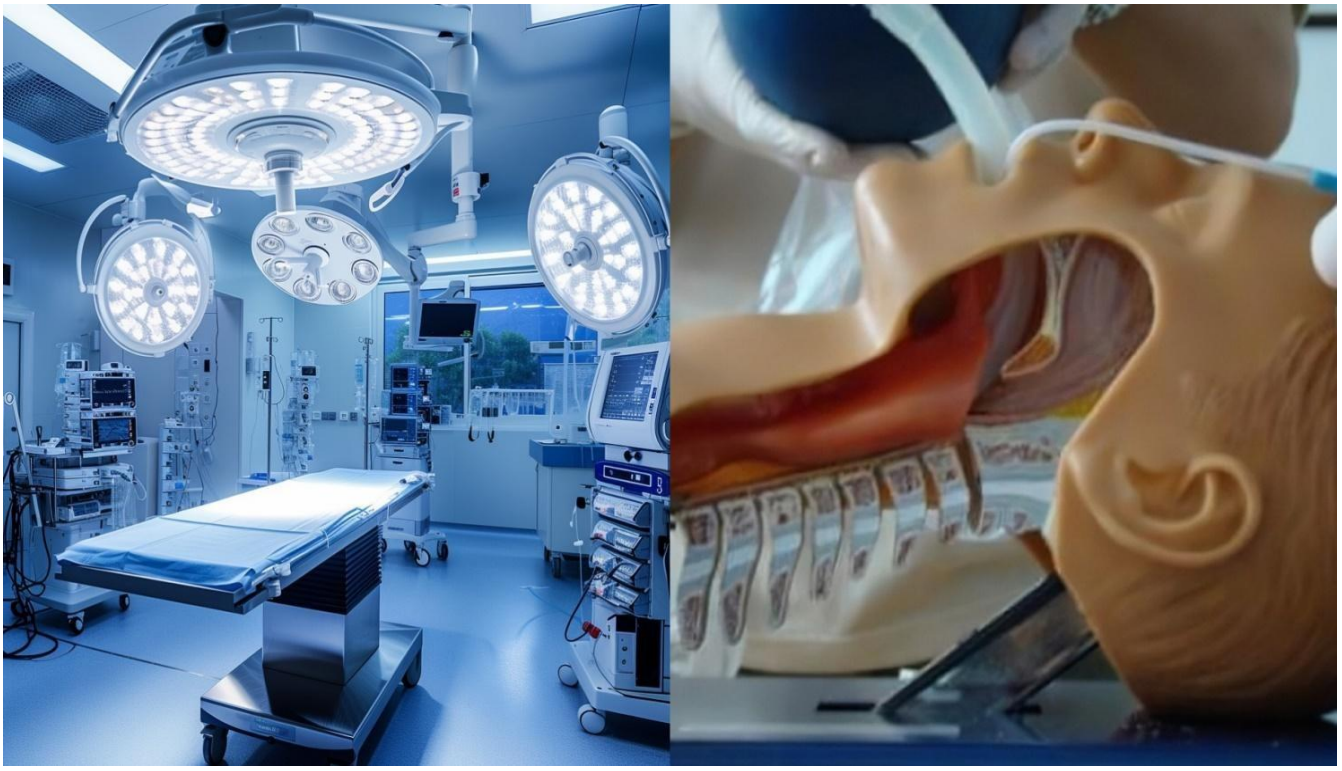
**COMPETENCY BASED CURRICULUM**

**for**

# Bachelor of Anaesthesia & Operation Theatre Technology (BAOTT)



**As per the NCAHP Act -2021**

| SEMESTER | Course Code | Course Title | Credits | Marks | | | | | Total Teaching hours | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Internal | | External | | Grand Total | | | |
| | | | | Theory | Practical | Theory | Practical | | Theory | CLP | P/D |
| 1st Semester | BAOTT-001 | Basics of Healthcare Delivery System in India | 4 | 10 | ---- | 40 | --- | 50 | 80 | ---- | …. |
| | BAOTT-002 | Medical Terminology & Record Keeping | 3 | 10 | --- | 40 | --- | 50 | 50 | ---- | …. |
| | BAOTT-003 | Anatomy | 6 | 20 | 10 | 80 | 40 | 150 | 100 | --- | 40 |
| | BAOTT-004 | Physiology | 6 | 20 | 10 | 80 | 40 | 150 | 100 | --- | 40 |
| | BAOTT-005 | Healthcare Quality & Patient Safety | 5 | 10 | 20 | 40 | 30 | 100 | 40 | --- | 60 |
| | **Total** | | **24** | | | | | **500** | **370** | **---** | **140** |
| 2nd Semester | BAOTT-006 | Medical Law & Ethics, Principles of Management | 4 | 10 | --- | 40 | --- | 50 | 60 | --- | --- |
| | BAOTT-007 | Basics of Biomedical Sciences in Surgery & Anesthesia | 3 | 10 | --- | 40 | --- | 50 | 40 | --- | 60 |
| | BAOTT-008 | Biochemistry & Hematology | 3 | 10+10 | 20 | 40+40 | 30 | 150 | 40+30 | --- | ----/30 |
| | BAOTT-009 | Pathology & Microbiology | 4 | 10+10 | --- | 40+40 | --- | 100 | 50+50 | --- | --- |
| | BAOTT-0010 | Basic Concept in Pharmacology | 2 | 10 | --- | 40 | --- | 50 | 40 | --- | --- |
| | BAOTT-0011 | Basic Computer & Information Sciences, communication& Soft Skills | 4 | 10 | 20 | 40 | 30 | 100 | 40 | --- | 60 |
| | **Total** | | **20** | | | | | **500** | **350** | **---** | **150** |
| 3rd Semester | BAOTT-012 | Basic Techniques of Anaesthesia | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-013 | Basics of Surgical Procedures | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-014 | CSSD & Manifold area | 4 | 10 | --- | 40 | --- | 50 | 50 | 100 | --- |
| | BAOTT-015 | Industrial Orientation & Industrial Visit | 2 | 10 | --- | 40 | --- | 50 | 50 | --- | --- |
| | **Total** | | **16** | | | | | **400** | **300** | **200** | **---** |
| 4st Semester | BAOTT-016 | Advanced Anesthesia Techniques | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-017 | Advanced Surgical Procedures | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-018 | Basic Intensive CARE | 4 | 10 | 20 | 40 | 30 | 100 | 50 | 100 | --- |
| | BAOTT- | Clinical Medicine & | 2 | 10 | --- | 40 | --- | 50 | 50 | --- | --- |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 019 | Management | | | | | | | | | |
| | **Total** | | **16** | | | | | **450** | **300** | **200** | **---** |
| | | | | | | | | | | | |
| **5st Semester** | BAOTT-020 | Specialized Anesthesia | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-021 | Specialized Surgery | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-022 | Recent Advances in Anesthesia & Surgical Field | 5 | 20 | --- | 80 | --- | 100 | 50 | 50 | --- |
| | BAOTT-023 | Disaster Management & Environ mental Science | 2 | 10 | --- | 40 | --- | 50 | 100 | ---- | --- |
| | **Total** | | **17** | | | | | **450** | **350** | **150** | **---** |
| | | | | | | | | | | | |
| **6st Semester** | BAOTT-024 | Specialized Anesthesia-2 | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-025 | Specialized Surgery-2 | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-026 | Specialized Anesthesia & Surgical-3 | 5 | 20 | 10 | 80 | 40 | 150 | 100 | 50 | --- |
| | BAOTT-027 | Research Methodology & Biostatistics | 2 | 10 | --- | 40 | --- | 50 | 50 | --- | --- |
| | **Total** | | **17** | | | | | **500** | **350** | **150** | **---** |
| | | | | | | | | | | | |

**Bachelor of Anaesthesia and Operation Theatre Technology (BAOTT) Semester Wise Distribution of Subjects Total Credits= 110; Total Marks=2800**

## Seventh and Eight Semesters:

| Course Code | Course Title | Time Period |
|---|---|---|
| BAOTT-028 | B. AOTT Internship (Anesthesia, Surgery, Specialties) | One Year |

# Bachelor of Anaesthesia & Operation Theater Technology (B. AOTT)

## Introduction:

**Learning Objectives:** At the completion of this course, the student should be -

- Able to help the anesthesiologist in administering anesthesia, assist in various procedures and also help in continuous monitoring of patients during surgery.
- Able to independently handle the latest technology and high end biomedical equipment in Operation Theatre
- Able to assist anesthesiologists in developing and implementing patient anesthesia care plans, including pre-operative, surgical theater, recovery room, and post-operative care procedures.
- Able to do- patient data record keeping catheter insertion, airway management , assisting the administration and monitoring of regional and peripheral nerve blockades, support therapy, adjusting anesthetic levels during surgery, peri-operative monitoring, postoperative procedures, patient education, and administrative tasks.
- Able to manage medical gases and pipeline system
- Able to assist in Intensive care unit
- Able to manage Central sterile supply department and be well versed with sterile techniques for anesthesia and surgical procedures.
- Able to assist during Disaster and emergency situations.

