease / trait,Thalessemia)
d. Polycythemia
e. White blooddisorders
f. Plateletabnormalities

16. Dermatological Emergencies:

a. Viralinfections:Varicella, Herpeszoster,Acuteleprosyreactions
b. Autoimmunedisorders:Pemphigusvulgaris,Systemiclupus erythematosus
c. Toxicdisorders:Acuteerythroderma
d. Severepruritus,
e. Scabies
f. Allergic reactions

17. Toxicology:

a. Definethetermpoison
b. Thefourways inwhich apoisonmay enterthe body
c. Generalprinciplesofassessmentandmanagementofpoison and overdose
d. Opiatestoxicity
e. Organophosphates
f. Carbonmonoxide
g. Cyanide
h. Caustics
i. Coppersulphate
j. Digoxintoxicity
k. Hydrocarbons
l. Tricyclicantidepressanttoxicity
m. Metals
n. Acetaminophen overdose
o. Poisonousalcohols
p. Poisonousplants

18. Emergenciesdueto venomousbitesandstings:

a. Snakebite
b. Scorpionstings
c. Spiderbite
d. Beeandwaspstings
e. Dog bite
f. Cat bite
g. Human bite

19. INDUSTRIAL HAZARDS

a. Electrocution
b. Amputatio
c. Crush injury
d. Fall fromheight
e. Assaults

20. OBSTETRICALEMERGENCIES

a. Pre eclampsia
b. Placentapraevia
c. Post Partum Hemorrhage
d. Amnioticfluidembolism

21. MENTAL HEALTHEMERGENCIES

a. Aggressive patient
b. Suicide
c. Deliberateself-harm

22. PAEDIATRICEMERGENCIES

a. Neonatalresuscitation
b. Pediatric resuscitation
c. Assessmentofnewborn andpediatric
d. Meconiumaspiration
e. Diaphragmatichernia
f. Apnea
g. Drowning
h. SIDS (Sudden infantDeath Syndrome)
i. NeonatalSeizure
j. Febrileconvulsion
k. Shock
l. Identifying a sick child
m. Fluidresuscitationin infantsand children
n. Commonneonatal emergencies

23. PRINCIPLES OF ANAESTHESIA

a. General Anaesthesia
b. Local Anaesthesia
c. RegionalAnaesthesia

24. WOUNDSANDSUTURING

a. Typesofcommon wounds
b. Treatment
c. Cleansing thewound
d. Wound healing
e. Principlesofincision andclosure(includingsuturing)

25. BURNS

a. SkinAnatomy
b. Classificationof Burn
c. SpecialBurnconsiderations

26. FOREIGNBODY

a. Airway
b. Oesophagus
c. Ear
d. Nose
e. Subcutaneous

27. GASTROINTESTINALSYSTEM

a. Acute Appendicitis
b. Acute Pancreatitis
c. Intestinalobstruction
d. UpperGI Bleed
e. LowerGI Bleed
f. Duodenal and gastric ulcer
g. Renal colic

28. ABDOMINAL TRAUMA

a. Blunttrauma
b. Penetrating trauma

29. TORSIONTESTIS

30. PROCEDURALSKILLS

Assistinginvarious procedures like

a. Central Venous Access
b. Suturing ofWounds
c. Tracheostomy
d. IntercostalDrainage
e. Needle Thoracocentesis
f. Cricothyroidectomy
g. Needle pericardiocentesis
h. Defibrillationandcardioversion
i. IV and IO access
j. Splintingtechniques

31. EPIDEMIOLOGY

a. Aims andapproach
b. Ratesand ratios
c. MeasurmentofMortalityand morbidity
d. Epidemiologicmethods
e. Descriptiveandanalyticalepidemiology
f. Experimentalepidemiology
g. Associationandcausation
h. Usesofepidemiology
i. Infectiousdiseaseepidemiology

32. SCREENINGFORDISEASE

a. Conceptanduses
b. Critera
c. Sensitivityandspecificity

33. HEALTHINFORMATIONANDBASICMEDICALSTATISTICS

a. Sourcesofhealthinformation
b. Presentationofastatisticaldata
c. Normaldistribution
d. Sampling
e. Testsofsignificance
f. Correlation

PAPERIII

Medicalemergencies,Toxicology&Epidemiology

1. **Endocrinological Emergencies**

   Hypoglycemia

   Hyperglycemia,DKA,HONK

2. **HypersensitivityEmergencies**

   Anaphylaxis

   Anaphylacticshock

3. **ThermoregulatoryEmergencies**

   Hypothermia

   Hyperthermia

4. **Fluidsand electrolytes**
   a. Fluid administration
   b. Formulas
   c. Dehydration
   d. Fluid therapy
   e. Electrolyteimbalanceandtheirmanagement-hypoorhyperkalemia, hypo or hypernatremia, hypomagnesemia, hypocalcemia

5. **Acidbase emergencies**

   Metabolic Acidosis, Metabolic Alkalosis
   RespiratoryAcidosis,RespiratoryAlkalosis

6. **RespiratoryEmergencies**
   a. Chronicobstructivepulmonarydisease (COPD)
   b. Asthma
   c. Pneumonia,Pulmonaryedema
   d. Commonmedicationinrespiratoryproblems
   e. Meterdoseinhaler,nebulizer
   f. Mechanical ventilator

7. **GastrointestinalEmergencies**:
    a. Abdominalpain
    b. Pepticulcer disease
    c. Pancreatitis
8. **CardiovascularEmergencies:**
    a. Angina pectoris
    b. Myocardialinfarction (MI), ThrombolyticTherapy
    c. CongestiveCardiacFailure(CCF)
    d. HypertensiveEmergencies
    e. CardiacArrhythmias
    f. 12 lead ECG
    g. HeartBlock
9. **Central NervousSystem Emergencies:**
    a. Meningitis
    b. Stroke
    c. Seizures
    d. Statusepilepticus
    e. Syncope
10. **Renal(Nephrological)emergencies:**
    a. Renalfailure-Acuteand Chronic
    b. Urinarytractinfection
    c. Hematuria
11. **HaematologicalDisorders:**
    a. Redblood cell disorders:
    b. Anemia – Aplastic, Hemolytic,Hypochromic/Microcytic, Megaloblastic.Normochromicnormocytic
    c. Hemoglobinopathies(Sickle celldisease / trait,Thalassemia)
    d. Polycythemia
    e. White blooddisorders
    f. Plateletabnormalities
12. **Dermatological Emergencies:**
    a. Viralinfections:Varicella, Herpeszoster,Acuteleprosyreactions
    b. Autoimmunedisorders:Pemphigusvulgaris,Systemiclupus erythematosus
    c. Toxicdisorders:Acuteerythroderma
    d. Severepruritus,
    e. Scabies
    f. Allergic reactions

13. Toxicology:

a. Definethetermpoison
b. Thefourways inwhich apoisonmay enterthe body
c. Generalprinciplesofassessmentandmanagementofpoison and overdose
d. Opiatestoxicity
e. Organophosphates
f. Carbonmonoxide
g. Cyanide
h. Caustics
i. Coppersulphate
j. Digoxintoxicity
k. Hydrocarbons
l. Tricyclicantidepressanttoxicity
m. Metals
n. Acetaminophen overdose
o. Poisonousalcohols
p. Poisonousplants

14. Emergenciesdueto venomousbitesandstings:

a. Snakebite
b. Scorpionstings
c. Spiderbite
d. Beeandwaspstings
e. Dog bite
f. Cat bite
g. Human bite

15. MENTAL HEALTHEMERGENCIES

a. Aggressive patient
b. Suicide
c. Deliberateself-harm

16. EPIDEMIOLOGY

a. Aims andapproach
b. Ratesand ratios

c. MeasurementofMortalityand morbidity
d. Epidemiologicmethods
e. Descriptiveandanalyticalepidemiology
f. Experimentalepidemiology
g. Associationandcausation
h. Usesofepidemiology
i. Infectiousdiseaseepidemiology

17. SCREENINGFORDISEASE

a. Conceptanduses
b. Criteria
c. Sensitivityandspecificity

18. HEALTHINFORMATIONANDBASICMEDICALSTATISTICS

a. Sourcesofhealthinformation
b. Presentationofastatisticaldata
c. Normaldistribution
d. Sampling
e. Testsofsignificance
f. Correlation

19. PROCEDURALSKILLS

Assistinginvarious procedures like

a. Central Venous Access
b. Needle Thoracocentesis
c. Needle pericardiocentesis
d. Defibrillationandcardioversion
e. IV and IO access