## 1.Eligibity for admission
## Selection Procedure

1. Minimum qualification: He/she has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks (50%) in physics, chemistry, biology (PCB) mandatory and mathematics (optional).
2. Candidates who have studied abroad and have passed the equivalent qualification as determined by the Association of Indian Universities will form the guideline to determine the eligibility and must have passed in the subjects: Physics, Chemistry, and Biology (mandatory) and Mathematics (optional) up to 12th Standard level.
3. The qualifying examination passed by FN/PIO/CIWGC students should be considered equivalent to eligibility examination by the Association of Indian Universities/Academic Council
4. He/she has to furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.
5. Admission to Bachelor of Anaesthesia & Operation Theatre Technology course shall be made on the basis of eligibility and an entrance test to be conducted for the purpose. No candidate will be admitted on any ground unless he/she has appeared in the admission test and interview.
    a. Entrance test, to be conducted by the university as per the syllabus under 10 +2 scheme of CBSE, subject-wise distribution of questions will be as 25% in Physics, 25% in Biology, 25% in Chemistry, 15% in English (Language & Comprehension) and 10% in General Awareness about health related methods.
    b. Successful candidates on the basis of written Test will be called for the interview & shall have to face an interview board. The interview board will include the Head of the Department of Surgery and/or Anesthesia (Chairman of the Board) along with other nominees, whose recommendations shall be final for the selection of the students.
    c. During subsequent counseling (s) the seat will be allotted as per the merit of the candidate depending on the availability of seats on that particular day.
    d. Candidate who fails to attend the Medical Examination on the notified date(s) will forfeit the claim for admission and placement in the waiting list except permitted by the competent authority under special circumstances.
    e. The name of the student(s) who remain(s) absent from classes for more than 15 days at a stretch after joining the said course will be struck off from the college rolls without giving any notice.

## 2. Provision of Lateral Entry:

Lateral entry to second year for allied and healthcare science courses for candidates who have passed diploma program from the Government Boards and recognized by State/Central University, fulfilling the conditions specified and these students are eligible to take admission on lateral entry system only if the same subject have been studied at diploma level.

Number of intakes: lateral entry admission must not be more than 20% of the annual intake.

A candidate with a minimum 2 years full-time diploma in Anaesthesia & Operation Theatre Technology recognized by a Government Body is eligible for lateral entry to the 3rd semester of Bachelor of Anaesthesia & Operation Theatre Technology.

**Note:** Candidates with minimum 2 years full-time diploma in Anaesthesia & Operation Theatre Technology from a recognized Government Body shall have passed „plus-two" [10+2] with Physics, Chemistry and Biology as subjects.

Eligibility of the lateral candidates based on examination conducted by NCAHP.

Foreign nationals and candidates who have qualified from a foreign University/Board should obtain permission from the NCAHP commission prior to the admission for equivalence of the qualification.

## 3. Duration of the course

Duration of the course: 4 years or 8 semesters. (2140 hours of Theory & 920 hours of Practical Classes) and 1440 hours (minimum) of internship

Total hours – 4500

## 4. Maximum period for completion of the course:

- The maximum period for completion of BAOTT is 6 years.
- If a candidate does not complete within the 6years, he/she should re-register.

## 5. Medium of instruction:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

## 6.Attendance:

A candidate has to secure minimum or as mandated by the State-

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.

A candidate having shortage of attendance shall repeat the exam when it is offered next.

**7.CONDONATION OF SHORTAGE OF ATTENDANCE;**
For valid reasons, ***5%*** relaxation of the Attendance may be considered by the College Authority.

## Teaching Tools:

The required tools to teach a course on surgical assistance and anaesthesia support may include the following:

a) Lecture Materials:

- Comprehensive lecture notes.
- Presentations and slides.
- Handouts and reading materials.

b) Demonstration Models:

- Anatomical models /simulators for demonstrating surgical techniques.
- Simulators for practicing instrument handling and airway management.

c) Surgical Instruments:

- Real surgical instruments (including laparoscopic, arthroscopic and Robotic instruments) for hands-on practice.
- Simulated instruments for familiarization.

d) Audiovisual Aids:

- Educational videos demonstrating surgical procedures.
- Interactive simulations or virtual reality tools.

e) Anesthesia Equipment:

- Anesthesia machines.
- Monitors for vital signs and anesthesia administration.
- Airway management devices.
- Intravenous equipment.

f) Sterile Technique Supplies:

- Sterile drapes.
- Surgical gowns and gloves.
- Sterile instruments and supplies.

g) Monitoring Equipment:

- Monitors for vital signs, oxygen saturation, and end-tidal carbon dioxide levels, Neuromuscular monitoring, BIS.

h) Simulation Training:

- High-fidelity patient simulators or mannequins for I.V Cannulation, Intubation, BLS & ACLS.

i) Clinical Observations:

- Opportunities to observe actual surgical procedures.
- Assistance in real-world clinical settings.
- Case Studies and Scenarios:

j) Customized case studies and scenarios for problem-solving and decision-making practice.

- Assessment Tools:

    1. Workshop, Quizzes, and written exams.
    2. Practical assessments on instrument handling, sterile technique, and Anaesthesia administration.
    3. Simulated emergency scenarios for performance evaluation.

Additionally, it is important to have a well-equipped simulation lab with appropriate infrastructure, access to clinical facilities for practical training, and safety protocols in place to ensure a conducive learning environment. Regular debriefing sessions, reflective discussions, and opportunities for students to ask questions and clarify doubts are also valuable components of the learning process.

The standalone Institutions who wish to conduct these allied health courses in Anaesthesia & Operation Theatre Technology will sign a MOU with the Hospitals/Healthcare facilities for providing practical training to the students of Anaesthesia & Operation Theatre Technology. The Hospitals/Healthcare facilities will impart practical training to the students by posting them in Operation Theatres and ICUs and other patient care areas which are essential for these students. The Number of students admitted in the Bachelor course by every hospital/ healthcare institution will not exceed by the 10% of the total bed strength of that hospital/healthcare facility with adequate numbers of Operation Theatres and ICU beds.

Method of teaching and learning-

- Lecture
- Tutorial
- Problem based learning
- Small group teaching and learning
- Continuous interactive learning
- Case-based
- Project based
- Research project- Research was considered by the group to be very important in order to keep pace with other professions and to generate a research background for our own profession.
- Seminars
- Clinical conferences
- E-learning
- Skills laboratory
- Industrial visit

**Assessment and Evaluation**

**Scheme of Evaluation**

The academic performance is assessed on the basis of both Continuous Internal Evaluation (CIE) assessment and End Semester Examination (ESE) in each semester.

ESE weightage will be in the ratio of 30 % for CIE and 70 % for ESE.

## Continuous Internal Evaluation (CIE)

- 30% of the total marks is allotted for CIE in each course.
- 50% of CIE shall be based on the average of marks obtained in two notified formative written tests. Absence without prior permission for a formative test shall result in scoring of the test as zero.
- The remaining 50% of CIE will be based on internal assessments in the form of evaluation seminars, journal club presentations, case presentations, completion of assignments etc. which will be specified in the individual course curricula.
- CIE will be conducted for theory and practical for each course wherever applicable.
- A Candidate must secure at least 40% of total marks fixed for CIE in the particular subject in order to be eligible to appear for the End Semester Examination (ESE) for that subject.

## End semester examination (ESE)

- There shall be a University Examination at the end of each semester.
- To be eligible to appear for university examination a candidate should fulfill all the following conditions
    - Undergone satisfactorily the approved program of study in the course/courses for the prescribed duration
    - 75% attendance separately in theory and in practical/hospital postings, in each course
    - Shall have the minimum attendance requirement in all courses of that semester for the first appearance
    - Secure at least 50% of total marks fixed for CIE in a particular course; and
    - Fulfill any other requirement that may be prescribed by the University from time to time.
- The End semester examination will consist of Theory examination for all courses and in addition, Practical examination for specified courses.
- Theory examination
    - Written tests with question types, pattern, duration and weightage as specified in the Course-wise curricula
    - Setting of question papers and evaluation of answer scripts as per University regulations
- Practical examination

Broad outline would be in the form of Spotters, Demonstration of equipment handling, Case based discussions.

## Criteria for pass:

A Candidate must score 50%separately in theory and practical wherever applicable to be declared as pass. In case of fail, subsequently a candidate has to appear for both theory and practical examination of the university in that particular course.

## Attendance and appearance for Exam:

Candidates not possessing required attendance in a particular course as prescribed by university will not be allowed to take up examinations and has to appear for supplementary examination whenever board conducts exam for the particular course very next time.

## Carry over benefit:

A candidate shall appear for all the subjects of that particular semester in the University examinations but failed in that semester can avail this benefit, provided:

- A candidate who fails in not more than 2 subjects in I semester is allowed to move to II semester. The candidate with back log subjects shall take both I semester backlog subjects as well as II semester subjects. The candidate with a backlog of not more than 2 subjects in II semester is allowed to go to the III semester till he/she clears all I semester subjects.
- The candidate with a backlog of not more than 2 subjects in III semester is allowed to go to the IV semester till he/she clears all II semester subjects.
- The candidate with a backlog of not more than 2 subjects in IV semester is allowed to go to the V semester till he/she clears all III semester subjects.
- The candidate with a backlog of not more than 2 subjects in V semester is allowed to go to the VI semester till he/she clears all IV semester subjects.
- Results of candidates will be declared at the end of VI semester only when the all-backlog subjects are cleared by the candidates.

Maximum attempt: No more than three attempts shall be allowed for the candidate to pass the any subjects. If he/she fails to clear the any subjects within three attempts will be considered as withdrawal of the course.

## Re-totaling:

Re-totaling of marks is permitted only for theory papers. The University/board, on application within the stipulated time and remittance of a prescribed fee, shall permit a re-totaling of marks for the course/s applied. The marks obtained after re-totaling shall be the final marks awarded.

## Supplementary Examinations:

Supplementary examination shall be conducted by the university for the benefit of unsuccessful candidates. Lower semester examinations shall be conducted by the University along with current semester examinations for the benefit of unsuccessful candidates.

- A Candidate detained for lack of attendance will be barred from appearing in any one or all course/s for the supplementary examination.
- A candidate permitted to appear for the supplementary examination can improve his internal assessment marks before he takes the supplementary examination by subjecting himself to internal assessment.

**First Semester**

| Sl. No. | Course Titles | Hours | | |
|---|---|---|---|---|
| | | Theory | Practical | Total |
| BAOTT-001 | Introduction to Healthcare Delivery System in India | 80 | 0 | 80 |
| BAOTT-002 | Medical Terminology and Record keeping (including anatomical terms) | 50 | 0 | 50 |
| BAOTT-003 | Anatomy | 100 | 40 | 140 |
| BAOTT-004 | Physiology | 100 | 40 | 140 |
| BAOTT-005 | Health Care Quality & Patient Safety | 60 | 40 | 100 |
| **TOTAL** | | **390** | **120** | **510** |

**Second Semester**

| Sl. No. | Course Titles | Hours | | |
|---|---|---|---|---|
| | | Theory | Practical | Total |
| BAOTT-006 | Medical Law and Ethics, Professionalism & Values, Principles of Management | (30+10 +30) | 0 | 70 |
| BAOTT-007 | Basics of Biomedical sciences in surgery and Anaesthesia | 40 | 60 | 100 |
| BAOTT-008 | Biochemistry & Hematology | (40+30) | (0+30) | 100 |
| BAOTT-009 | Pathology & Microbiology | (50+50) | 0 | 100 |
| BAOTT-0010 | Basic Concepts in Pharmacology | 40 | 0 | 40 |
| BAOTT-011 | Basic computers and information Science, Communication and soft skills. | 40 | 60 | 100 |
| **TOTAL** | | **360** | **150** | **510** |

**Third Semester**

| Sl. No. | Course Titles | Hours | | |
|---|---|---|---|---|
| | | Theory | Practical | Total |
| BAOTT-012 | Basic techniques of Anaesthesia | 100 | 50 | 150 |
| BAOTT-013 | Basics of Surgical procedures | 100 | 50 | 150 |
| BAOTT-014 | CSSD & Manifold Area. | 50 | 100 | 150 |
| BAOTT-015 | Industrial orientation and Industrial Visit | 60 | 0 | 60 |
| **TOTAL** | | **310** | **200** | **510** |

**Fourth Semester**

| Sl. No. | Course Titles | Hours | | |
|---|---|---|---|---|
| | | Theory | Practical | Total |

| | | | | |
|---|---|---|---|---|
| BAOTT-016 | Advanced Anaesthesia Techniques | 100 | 50 | 150 |
| BAOTT-017 | Advanced Surgical Procedures | 100 | 50 | 150 |
| BAOTT-018 | Basic Intensive Care | 50 | 100 | 150 |
| BAOTT-019 | Clinical Medicine & Related Management | 60 | 0 | 60 |
| **TOTAL** | | **310** | **200** | **510** |

**Fifth Semester**

| **Sl. No.** | **Course Titles** | **Hours** | | |
|---|---|---|---|---|
| | | **Theory** | **Practical** | **Total** |
| BAOTT-020 | Specialized Anaesthesia 1 | 100 | 50 | 150 |
| BAOTT-021 | Specialized surgery 1 | 100 | 50 | 150 |
| BAOTT-022 | Recent Advances in Anaesthesia and Surgical fields | 100 | 0 | 100 |
| BAOTT-023 | Community Medicine & Environmental Sciences | 50+60 | 0 | 110 |
| | **TOTAL** | **410** | **100** | **510** |

**Sixth Semester**

| **Sl. No.** | **Course Titles** | **Hours** | | |
|---|---|---|---|---|
| | | **Theory** | **Practical** | **Total** |
| BAOTT-024 | Specialized Anaesthesia 2 | 100 | 50 | 150 |
| BAOTT-025 | Specialized Surgery 2 | 100 | 50 | 150 |
| BAOTT-026 | Specialized Anaesthesia & Surgery 3 | 100 | 50 | 150 |
| BAOTT-027 | Research Methodology and Biostatistics | 60 | 0 | 60 |
| | **TOTAL** | **360** | **150** | **510** |

**Seventh and Eighth Semester**

| **Sl. No.** | **Course Titles** | **Hours** | | |
|---|---|---|---|---|
| | | **Theory** | **Practical** | **Total** |
| BAOTT-028 | AOTT Internship (should contain six months of Anaesthesia, six months of surgery, and at least one month of each specialty) | - | 1440 | 1440 |

**B.Sc. IN ANAESTHESIA AND OPERATION THEATRE TECHNOLOGY COURSE**

**Curriculum Outline**

**BAOTT-001: Introduction to Healthcare Delivery System in India. (80 Hours)**
**Learning Objectives**

Understanding the key features of the Indian healthcare delivery system, comparing it to other countries, evaluating community participation in healthcare, understanding the role of the private sector in healthcare, familiarizing oneself with the National Health Mission and National Health Policy, identifying issues and challenges, and exploring the background, objectives, and operations of national health programs are the learning objectives of this course. The course also covers the AYUSH medical system, India's past, present, and future health scenarios, demography, vital statistics, epidemiological concepts, disease transmission, and disease monitoring in infectious and non-communicable diseases.

## Course Outcome

The course outcomes include describing the primary, secondary, and tertiary healthcare delivery systems in India, evaluating community participation, comparing and contrasting healthcare systems in developed countries, analyzing the role of the private sector in healthcare provision, understanding the objectives, action plans, and achievements of national health programmes, analyzing the National Health Policy and its implications for healthcare delivery, identifying and annotating national health policies, and identifying and annotating national health policies.