PAPERIV

Surgicalemergencies,Trauma&Industrial Hazards

1. **GastrointestinalEmergencies**:
   - Abdominal pain
   - Bowelobstruction
   - Hernias
   - Gastrointestinalbleeding
   - Acute Appendicitis
   - Intestinal obstruction
   - Upper GI Bleed
   - LowerGI Bleed
   - Duodenal and gastric ulcer
2. **CardiothoracicEmergencies:**
   - Aortic Aneurysm
   - Aortic Dissection
   - Penetratinglunginjury
3. **CentralNervousSystemEmergencies:**
   - Sub arachnoid haemorrhage
   - Epidural haemorrhageSubdural
   - Haemorrhage Contusions
4. **Genitourinaryemergencies:**
   - Urolithiasis
   - TorsionTestis
   - Renal colic
5. **BURNS**
   - Skin Anatomy
   - Classification of Burn
   - SpecialBurnconsiderations
6. **FOREIGNBODY**
   - Airway
   - Esophagus
   - Ear
   - Nose
   - Subcutaneous

7. ABDOMINAL TRAUMA

Blunt trauma

Penetratingtrauma

8. WOUNDSANDSUTURING

Typesofcommonwounds

Treatment

Cleansingthewound

Wound healing

Principlesofincision andclosure(includingsuturing)

9. PROCEDURALSKILLS

Assistinginvariousprocedureslike

Suturing of Wounds

Tracheostomy

IntercostalDrainage

Cricothyroidectomy

Splintingtechniques

10. PRINCIPLES OF ANAESTHESIA

General Anaesthesia

Local Anaesthesia

RegionalAnaesthesia

11. INDUSTRIAL HAZARDS

Electrocution

Amputation

Crush injury

Fallfromheight

Assaults

PAPERV

Obstetric&PaediatricEmergencies

OBSTETRICALEMERGENCIES

a. Pre-eclampsia
b. Placentaprevia
c. Post-PartumHemorrhage
d. Abruptio Placenta
e. Amnioticfluidembolism

PAEDIATRICEMERGENCIES

a. Neonatalresuscitation
b. Pediatric resuscitation
c. Assessmentofnewborn andpediatric
d. Meconiumaspiration
e. Diaphragmatichernia
f. Apnea
g. Drowning
h. SIDS (suddeninfant death syndrome)
i. NeonatalSeizure
j. Febrileconvulsion
k. Shock
l. Identifying a sick child
m. Fluidresuscitationin infantsand children
n. Commonneonatal emergencies

END

➢ CARDIOCARETECHNOLOGY AND CARDIOVASCULARTECHNOLOGY

AppliedCardiovascularPathology

1. Describebriefly**thepathology&pathogenesis**ofcommon&importantcardiac diseases – i.e.
2. **Atherosclerosis**-definition,riskfactors,briefpathogenesis,briefhistopathology of plaque and its characteristics and outcomes
3. **CoronaryArteryDisease**-brief description ofpathogenesis&pathology
4. **HeartFailure** –brief pathophysiology
5. Rheumaticheartdisease –brief pathogenesis&pathology

CommonCardiovascularDiseases–

- For each ofthem –
*- abriefdescription,classificationifany,briefetiopathogenesis,**commonclinical features**; brief principles of management*
*- Cardiac**investigationsforeachofthem–includingECG,Echo,X-ray,CTscan& catheterisation findings if any;***
*- **Interventionalprocedureifany–description,indications&contraindications, preparation of patient, procedure/ technique, complications, Role of Technician***

6. Pulmonary thromboembolism&Deepveinthrombosis**(PTE&DVT)**
7. **Cardiactamponade,Constrictivepericarditis**
8. Listoutthecommon congenitalheartdiseases andclassifythem broadly.
9. **ASD, VSD, PDA, PS**– as above
10. **Tetralogy of Fallot TOF (VSD-PS)**; Ebstein's; **Eisenmenger syndrome**; TGA, TAPVC,TricuspidAtresia;TruncusArteriosus–briefdescription;Echofeatures; Cath. features if any
11. **Prosthetic Valves** – introduction, types, principles of long term follow-up of patients,AssessmentofProstheticValvesinEcho&CathLab.Roleoftechnician
12. Newer&OtherEchoTechniques–Principles,indications&BasicsofFetalEcho, Contrast Echo, Myocardial Contrast Echo, 3D Echo, Stress Echo
13. ASERecommendationsfor Echocardiographicmeasurements

CardiacCatheterisationrelated

14. Cardiac Catheterisation – **Describe various vascular accesses. Describe preparation for Femoral artery / Femoral vein / Radial artery / Subclavian vein access & Role of technician.**
15. **Pressure recording – principles, transducers, phlebostactic axis, setting up a pressure recording system,**
16. **Oximetry – techniques of oximetry, oximetry run, normal values, abnormalities of oximetry, calculation of flow & resistance**
17. **Coronay Angiography – selection of catheters for coronary angiography, common coronary anomalies, different views & interpretation, coronary artery bypass graft angiography, QCA ,complications & management ; role of technician in CAG**
18. **Contrastmaterials–types&uses;adverse effects;**
19. **LV,RV, Aorticangiography – procedure,indications. Useofpower injector**
20. Peripheral & Renal & Cerebral 4 vessel angiography – procedure, indication, contraindication
21. Coronary angioplasty – advanced techniques – principles of Rotablation, laser atherectomy, cutting balloons, IVL
22. **IVUS (intravascular ultrasound), Doppler & Pressure wires, FFR (Functional Flow Reserve), OCT (optical coherence tomography)** -principles, indications & technique for each.& role of technician
23. Peripheral&Renal& Carotidangioplasty–foreach–indications,basictechnique, Role of Technician
24. **Balloon valvotomy – principles, technique, indications & contraindications, common complications – Mitral valvotomy, Pulmonary valvotomy . role of technician**
25. **Device closure of ASD, PDA, - principles, technique, indications & contraindications, common complications. Role of technician.**
26. Basicprinciples &usesof Electrophysiological studyin cardiaccathlab
27. **Permanent pacing – principles, indications, technique, modes of permanent pacing, complications. Role of technician**
28. CRT;ICD – foreach- principles, indications, technique. Role of technician
29. Introduction toCARTO&ENSITE mapping
30. Other procedures – **pericardiocentesis,** endomyocardial biopsy, balloon atrial septostomy, **IABP,** IVC filters, Impella device, ECMO (extracorporeal membrane oxygenator)-techniqueinbrief,indications.RoleofTechnician

Othertopics

31. **Duties & responsibilities of cardiovascular technician; Ethical Issues; Professionalism. Duties in the ICU, Imaging Room, Cath Lab**
32. Medico-legalissuesfor thecardiovasculartechnician
33. BasicPrinciples of Patientsafety &Qualityassurance inCardiology
34. **Computers-Useofcomputersincardiology;Computerapplicationsforthe cardiovascular technician**
35. Intensivecareunit&recoveryroom-concept,structure&function
36. **Equipment in Cardiology – ECG machine, Echo machine, TMT system, Holter system, Cath Lab – for each - Basic structure & functioning & maintenance &trouble-shooting**
37. **Principles of Biomedicalwaste management inCardiology, ICU, Cathlab**
38. **Radiation-RadiationhazardintheCathLab–protectiveequipment, precautions, pregnancy & radiation**
39. **Use of common& emergency drugs in ICU &in CathLab**
40. Palliativecareincardiology–basicprinciples

PracticalSkills–Assistinrunningthecathlab;OperatetheCathLabsystem;Table movement & C-arm positioning; Patient monitoring in cath. Lab. Assist in basic & common cath lab procedures including right & left heart cath, Coronary Angiogram, Temporary&permanentpacing,simplecoronaryangioplasty;Recognisecommon& importantemergenciesandassistintheirmanagement;Assistinadministeringdrugs etc. in cath. Lab. Prepare report under supervision; Data storage in computer & generation of report;Data entry into excel sheet and do basic data analysis; Identify common & important lesions in angiography; Assist in QCA; Post cath care & instructions to patient; Setting up IABP;

- Tobereadinconjunctionwith the 3rdyear(1st&2ndyearsyllabi).

Paper–III

Applied Aspects of Cardiac Anatomy, Physiology, Pathology, Drugs & Some Common / Important Cardiac disorders – focus on technician related aspects (ECG,Echo,Cath,Interventions)andbriefoverviewSomeCommon/Important Cardiac Emergencies – focus on technician related aspects (recognition, emergency treatment, ECG, Echo, Interventions) Cardiac Equipment &Basic physics/ functioning & Maintenance / Troubleshooting

1) **Applied Aspects of Cardiac Anatomy, Physiology & Pathology (especially withreferencetoclinicalcardiology&investigationsincludingECG,echo,Cath lab procedures)**
Including–someexamples –
Echo anatomy of heart, Coronary artery anatomy on angiogram, Genesis of ECG waves,Bloodpressureregulation/maintenance,Atherosclerоticplaque(incl.IVUS & OCT),

2) **Applied Aspects of Common / Important Drugs in Cardiology – indications, dosage, administration, important side effects**
Including-someexamples–
Common Antiplatelets, Anticoagulants, Antihypertensives, Anti-anginals,Statins, ACEI/ARB, Beta blockers, Amiodarone, Digoxin, Adenosine, Diuretics, Inotropes, Common / Important Drugs used in cardiac emergencies
Common/Importantdrugs usedincath lab

3) **Common Cardiac disorders – their chief clinical features, ECG/Echo features, treatment principles of** – Hypertension, MI, Heart Failure,

4) **Cardiac Equipment – basic physics, functioning & maintenance** – ECG machine, Echo machine, Holter system, TMT, ICU equipment

5) **Common / Important Cardiac Emergencies & ECG/ Echo features, principles of management –**Acute MI, Acute LVF, Hypertensive crisis, Cardiac arrest, AF, VT, SVT, CHB, Shock.