## Introduction to National Healthcare Delivery System

The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world. Topics to be covered under the subject are as follows:

Introduction to healthcare delivery system -15 Hours

a) Healthcare delivery system in India at primary, secondary and tertiary care
b) Community participation in healthcare delivery system
c) Health system in developed countries.
d) Private Sector
e) National Health Mission
f) National Health Policy
g) Issues in Health Care Delivery System in India

National Health Programmed- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programmed. -10 Hours Introduction to AYUSH system of medicine. -15 Hours

a) Introduction to Ayurveda.
b) Yoga and Naturopathy

c) Unani
d) Siddha
e) Homeopathy
f) Need for integration of various system of medicine

Health scenario of India- past, present, and future. -5 Hours

Demography & Vital Statistics- -10 Hours

a) Demography – its concept
b) Vital events of life & its impact on demography
c) Significance and recording of vital statistics
d) Census & its impact on health policy

Epidemiology -25 Hours

a) Principles of Epidemiology
b) Natural History of disease
c) Methods of Epidemiological studies
d) Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

**BAOTT-002: Medical Terminology and Record keeping (including anatomical terms)**

**(50 Hours)**

**Medical terminologies and record keeping**

This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student‟s field of study. Spelling is critical and will be counted when grading tests.[25]Topics to be covered under the subject are as follows:

1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals.
4. Basic medical terms.
5. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
6. Interpret basic medical abbreviations/symbols.
7. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
8. Interpret medical orders/reports.
9. Data entry and management on electronic health record systems

**BAOTT-003: Anatomy** **(100 Hours)**

**Learning Objectives**

The course aims to teach basic anatomical terminology, identify bones and features of the limbs, thorax, lungs, and heart, comprehend the muscular system, investigate excretory, digestive, and nervous systems, comprehend the gastrointestinal tract, and comprehend the structure and function of the central nervous system. Students will also learn surface anatomy and radiological interpretation abilities. Understanding the relationship between the muscular system and specific actions, describing the excretory and digestive systems, explaining the structure and function of the central nervous system, and applying surface anatomy and radiology interpretation techniques are among the course outcomes.

## Basic anatomy

1. Introduction to Anatomy: Basic Anatomical terminology

    a) Osteology- -20 Hours
        - Upper limb – clavicle, scapula, humerus, radius, ulna,
        - Lower limb - femur, hipbone, sacrum, tibia, fibula &Vertebral column
    b) Thorax – Intercostal space, pleura, bony thoracic cage, ribs sternum &thoracic vertebrae - 8 Hours
    c) Lungs – Trachea, bronchial tree. - 6 Hours
2. Heart – Surface anatomy of heart, chambers of the heart, valves of the heart, and major blood vessels of heart, pericardium, and coronary arteries -10 Hours
3. Skeleton-muscular system – Muscles of thorax, muscles of upper limb(arm & fore arm) Flexor and extensor group of muscles (origin, insertion, action) -10 Hours
4. Excretory system – Kidneys, ureters, bladder. - 6 Hours
5. Digestive System: -20 Hours
    Structure and function of the digestive system
    Oral cavity and digestive enzymes
    Anatomy and function of the gastrointestinal tract
    Absorption and digestion of nutrients
    Common digestive disorders
6. Nervous System: -20 Hours
    Structure and function of neurons
    Organization of the central nervous system (brain and spinal cord)
    Peripheral nervous system and its divisions
    Cranial nerves and spinal nerves
    Basic principles of neurophysiology

Practical in Anatomy (40 Hours)

Mannequins to be provided for Teaching Osteology – Bones identification (right and left side) and prominent features and muscle attachment of the bone, clavicle, scapula, radius, ulna, humerus, femur, hip bone, sacrum, tibia, fibula.

Surface Anatomy, Organ Anatomy (Heart, Lungs, Stomach, Liver, Spleen, Kidney, Urinary tract, Testis, Female reproductive organs), Radiology, and X-ray Chest PA view.

**BAOTT-004: Physiology (100 Hours)**

**Learning Objectives**

Learn about cellular physiological processes, blood composition and functions, cardiovascular, respiratory, excretory, reproductive, central nervous, endocrine, gastrointestinal tract, vital signs, electrocardiogram interpretation, and respiratory examinations. Learn how to take vital signs, interpret electrocardiograms, and do respiratory tests. Learn about the activities of the central nervous system and the endocrine system, as well as the physiological architecture of the gastrointestinal tract.

## Physiology

The Cell: -8 Hours

a) Acid base balance and disturbances of acid base balances (Alkalosis, Acidosis)

The Blood: - 10 Hours

a) Composition of Blood, functions of the blood and plasma proteins, classification and protein, Blood Cascade, Bleeding and Clotting time.
b) Pathological and Physiological variation of the RBC.
c) Function of Haemoglobin.
d) Erythrocyte Sedimentation Rate.
e) Detailed description about WBC-Total count (TC), Differential count (DC) and functions.
f) Platelets – formation and normal level and functions.
g) Blood groups and Rh factor.

Cardio-Vascular System: - 15 Hours

a) Physiology of the heart.
b) Heart sounds.
c) Cardiac cycle, Cardiac output.
d) Auscultation
e) Arterial pressures, blood pressure.
f) Hypertension.
g) Electro cardiogram (ECG.)

Respiratory system: - 10 Hours

a) Respiratory ventilation
b) Oxygenation
c) Definitions and Normal values of Lung volumes and Lung capacities.

Excretory system: - 10 Hours

a) Renal System:
b) Urine volume and specific gravity measurements
c) Renal function tests, including assessment of glomerular filtration rate (GFR)
d) Analysis of renal tubular function
e) Study of renal handling of electrolytes and water
f) Assessment of acid-base balance and renal regulation of pH.

Reproductive system: - 8 Hours

a) Formation of semen and spermatogenesis.
b) Brief account of menstrual cycle.

Central Nervous system: -9 Hours

a) Functions of CSF.

Endocrine system: - 10 Hours

a) Functions of the pituitary, thyroid, parathyroid, adrenal and pancreatic Hormones.

Digestive system: - 10 Hours

a) Physiological Anatomy of the GIT.
b) Food Digestion in the mouth, stomach, intestine
c) Absorption of foods
d) Role of bile in the digestion.

Special Senses: - 10 Hours

- Vision testing and assessment of visual acuity
- Auditory tests and assessment of hearing function
- Study of taste and olfaction perception
- Analysis of vestibular system and balance control
- Assessment of proprioception and kinesthetic sense

**Practical in Physiology** (40 Hours)

a) Determination of Blood Groups.
b) Vital signs measurement: Students can learn how to measure and interpret vital signs, including blood pressure, heart rate, respiratory rate, and body temperature. This may involve using instruments such as sphygmomanometers, stethoscopes, and thermometers.
c) Electrocardiography (ECG): Students can practice performing and interpreting electrocardiograms to study the electrical activity of the heart. This may involve placing electrodes on the body to record the ECG waveform and analyzing abnormalities.
d) Spirometry: Students can learn how to perform spirometry tests to measure lung function. This involves using a spirometer to assess parameters such as tidal volume, vital capacity, forced expiratory volume, and peak expiratory flow rate.
e) Examination of Respiratory system to count respiratory rate and measure inspiration and respiration.

**BAOTT-005: Health Care Quality & Patient Safety (60 Hours)**

## Learning Objectives

Learn essential life support and emergency care procedures, such as vital sign and primary assessment, infection prevention and control principles, and recognizing prevalent healthcare-associated infections. Identify and implement infection prevention and control methods, as well as enhance environmental safety through biomedical waste management. Proficiency in BLS procedures, accurate vital sign assessment, infection prevention and control, and environmental safety through biomedical waste management practices are among the course outcomes.

Quality assurance and management, antibiotic resistance, disaster readiness, and disaster preparedness are among the learning objectives. Understanding the core concepts of care quality, approaches to improvement, standards, and instruments for improving healthcare procedures are all part of quality assurance. Antibiotic resistance is an increasing concern in healthcare settings, with a variety of forms, trends, and tactics required to effectively combat it. Principles and strategies for antimicrobial stewardship are also discussed. Understanding psychological effect management, resource management, readiness and risk reduction concepts, critical response functions, institutional procedures, and the importance of information management in coordinating and communicating during catastrophes are all part of disaster preparedness and management.