AppliedCardiovascularPathology

1. Describe briefly **the pathology & pathogenesis** of common & important cardiac diseases – i.e.

2. **Atherosclerosis**-definition,riskfactors,briefpathogenesis,briefhistopathologyof plaque and its characteristics and outcomes
3. **CoronaryArteryDisease**-brief description ofpathogenesis&pathology
4. **HeartFailure** –brief pathophysiology
5. Rheumaticheartdisease –brief pathogenesis&pathology

CommonCardiovascularDiseases–

- For each of them –
- a brief description, classification if any, brief etiopathogenesis, **common clinicalfeatures**; brief principles of management
- Cardiac**investigationsforeachofthem–includingECG,Echo,X-ray,CTscan& catheterisation findings if any;**
- **Interventional procedure if any – description, indications & contraindications, preparation of patient, procedure/ technique, complications, Role of Technician**

6. Pulmonary thromboembolism&Deepveinthrombosis**(PTE&DVT)**
7. **Cardiactamponade,Constrictivepericarditis**
8. Listoutthecommon congenitalheartdiseases andclassifythem broadly.
9. **ASD, VSD, PDA, PS**– as above
10. **Tetralogy of Fallot TOF (VSD-PS)**; Ebstein's; **Eisenmenger syndrome**; TGA, TAPVC, Tricuspid Atresia; Truncus Arteriosus – brief description; Echo features; Cath. features if any
11. **ProstheticValves**–introduction,types,principlesoflongtermfollow-upofpatients, Assessment of Prosthetic Valves in Echo & Cath Lab. Role of technician
12. Newer & Other Echo Techniques – Principles, indications & Basics of Fetal Echo, Contrast Echo, Myocardial Contrast Echo, 3D Echo, Stress Echo.
13. ASERecommendationsfor Echocardiographicmeasurements.

Othertopics

14. Intensivecareunit&recoveryroom-concept,structure&function.
15. **Use of common& emergency drugs in ICU &in CathLab.**

Paper–IV

IncludesCardiac Investigations –interpreting& reportingof ECG, Echo incl. newer Echo procedures, Stress testing, Holter

Common Cath Lab proceduresComputersinCardiovascularTechnology

SomeCommon/ImportantCardiacdisorders–focusontechnicianrelated aspects (ECG, Echo, Cath, Interventions) and brief overview

Some Common / Important Cardiac Emergencies – focus on technician relatedaspects (recognition, emergency treatment, ECG, Echo, Interventions)

1) **Recognition&interpretationofabnormalitiesonECG,Echo,stresstesting& Report writing/ generation**e.g. –
ECG– MI, arrhythmia,chamberhypertrophy,artefacts,alternate ECG leads
Echo–ofcommon&importantcardiacdisorders–incl.M-mode,PW,CW,tissue doppler, TEE, etc.
Newer modesof Echoincluding StrainImaging
Conducting&InterpretingTMT, dobutamine stressecho, Holtermonitoring

2) **CathLabequipment&commonprocedures&interpretation-**Including- some examples –
Patientpreparation,Cardiaccatheterization(leftheart&rightheart),Pressure recording & normal & abnormal patterns, Oximetry (normal & abnormal), Coronary angiography – normal & abnormal, LV/ RV angiogram, Pulmonary artery angiogram, Peripheral angiogram, Digital subtraction angiography Coronary angioplasty, Pacemaker (temporary, permanent), Device closure of ASD, PDA, balloon valvotomy

3) **CommonCardiacdisorders–theirchiefclinicalfeatures,ECG/Echofeatures, treatment principles** – Coronary Artery disease, Valvular heart disease, common congenital heart diseases, etc.

4) **Emergencyinterventionalcardiacprocedures**–Principles,procedure,roleof technician, etc.
Temporarypacing,Pericardiocentesis, DCshock,Primaryangioplasty, IABP,etc.

5) **ComputersinCardiovasculartechnology –**Datastorage&retrieval.Preparing & Generating reports of various investigations. File transfer incl images, videos.