The course covers four key areas of healthcare management: quality assurance and management, antibiotic resistance, disaster preparedness and management. Students will learn to apply quality of care concepts, implement quality improvement approaches, adhere to standards, and use tools to identify areas for improvement. They will also understand the significance of NABH guidelines and their role in promoting quality and patient safety in healthcare organizations.

Antibiotic resistance is addressed by understanding the historical context, factors contributing to its spread, different types of resistance, monitoring trends, advocating for actions and policies, and implementing antimicrobial stewardship practices. Disaster preparedness and management involves applying emergency management principles, managing the psychological impact, managing resources efficiently, developing preparedness plans, coordinating key response functions, contributing to recovery, rehabilitation, and reconstruction efforts, and utilizing information management systems for effective communication and coordination during disasters.

## Basics of emergency care and life support skills. (25 Hours)

Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. The student is also expected to learn about basic emergency care including first aid and triage. Topics to be covered under the subject are as follows:

a) Vital signs and primary assessment
b) Basic emergency care – first aid and triage
c) Ventilations including use of bag-valve-masks (BVMs)
d) Choking, rescue breathing methods
e) One- and Two-rescuer CPR
f) Using an AED (Automated external defibrillator).
g) Managing an emergency including moving a patient

At the end of this topic, focus should be to teach the students to perform the maneuvers in simulation lab and to test their skills with focus on airways management and chest compressions. At the end of the foundation course, each student should be able to perform and execute/operate on the above-mentioned modalities.

## Infection prevention and control. (15 Hours)

The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes. Concepts taught should include –

a) Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
b) Prevention & control of common healthcare associated infections,
c) Components of an effective infection control program, and
d) Guidelines (NABH and JCI) for Hospital Infection Control

## Bio medical waste management and environmental safety. (8 Hours)

The aim of this section will be to help prevent harm to workers, property, the environment, and the public. Topics to be covered under the subject are as follows:

a) Definition of Biomedical Waste
b) Waste minimization
c) BMW – Segregation, collection, transportation, treatment and disposal (including color coding)
d) Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
e) BMW Management & methods of disinfection
f) Modern technology for handling BMW
g) Use of Personal protective equipment (PPE)
h) Monitoring & controlling of cross infection (Protective devices)

## Quality assurance and management. (12 Hours)

The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system.

a) Concepts of Quality of Care
b) Quality Improvement Approaches
c) Standards and Norms
d) Quality Improvement Tools
e) Introduction to NABH guidelines

## Second Semester

### BAOTT-006: Medical Law and Ethics, Professionalism & Values, Principles of Management (70 Hours)

**Learning Objectives**

This course delves into the legal and ethical issues that arise in medical practice. Medical ethics, confidentiality, informed consent, euthanasia, organ transplantation, medico-legal implications of medical data, and professional indemnity insurance are among the topics covered.

The professionalism module emphasizes the significance of professionalism in the healthcare system and its impact on the patient environment. It addresses professional values like integrity, objectivity, competence, confidentiality, ethical or moral values, attitude and behavior, code of conduct, professional accountability, responsibility, misconduct, differences between professions, team efforts, and cultural issues in the healthcare setting. The programme emphasizes the value of collaboration and adhering to ethical norms in the healthcare system.

This course focuses on management principles and functions in a variety of situations, including healthcare organizations. Planning, organizing, directing, controlling, motivation, communication, leadership, coordination, human management, financial management, and healthcare technology management are among the themes covered.

### Medical law and ethics (30 Hours)

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society‟s legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.[26]

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, behavior, and attempting to resolve the ethical problems that arise in practice" Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

a) Medical ethics – Definition – Goal – Scope
b) Introduction to Code of conduct
c) Basic principles of medical ethics – Confidentiality
d) Malpractice and negligence – Rational and irrational drug therapy
e) Autonomy and informed consent – Right of patients
f) Care of the terminally ill- Euthanasia
g) Organ transplantation

h) Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC – ownership of medical records – Confidentiality Privilege communication – Release of medical information – Unauthorized disclosure – retention of medical records – other various aspects.
i) Professional Indemnity insurance policy
j) Development of standardized protocol to avoid near miss or sentinel events.
k) Obtaining an informed consent.

**Professionalism and values.** **(10 hours)**

The module on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant is professionalism in terms of healthcare system and how it affects the overall patient environment.

Professional ethics act (2002)

- Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
- Personal values- ethical or moral values
- Attitude and behavior- professional behavior, treating people equally.
- Code of conduct, professional accountability and responsibility, misconduct
- Differences between professions and importance of team efforts
- Cultural issues in the healthcare environment

**Principles of Management** **(30 Hours)**

**i) Principles of Management** - 20 Hours

a) Development of Management: Definitions of Management – Contributions of F.W. Taylor, Henry Fayol, and others.
b) Functions of Management: Planning – Organizing – Directing – Controlling Planning: Types of planning – Short–term and long plans – Corporate or Strategic Planning – Planning premises – Polices – Characteristics and sources – principles of policy making – Strategies as different from policies – Procedures and methods– Limitations of planning.
c) Organizing: Importance of organization – Hierarchy – Scalar chain – Organization relationship – Line relationship – Staff relationship – Line staff relationship – Functional relationship – Committee organization – Management committees – Depart mentation.
d) Motivation: Motivation theories – McGregor‟s theory X and theory Y – Maslow‟s and Herzberg‟s theory – Porter and Lawler model of complex view of motivation– Other theories – Diagnostic signs of motivational problems – Motivational Techniques.
e) Communication: Types of communication – Barriers of effective communication– Techniques for improved communication.

f) Directing: Principles relating to Direction process – Principles and theories of leadership – Leadership Styles – Delegation of authority. Controlling: Span of control – Factors limiting effective span of control – Supper management, General managers, Middles managers and supervisors – Planning and controlling relationships – Management control process – Corrective measures– Strategic control points – Budgetary control – Types of budgets.

g) Co-ordination: Co-ordination and co-operation – Principles of co-ordination – Techniques of co-ordination charts and records – Standard procedure instructions.

h) Acts: CPA Act (1986 & 2019), BMW Act (1998,2016), Drugs Act(1940), IMC Act(1956), Patient Privacy – IT Rules, 2011

i) Medical Malpractice sections: - 304A, 337 and IPC 1860.

**ii) Personnel management:** - 5 Hours

Objective of Personnel Management – Role of Personnel Manager in an organization – Staffing and work distribution techniques – Job analysis and description – Recruitment and selection processes – Orientation and training – Coaching and counseling – disciplining – Complaints and grievances – Termination of employees – Performance appraisal – Health and safety of employees – Consumer Protection Act as applicable to health care services.

**iii) Financial management:** -5 Hours

Definition of financial Management – Profit maximization – Return maximization– wealth maximization – Short term Financing – Intermediate Financing – Long term Financing – leasing as a source of Finance – cash and Security Management – Inventory Management – Dividend policies – Valuations of Shares – Financial Management in a hospital – Third party payments on behalf of patients. Insurance – health schemes and policies.

**BAOTT-007: Basics of Biomedical sciences in surgery and Anaesthesia (40 Hours)**

## Learning Objectives

This course introduces biomedical engineering principles and technology in the realms of surgery and anaesthesia. It discusses surgical and anaesthesia devices, biomedical imaging, surgical navigation and guidance systems, anaesthesia delivery and monitoring, healthcare technology management, and ethical and legal issues in biomedical engineering.