CardiacCatheterisationrelated

1. CardiacCatheterisation–Describevariousvascularaccesses.Describepreparation for Femoralartery/Femoralvein/Radialartery/Subclavianveinaccess&Roleof technician.
2. Pressure recording – principles, transducers, phlebostactic axis, setting up a pressure recording system,
3. Oximetry – techniques of oximetry, oximetry run, normal values, abnormalities of oximetry, calculation of flow & resistance
4. Coronay Angiography– selection of catheters for coronaryangiography, common coronary anomalies,differentviews&interpretation,coronary arterybypassgraft angiography, QCA ,complications & management ; role of technician in CAG
5. Contrastmaterials– types&uses;adverseeffects;
6. LV,RV, Aorticangiography– procedure, indications.Useofpower injector

7. Peripheral & Renal & Cerebral 4 vessel angiography – procedure, indication, contraindication.
8. Coronary angioplasty – advanced techniques – principles of Rotablation, laser atherectomy, cutting balloons, IVL.
9. Balloon valvotomy – principles, technique, indications & contraindications, common complications – Mitral valvotomy, Pulmonary valvotomy . role of technician.
10. Device closure of ASD, PDA, - principles, technique, indications & contraindications, common complications. Role of technician.
11. Permanentpacing–principles,indications,technique,modesofpermanentpacing, complications. Role of technician.

Othertopics

12. Computers-
    Useofcomputersincardiology;Computerapplicationsforthecardiovascular technician.

Paper–V

Includesadvanced & other cath lab procedures
SomeCommon/ImportantCardiacdisorders–focusontechnicianrelatedaspects (ECG, Echo, Cath, Interventions) and brief overview
SomeCommon/ImportantCardiacEmergencies–focusontechnicianrelated aspects (recognition, emergency treatment, ECG, Echo, Interventions)
EPSprinciples,Radiationissues,BiomedicalWastemanagement Cath
Lab functioning & maintenance
Ethicalissues for Cardiology Technicians&palliative careprinciples

1) Common / Important Cardiac disorders – their chief clinical features, ECG/Echo features, treatment principles -Arrhythmias, pericardial effusion / constriction, cardiomyopathy, tumors, Pulmonary embolism, Pulmonary hypertension,HFwithpreservedEF(diastolicheartfailure),Prostheticvalve assessment, etc.
2) Advanced & Other Procedures in Cath. Lab. – procedure, preparation of patient,indications,roleoftechnician,contraindicationsifany,complications &theirrecognition&management,e.g.–PTCA,FFR,IVUS,OCT,pacemakers & types including DDD, AID, CRT, peripheral & renal angioplasty, carotid angioplasty, TAVI, Cath study in congenital heart diseases including shunt lesions, and angiography & pressure tracing including pullback, etc.
3) Recognition & management principles & prevention of common / important complications in cath. Lab.– including local bleeding, anaphylaxis, acute kidney injury, embolism, coronary artery perforation, dissection, shock, arrhythmias, CPR, spasm, etc.
4) Newer cath lab interventional procedures & recent advances - including TAVI, Mitra clip, Rotablation, cutting balloons, IVL, OCT, IVUS, FFR.

5) BasicprinciplesofEPS.
6) Basicphysics&functioning&maintenanceofvariousequipmentinCathlab &ICU–includingcathlab,fluoroscopy&imageintensifier,imageacquisition & storage & retrieval, report writing, Quantitative coronary angiography, Impella device, ECMO, etc.
7) Radiation hazards & prevention &precautions.
8) Biomedicalwaste management in cardiology,ICU & cath lab.
9) EthicalIssues&Palliativecareprinciplesin cardiology.

CardiacCatheterisationrelated

1. IVUS (intravascular ultrasound),Doppler & Pressure wires, FFR (Functional Flow Reserve), OCT (optical coherence tomography) -principles, indications & technique for each.& role of technician.
2. Peripheral&Renal& Carotidangioplasty–foreach–indications,basictechnique, Role of Technician.
3. Basicprinciples &usesof Electrophysiological studyin cardiaccathlab
4. Permanentpacing–principles,indications,technique,modesofpermanentpacing, complications. Role of technician
5. CRT;ICD – foreach- principles, indications, technique. Role of technician
6. Introduction toCARTO&ENSITE mapping
7. Other procedures – pericardiocentesis, endomyocardial biopsy, balloon atrial septostomy, IABP, IVC filters, Impella device, ECMO (extracorporeal membrane oxygenator)-technique in brief, indications. Role of Technician

Othertopics

8. Duties & responsibilities of cardiovascular technician; Ethical Issues; Professionalism. Duties in the ICU, Imaging Room, Cath Lab
9. Medico-legalissuesfor thecardiovasculartechnician
10. BasicPrinciples of Patientsafety &Qualityassurance inCardiology.
11. EquipmentinCardiology –EC201
12. Gmachine,Echomachine,TMT system,Holter system,CathLab–for each-Basic structure & functioning & maintenance & trouble-shooting
13. PrinciplesofBiomedical wastemanagementinCardiology,ICU,Cathlab.
14. Radiation -RadiationhazardintheCath Lab –protectiveequipment,precautions, pregnancy & radiation.