This course contains following modules:

- Introduction to Biomedical Engineering in Surgery and Anaesthesia. -4 Hours
- Surgical and Anesthesia Devices (OT Table, OT light, Infusion Pumps, TCA pumps, Video Laryngoscopes, Bronchoscopes, Diathermy, Drills, Coagulation devices like E.S. U‟s, LASER, Ultrasonic devices, RF Devices and Harmonic Scalpels, 12 Lead ECG), and Physical laws behind Transducer7, EtCO2 monitor, Pulse oximeter, Blood pressure monitor. - 15 Hours
- Surgical Microscope. - 2 Hours

- Laparoscopic cart (including various scopes), Veress needle, Trocars, and various instruments. - 2 Hours
- Biomedical Imaging in Surgery and Anaesthesia. - 6 Hours
    - Principles and technologies of medical imaging (e.g., X-ray, computed tomography, magnetic resonance imaging) Image-guided surgical procedures and interventions
    - Image processing and analysis techniques for surgical planning and intraoperative guidance
    - Advances in real-time imaging and its integration into surgical and Anaesthesia workflows
- Surgical Navigation and Guidance Systems. - 2 Hours
    - Principles of surgical navigation systems and their applications
    - Use of imaging, tracking, and registration techniques in surgical navigation.
- Anesthesia Delivery and Monitoring. - 9 Hours
    - Anaesthesia machines and delivery systems
    - Design and development of Anesthesia monitoring devices.
    - Physiological monitoring parameters and their interpretation during Anesthesia
    - Advances in Anesthesia technology, such as closed-loop Anaesthesia delivery systems.

**BAOTT-008 Biochemistry & Haematology (40+30 Hours)**

## Bio-chemistry (40 Hours)

- Vitamins & Minerals: Fat soluble vitamins (A, D, E, K) – Water soluble vitamins – B-complex vitamins- principal elements (Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine, and sulfur)- Trace elements – Calorific value of foods – Basal metabolic rate (BMR) – respiratory quotient (RQ). - 30 Hours
- Acids and bases: Definition, pH, Henderson – Hassel Balch equation, Buffers, Indicators, Normality, Molarity, Molality. - 10 Hours

## Hematology (30 Hours)

- Hemoglobin, blood cell counts, differential count - 5 Hours.
- Anemia, polycythemia - 5 Hours
- Thrombocytopenia - 5 Hours
- Coagulation parameters- BT, CT, PT, INR, APTT - 5 Hours
- Coagulation disorders. - 5 Hours
- Blood transfusion-hazards and complications - 5 Hours

## Practical (Hematology) (40 Hours)

- Phlebotomy
- CBC
- RBO Typing
- Cross Matching of blood

**BAOTT-009: Pathology & Microbiology (50+50 Hours)**

## Learning Objectives

This course introduces students to the fundamentals of pathology, and microbiology. injury, inflammation, immunity disorders, infectious diseases, neoplasia, environmental and nutritional disorders, morphology and growth of microorganisms, culture media, sterilization and disinfection, immunology, systematic bacteriology, parasitology, mycology, and virology are among the topics covered.

## Pathology

a) Cellular adaptation, Cell injury & cell death. - 17 Hours

- Introduction to pathology.
- Overview: Cellular response to stress and noxious stimuli. Cellular adaptations of growth and differentiation.
- Overview of cell injury and cell death.
- Causes of cell injury. Mechanisms of cell injury.
- Reversible and irreversible cell injury.
- Examples of cell injury and necrosis.

b) Inflammation. -8 Hours

- General features of inflammation Historical highlights
- Acute inflammation
- Chemical mediators of inflammation Outcomes of acute inflammation Morphologic patterns of acute inflammation Summary of acute inflammation
- Chronic inflammation

c) Immunity disorders. - 6 Hours

- General features of the immune system Disorders of the immune system

d) Infectious diseases. - 6 Hours

- General principles of microbial pathogenesis viral infections.
- Bacterial infections-Rheumatic heart disease.
- Fungal infections.
- Parasitic infections.

e) Neoplasia. - 5 Hours

- Definitions Nomenclature.
- Biology of tumor growth benign and malignant neoplasms Epidemiology.
- Carcinogenic agents and their cellular interactions Clinical features of tumors.

f) Environmental and nutritional disorders. - 8 Hours

- Environmental and disease.
- Common environmental and occupational exposures Nutrition and disease.
- Coronary artery disease.

## Clinical Microbiology (50 Hours)

a) Morphology - 6 Hours

- Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.

b) Growth and nutrition. - 4 Hours

- Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.

c) Culture media. - 4 Hours

- Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test.

d) Sterilization and Disinfection. - 2 Hours

- Principles and use of equipment of sterilization namely hot air oven, autoclave, and serum inspissator, pasteurization, antiseptic and disinfectants.

e) Immunology. - 6 Hours

- Immunity, vaccines, types of vaccine and immunization schedule, principles, and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA.
- Rapid tests for HIV and HBsAg (excluding technical details).

f) Systematic Bacteriology. - 10 Hours

- Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (excluding classification, antigenic structure, and pathogenicity),
- Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, E. coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes.

g) Parasitology. - 6 Hours

- Morphology, life cycle, laboratory diagnosis of following parasites: E. histolytica, Plasmodium, tape worms, Intestinal nematodes.

h) Mycology. - 6 Hours

- Morphology, diseases caused and lab diagnosis of following fungi. Candida, Cryptococcus, Dermatophytes, opportunistic fungi

i) Virology. -6 Hours

- General properties of viruses, diseases caused lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.

**BAOTT-010 Basic Concepts in Pharmacology (40 Hours)**

## Learning Objective

This course provides an overview to pharmacology. It discusses several medication classes, their modes of action, indications, contraindications, adverse effects, and interactions.

## Clinical pharmacology

a) Introduction to Pharmacology. - 2 Hours
b) Pharmacokinetic & Pharmacodynamics & routes of drugs administration - 3 Hours
c) NSAIDs Drugs. -3 Hours
d) Ant sialagogues: Atropine, Glycopyrrolate. - 4 Hours
e) Sedatives *I* Anxiolytics: Diazepam, Midazolam, Phenergan, Lorazepam, Chlorpromazine, and Tricolors. - 4 Hours
f) Narcotics: Morphine, Pethidine, Fentanyl, Pentazocine, tramadol. - 2 Hours
g) Antiemetic"s: Metoclopramide, Ondansetron, Dexamethasone - 2 Hours
h) Induction Agent: Thiopentone, Diazepam, Midazolam, Ketamine, Propofol, Etomidate. - 4 Hours
i) Muscle Relaxants: Depolarizing - Suxamethonium, Non depolarizing - Vecuronium, Atracurium, rocuronium. - 4 Hours
j) Inhalational Gases: Gases-02, N20, Air, Agents-Ether ,Halothane, Isoflurane, Sevoflurane, Desflurane - 2 Hours
k) Reversal Agents: Neostigmi*ne,* Glycopyrrolate, Atropine, Naloxone, Flumazenil (Diazepam). - 2 Hours
l) Local Anesthetics: Xylocaine, Bupivacaine - Topical, Prilocaine-jelly, Emla -

Ointment, Etidocaine. Ropivacaine. - 3 Hours

m) Emergency Drugs : Mode or administration, dilution, dosage and effects - 12 Hours

- Adrenaline, Atropine
- Ephedrine, Mephentermine
- Bicarbonate, calcium, potassium.
- Inotropes: dopamine, dobutamine, amiodarone
- Aminophylline, hydrocortisone, antihistaminic,
- Antihypertensive –Beta-blockers, Ca-channel blockers.
- Antiarrhythmic- xylocard
- Vasodilators- nitroglycerin & sodium nitroprusside
- Respiratory system- Bronchodilators
- Renal system- Diuretics, frusemide, mannitol

**BAOTT-011 Basic computers and information Science, Communication, and soft skills. (40 Hours)**

Learning Objectives

This course exposes students to computer technology, including topics such as computer organization, operating systems, software applications (MS Word, Excel, and PowerPoint), computer networks, internet applications, and computer use in healthcare settings. It also includes fundamental language and communication skills such as grammar, business communication, writing techniques, and oral presentations

Basic computers and information science - 24 Hours

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation. Topics to be covered under the subject are as follows:

a) Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
b) Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).
c) Processor and memory: The Central Processing Unit (CPU), main memory.
d) Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
e) Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

f) Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
g) Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
h) Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
i) Introduction of Operating System: introduction, operating system concepts, types of operating system.
j) Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
k) Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
l) Application of Computers in clinical settings.

Practical on fundamentals of computers - 30 Hours

- Learning to use MS office: MS word, MS PowerPoint, MS Excel.
- To install different software.
- Data entry efficiency

## Practical Topics:

This would involve hands-on training in computer systems and software applications. This includes learning about computer hardware components and their functions, input and output devices, processor and memory management, and storage devices.

Practical sessions can be conducted on operating systems such as MS Windows, with a focus on navigating the desktop, managing files and folders, and working with windows and shortcuts.

Students should also gain proficiency in using MS Word for document creation and formatting, MS Excel for data entry and manipulation, and MS PowerPoint for creating and delivering presentations.

Additionally, practical exercises on computer networks and internet applications, including email, file transfer, and web browsing, can be provided to enhance their understanding of computer usage in clinical settings.

## Communication and soft skills

Major topics to be covered under Communication course: - 16 Hours

- Basic Language Skills: Grammar and Usage. - 2 Hours
- Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation. - 2 Hours
- Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization. - 4 Hours
- Basic concepts & principles of good communication - 2 Hours
- Special characteristics of health communication - 2 Hours
- Types & process of communication - 2 Hours
- Barriers of communication & how to overcome - 2 Hours

**Practical in Communication & Soft Skills – 30 Hours**

In terms of communication and soft skills, practical topics should aim to develop effective communication abilities for interacting with patients and healthcare professionals.

This can involve exercises in grammar and language skills, emphasizing business communication and spoken communication through conversations, discussions, and short presentations.

Practical sessions on various writing formats such as letters, emails, reports, and case studies should be included, focusing on proper organization and clarity.

Students should be taught the principles of good communication, including the special characteristics of health communication, and strategies for overcoming communication barriers. Role-playing scenarios and simulated patient interactions can also be incorporated to enhance their communication skills in a healthcare context.

## Third Semester

**BAOTT-012 Basic techniques of Anaesthesia (100 Hours)**

**Learning Objectives**

The learning objectives are designed to provide a thorough grasp of the significance of preoperative assessment and patient preparation in assessing Anaesthesia risks and planning appropriate care. The design, components, and performance of the anaesthesia machine, safety systems, fluid management strategies, emergency drugs, anaesthetic induction and airway management procedures, and airway devices are all covered in this course. It also discusses the principles of balanced anaesthesia, the administration of inhalation and intravenous anaesthetics, vital sign monitoring techniques, depth of anaesthesia, and oxygenation.

The training also delves into pain management and analgesia techniques such as systemic analgesics, regional anaesthesia, and patient-controlled analgesia. It also discusses anaesthetic considerations for typical general surgical operations as well as challenges in obstetric and gynaecological surgery. The course outcomes include demonstrating proficiency in conducting preoperative assessments, operating the Anaesthesia machine effectively and safely, implementing safety systems, implementing appropriate perioperative fluid management strategies, registering and managing emergencies, performing anaesthetic induction and airway management, demonstrating knowledge of pre-medication, pre-oxygenation, induction agents, intubation and reversal agents, vaporizers, , and demonstrating knowledge of vaporizers.

### Basics Techniques of Anesthesia

a) Preoperative assessment and patient preparation: Understanding the importance of preoperative evaluations, patient history, and physical examinations to assess Anaesthesia risks and plan appropriate care. - 10 Hours
b) Anesthesia Machine: Design, Components, and Functionality. - 5 Hours
c) Safety systems in Anesthesia machine. Flow systems, CO2 Absorbents, Circuit types, Humidification devices. - 5 Hours
d) Perioperative Fluid Management: Strategies and Considerations. (Crystalloids and Colloids). - 5 Hours
e) Perioperative Emergency Medications: Indications, Administration, and Management – 5 Hours
f) Anesthetic induction and airway management: Learning about various induction techniques, airway devices, and strategies for maintaining a patent airway during surgery. - 10 Hours
g) Brief Idea about Premedication, Pre oxygenation or denitrogenating, Induction and inducing agents, Sellick‟s maneuverer, Vaporizers, Principles and types, Intubation, and reversal agents. - 10 Hours
h) Maintenance of Anesthesia and monitoring: Understanding the principles of balanced Anaesthesia, administration of inhalation and intravenous anaesthetics, and monitoring techniques for vital signs, depth of Anaesthesia, and oxygenation. - 10 Hours

i) Pain management and analgesia: Exploring different methods of perioperative pain management, including systemic analgesics, regional Anaesthesia, and patient-controlled analgesia. - 10 Hours

j) Anesthetic considerations for common general surgical procedures: Studying the specific Anaesthesia considerations, techniques, and challenges associated with general surgical procedures like appendectomy, cholecystectomy, hernia repair, and laparotomy. - 10 Hour

k) Anesthetic considerations for obstetric and gynaecological surgeries: Learning about the unique challenges and considerations for providing Anaesthesia during labor and delivery, caesarean section, gynaecological surgeries, and management of obstetric emergencies. - 10 Hours

l) Management of Anesthesia-related complications: Understanding the recognition and management of potential complications and adverse events related to Anaesthesia, including cardiovascular, respiratory, and allergic reactions. - 10 Hours

**Practical or Clinical posting topics: (50 Hours)**

- Preoperative assessment and patient preparation include performing simulated preoperative assessments such as history taking and physical tests.
- Using patient features to stratify risk and make decisions for anesthesia treatment.
- Anesthesia machine and safety systems: Familiarization with the components and functionality of an anaesthesia machine through hands-on experience.
- Regional anesthesia procedures: Training in various regional anaesthesia techniques, such as peripheral nerve blocks and epidurals, using simulation.
- Management of anesthesia-related complications
- Simulation of anesthesia-related problems such as airway obstruction, hypotension, and allergy through role-playing.

**BAOTT-013 Basics of Surgical procedures (100 Hours)**

Learning Objectives

Understanding the operation theatre layout, WHO checklist, carbolization, and fumigation processes, as well as the concepts, indications, and techniques of typical general surgical procedures, are the learning objectives. They must also use aseptic technique and maintain a sterile field. Appendicitis, hernias, cholecystitis, gastrointestinal cancers, and peptic ulcer disease are among the diseases covered in the course, as are ectopic pregnancy, pelvic inflammatory disease, endometriosis, fibroids, ovarian cysts, and cervical and ovarian cancers.

The course outcomes include demonstrating understanding of the operation theatre layout, WHO checklist, carbolization, and fumigation procedures, effectively applying principles, indications, and techniques, identifying, and managing diseases in general surgical practice, managing diseases in obstetric/gynecologic practice, applying appropriate incision and wound closure techniques, recognizing and handling surgical instruments, and implementing site infection prevention and control. The learning objectives aim to provide a comprehensive understanding of general surgical procedures, obstetric/gynecologic procedures, and patient

positioning requirements.

Basics of Surgical procedures

- Layout of Operation Theatre, WHO Checklist, Carbolization and Fumigation: - 10 Hours
- Introduction to general surgical procedures: Understanding the principles, indications, and techniques of common general surgical procedures, such as appendectomy, cholecystectomy, and hernia repair. - 10 Hours
- Principles of aseptic technique and sterile field management: Spaulding‟s Classifications of zones. Learning the importance of maintaining a sterile environment in the operating room, including proper hand hygiene, gowning, gloving, and sterile draping techniques. - 10 Hours
- Diseases in General Surgical Practice: Appendicitis, Hernias, cholecystitis, Gastrointestinal (GI) Cancers, Peptic Ulcer Disease. - 10 Hours
- Diseases in Obstetric/ Gynecologic Practice: Ectopic Pregnancy, Pelvic Inflammatory Disease (PID), Endometriosis, Fibroids, Ovarian Cysts, Cervical and Ovarian Cancer - 10 Hours
- Incision and wound closure techniques: Studying various surgical incision types, wound closure methods (such as sutures, staples, and adhesive tapes), and wound dressing principle -10 Hours
- Surgical instrument identification and handling: Familiarizing with surgical instruments commonly used in general surgery and obstetrics and gynecology, and understanding their functions, proper handling, and maintenance. - 10 Hours
- Surgical site infection prevention and control: Exploring strategies and protocols to minimize the risk of surgical site infections, including preoperative skin preparation, antimicrobial prophylaxis, and aseptic practices. - 10 Hours
- Anesthesia considerations and patient positioning in general surgery: Understanding the specific Anaesthesia considerations and patient positioning requirements for general surgical procedures to optimize patient safety and surgical outcomes. - 10 Hours
- Common general surgical procedures in obstetrics and gynecology: Studying the specific surgical procedures performed in obstetrics and gynecology, such as caesarean section, hysterectomy, and ovarian cystectomy, and their related considerations - 10 Hours

Practical / Clinical Postings topics: (50 Hours)

- Operation Theatre Layout and WHO Checklist: A guided tour of an operating theatre, covering the layout, equipment organization, and separate zones (sterile and non-sterile).
- Using the WHO Surgical Safety Checklist to demonstrate preoperative, intraoperative, and postoperative checklist components.
- Suturing materials and suturing techniques will be demonstrated.
- Scenarios were created to emphasize the need to keep a sterile area and avoid contamination during surgical procedures. Gloving, Gowning and Draping Techniques.
- Identification and uses of surgical instruments.