Palliativecareincardiology–basicprinciples.

6.2 Principles of Accountancy

6.3 Sales, Purchase

6.4 Revenue Expenses

6.5 Profit Loss

6.6 Assets , Liabilities

6.7 Records of Accountancy

General Ledger, Cash Book, Purchase Register, Sales Register, Fixed Assets Register, Journal Register

6.8 Preparation of Accounts

Trading Accounts, Profit loss account, Income account, Expenditure account

6.9 Public Relations

Introduction, Publicity, Propaganda, Advertising , Public Relation Phases, Public Relation Methods,

Public Relations within Organisation , NGOs, Media, Customers and Hospital Agencies.

7.0 Occupational Optometry:

7.1 Introduction to Occupational Health and Safety

7.2 Visual standards and requirements in different occupations

Industries, Railways, Airlines, Army, Navy, Air Force

7.3 Occupational Ocular hazards

Mechanical, Chemical, Electrical, Radiational, Thermal

7.4 Prevention of Occupational Ocular Hazards

Vision Screening, Pre placement, Periodic

7.5 Ocular Protective Equipment

7.6 Role of Optom in Occupational Vision safety and Health

6th TERM Practical Syllabus- 120 classes

1.0 Visual Acuity Assessment

Pre Verbal Children

Pre School Children

Children with Multiple Disabilities

Children with Low Vision

Geriatrics Age Patients

2.0 Refractive Assessment in

Pre Verbal Children

Pre Children

Children with Multiple Disabilities

Children with Low Vision

Geriatrics Age Patients

3.0 Soft Toxic Lens Fitting

4.0 RGP Lenses Fitting

5.0 Contact Lens Fitting in

Children

Astigmatism

Keratoconus

6.0 Synaptophore

Exercises for Amblyopia

Supression

AIZE

7.0 Synoptophore

Estimation of BSV Grades

Angle of Deviation

Ac/A ratio

8.0 Ortho Keratology

9.0 Low Vision Aids Prescription and Training

10.0 Counselling Sessions

PAPER –III

SL. NO. TOPIC CHAPTERS TO BE COVERED

1 POSTERIOR SEGMENT

VITREOUS

RETINA

5TH SEM 1.1 – 2.10

2 NEURO EYE DISEASES 5TH SEM 3.1 – 3.2.13

3 BINOCULARE VISION AND OCULAR

MOTOR DISORDERS

5TH SEM 4.1 – 5.9.1

4 OCULAR TRAUMA 5TH SEM 10.1 – 10.6

5 OCULAR MANIFESTATIONS IN

SYSTEMIC DISEASES

6TH SEM 1.1 – 1.12

PAPER-IV

SL. NO TOPIC CHAPTERS TO BE COVERED

1 CONTACT LENS - I & CONTACT LENS - II 5TH SEM 6.1 – 6.12

2 LOW VISION AND VISUAL

REHABILITATION

5TH SEM 7.1 – 7.20

3 CLINICAL REFRACTION II &GERIATRIC

AND PAEDIATRIC OPTOMETRY

5TH SEM 8.1 – 9.4.7

PAPER-V

SL.NO. TOPIC CHAPTERS TO BE COVERED

1 PUBLIC HEALTH AND COMMUNITY OPTOMETRY 6TH SEM 2.1 – 2.19

2 BIOSTATISTICS 5TH SEM 3.0 – 3.15

3 PROFESSIONAL PRACTICE MANAGEMENT 6TH SEM 5.1 – 7.6

4 SPORTS VISION 5TH SEM 11.1 – 11.7

5 OCCUPATIONAL OPTOMETRY 6TH SEM 7.1 – 7.6

*** END ***

➢ PERFUSION TECHNOLOGY

Term 5 (3rd year) 57 classes

PAPER- III PERFUSION TECHNOLOGY CLINICAL

1. Pharmacokinetics and Pharmacodynamics of Cardiopulmonary bypass
2. Drugs (including aesthetic drugs) used in cardiopulmonary bypass
3. Conduct and monitoring of Cardiopulmonary bypass
4. Adequacy of perfusion – General considerations, specific aspects of perfusion, monitoring, other concomitants which may affect its adequacy
5. Pulsatile perfusion – Introduction, theory & physiology of pulsatile flow, hemodynamic, metabolic effects, Clinical use, haematological effects
6. Cannulation techniques during cardiopulmonary bypass
7. Termination of cardiopulmonary bypass – principles and methodology
8. Myocardial protection and cardioplegia- pre-treatment of the Myocardium, cardioplegia, hypothermia, controlled reperfusion, myocardial protection for specific clinical problems, Complications of cardioplegia. Non cardioplegic methods during cardiac surgery on cardiopulmonary bypass
9. Oxygenation – general consideration, bubble & membrane (including assessment and comparison of oxygenator function)
10. Heat exchangers-principles function of heat exchangers & their assessment. Complications related to heat exchange and their management
11. Priming fluids and hemo dilution.

Term 6 (3rd year)- 180 classes

Paper – IV Perfusion Technology – Applied

1) Blood cell trauma – analysis of forces of fluid motion, effects of physical forces o blood cell, clinical effect. Complications of blood transfusion.

2) Anticoagulation on bypass, its monitoring, its reversal and complications. Heparinless bypass. Platelet aggregation and platelet dysfunction. Coagulopathies due to cardiopulmonary bypass and its management.

3) Inflammatory response to cardiopulmonary bypass & its clinical effects. Methods to

minimise the same. Immune response, neuroendocrine, renal, metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass.

4) Blood conservation hemofiltration & dialysis during cardiopulmonary bypass including modified ultra-filtration reverse autologous priming and other methods.

5) Micro emboli- gaseous and particulate, filters used in cardiopulmonary bypass circuit.

6) Micro pore filtration during cardiopulmonary bypass

7) Counter pulsation techniques and assist devices

PAPER- V PERFUSION TECHNOLOGY ADVANCED

1. Perfusion techniques for Paediatric cardiac surgery

2. ECMO- special perfusion techniques for special cardiac surgeries and medical conditions (including thoracic aortic surgeries deep hypothermia and circulatory arrest). Perfusion for non-cardiac surgery, invasive cardiology and outside the operation suite.

3. Perfusion as a method of cardiopulmonary bypass

4. Complications and safety during cardiopulmonary bypass – bypass safety, organizational aspects, accidents, coagulopathies, mechanical and electrical failures, perfusion management, perfusion systems, safety for the perfusionist and surgical team management of perfusion accidents

5. Minimally invasive surgery and the perfusionist

6. Recent advances in perfusion techniques

7. Experimental perfusion

PRACTICAL SYLLABUS

DISEASES AND CLINICAL EVALUATION

GROSS ANATOMY AND STRUCTURAL FEATURES OF HEART

1. Location, size, surface features, venous area, septum and atrial appendage.

2. Right atrium- structural features, venous area, septum and appendage.

3. Left atrium- structural features venous area, septum and appendage.

4. Right ventricle- structural features inflow and outflow characteristics.

5. Left ventricle- structural features inflow and outflow characteristics.

6. Valves-location, structure and functions of each valve.

7. Blood supply of Heart in brief: Coronary arteries.

8. Innovation: Sympathetic and parasympathetic sensory.

GREAT VESSELS:

1. Structure of blood vessels and its organization.

2. Example: Aorta, pulmonary artery, pulmonary veins.

Advanced Perfusion Technology-

1. Calculation of PCV on CPB and amount of blood to be added to bring the PCV on CPB to

particular level

2. Interpretation and correction of a given arterial blood gas

3. Interpretation and correction of a given electrolyte abnormally

4. Calculation of body surface area

5. Performing an ACT estimation and interpretation of results

6. Setting of a dummy CPB circuit

7. Managing a simulated perfusion accident on a dummy CPB circuit including changing oxygenators when on CPB, managing falling/leaking reservoir levels, venous airlocks, air in the arterial line, cardioplegia delivery failure, increased arterial line pressure, recognition of a possible dissection, run a way pump head, recognition of heat exchanger water leak into the CPB circuit,

8. Identification of various CPB circuit components and their uses, method of sterilization and complications related to them

9. Identification of drugs and their pharmacology

10. Calculating vascular resistance on CPB and management of increased perfusion pressure on bypass

11. Adult perfusion,

12. Paediatric perfusion,

13. Assessment of patient (via history) before bypass,

14. Assessment of patient post bypass,

1 5. Calculation of prime components,

16. Selection of cannula,

17. Assembly of equipment,

18. Priming of oxygenator,

19. Going on and coming off bypass,

20. Adverse effects of CPB;
21. Assisting open heart surgeries and maintenance of log book minimum of 15 cases