- Anesthesia and patient positioning: Demonstration and practice of patient positioning techniques for general surgical operations, considering patient safety, accessibility, and the demands of the surgeon.
- Simulations of communication and coordination between anaesthesia providers and surgical team members during patient placement.

**BAOTT-014 CSSD & Manifold Area (50 Hours)**

**Learning Objectives**

The Central Sterile Services Department (CSSD) is responsible for infection control as well as the provision of sterile tools and equipment. It entails a variety of sterilization techniques, decontamination processes, and instrument preparation and packaging techniques. In addition, the department oversees sterile storage and distribution, which includes inventory control, first-in-first-out processes, and proper labeling and paperwork. Quality assurance and control procedures are put in place, such as monitoring sterilization processes and guaranteeing standard compliance. Hand hygiene, personal protective equipment use, aseptic procedures, and cross-contamination prevention are also addressed as infection control practices.

Procedures for equipment maintenance and troubleshooting are also provided. Overall, the CSSD is critical to the safety and effectiveness of its operations.

**CSSD Procedures**

i. Introduction to Central Sterile Services Department (CSSD): Understanding the role and importance of CSSD in maintaining infection control and providing sterile instruments and equipment for surgical procedures. -3 Hours
j. Sterilization methods: Exploring various sterilization methods used in CSSD, such as steam sterilization (autoclaving), ethylene oxide (ETO) sterilization, hydrogen peroxide plasma sterilization, and chemical sterilization. - 10 Hours
k. Decontamination processes: Learning about the decontamination procedures involved in CSSD, including manual cleaning, mechanical cleaning (using ultrasonic cleaners), and enzymatic cleaning. - 4 Hours
l. Instrument preparation and packaging: Understanding the proper techniques for instrument cleaning, inspection, assembly, and packaging to ensure their sterility and safe use in surgical procedures. - 3 Hours
m. Sterile storage and distribution: Studying the appropriate storage and distribution methods in CSSD, including maintaining proper inventory control, implementing first-in-first-out (FIFO) system, and ensuring proper labelling and documentation. - 4 Hours
n. Quality assurance and control: Exploring the quality assurance and control measures in CSSD, including biological and chemical monitoring of sterilization processes, documentation, and compliance with regulatory standards. - 6 Hours

o. Infection control practices: Understanding the principles of infection control in CSSD, including hand hygiene, personal protective equipment (PPE) usage, aseptic techniques, and prevention of cross-contamination. - 4 Hours

p. Equipment maintenance and troubleshooting: Learning about the maintenance and troubleshooting procedures for CSSD equipment, such as sterilizers, washers, and drying cabinets, to ensure their optimal performance. - 3 Hours

**Manifold: (13 Hours)**

Introduction to Hospital Manifold Systems, Types of Medical Gases, Design and Layout of Manifold Systems, Gas Pressure Regulation and Control, Maintenance and Safety Practices, Gas Outlets and Connection Systems, Gas Identification and Labelling, Liquid Medical Oxygen,

Emergency Response and Gas Shutdown Procedures,

3. Troubleshooting and Problem-solving,

4. Regulations and Compliance.

**Practical Sessions for CSSD & Manifold Area: (100 Hours)**

CSSD Procedures: 60 Hours

Sterilization Methods:

Autoclave Operation: Students will learn how to operate an autoclave for steam sterilization.

Chemical Sterilization: Students will be introduced to chemical sterilization methods, such as using high-level disinfectants or low temperature sterilant.

Decontamination Processes:

Manual Cleaning Techniques: Students will practice manual cleaning techniques for decontaminating surgical instruments.

Ultrasonic Cleaner Operation: Students will operate an ultrasonic cleaner and learn about its role in mechanical cleaning.

Sterile Storage and Distribution:

Inventory Management: Students will learn how to maintain an organized inventory system in the CSSD.

Manifold Area: (40 Hours)

**Hospital Manifold Systems:**

Manifold System Components: Students will explore the layout and components of a

hospital manifold system.

They will learn about the gas sources, pressure regulation devices, alarms, and safety features present in the system.

Emergency Equipment Familiarization: Students will familiarize themselves with emergency equipment, such as gas shut-off valves, pressure relief devices, and emergency alarms.

Troubleshooting and Problem-Solving:

Manifold System Maintenance: Students will learn about common issues that can arise in the manifold system and practice troubleshooting techniques.

These practical sessions will provide students with hands-on experience, allowing them to apply their knowledge and develop essential skills related to CSSD procedures and manifold systems.

**BAOTT-015 Industrial orientation and Industrial Visit (50 Hours)**

**Learning Objectives**

Understanding the types of industries relevant to the field, recognising the importance of industrial visits for practical exposure, planning and preparing for an industrial visit, gaining orientation to the industry, and actively observing and interacting with professionals are among the learning objectives for Operation Theatre and Anaesthesia Technology. Understanding the industry's organisational structure, departments, and functions, witnessing and engaging with professionals, displaying ethical conduct, and commenting on the experience are among the course outcomes. The final report or presentation summarises major takeaways, observations, and experiences from the industrial tour. The goal of the course is to provide practical insights and relevance to the curriculum as well as future professional growth.

Industrial orientation and Industrial Visit

a. Introduction to industrial settings: Understanding the various types of industries relevant to the field of Operation Theatre and Anaesthesia Technology, such as medical device manufacturing companies, pharmaceutical companies, hospitals, and healthcare facilities. - 6 Hours
b. Importance of industrial visits: Exploring the significance of industrial visits in gaining practical exposure, understanding real-world applications of theoretical knowledge, and observing professional work environments. - 6 Hours
c. Preparing for an industrial visit: Learning about the necessary preparations, including scheduling, logistics, and safety guidelines, for a successful and productive industrial visit. - 6 Hours

d. Orientation to the industry: Getting acquainted with the organizational structure, departments, and functions of the industry being visited, and understanding the roles and responsibilities of professionals working in that industry. - 6 Hours
e. Observation and interaction: Actively observing the operations, processes, and workflows within the industry, and interacting with professionals to gain insights into their work, challenges, and best practices. - 6 Hours
f. Ethical considerations: Understanding ethical guidelines and professional conduct expected during the industrial visit, including respecting confidentiality, intellectual property, and workplace rules. - 6 Hours
g. Reflective learning: Reflecting on the industrial visit experience, consolidating observations, and discussing the practical implications and relevance of the visited industry to the field of Operation Theatre and Anaesthesia Technology. - 6 Hours
h. Reporting and documentation: Summarizing the key learnings, experiences, and observations from the industrial visit in a comprehensive report or presentation, highlighting the relevance to the curriculum and future professional development. 8 Hrs.

## Fourth Semester

### BAOTT-016 Advanced Anesthesia Techniques (100 Hours)

### Learning Objectives

The learning objectives cover various aspects of Anaesthesia, including ear, nose, and throat surgeries, airway management, ophthalmic surgeries, local and regional anaesthesia techniques, head and neck procedures, and complications specific to ENT and ophthalmic surgeries. Anaesthetic considerations for ear, nose, and throat surgeries include identifying challenges, understanding techniques for maintaining airway patency, evaluating risks and benefits, and developing strategies for pain and discomfort management. Advanced airway management techniques, such as fibreoptic intubation, supraglottic airway devices, and video laryngoscopy, are essential for securing and maintaining the airway during ENT procedures.

Ophthalmic surgeries involve unique considerations and challenges, with different techniques used for patient positioning, sedation, and monitoring. The advantages and disadvantages of different methods for specific ophthalmic procedures are also discussed. Local and regional anaesthesia techniques for head and neck procedures are also discussed, with the benefits, limitations, and potential complications of these techniques.

Complication management for ENT and ophthalmic surgeries involves recognizing potential complications, developing strategies for preventing and managing them, understanding the appropriate use of medications and interventions, and evaluating and implementing measures for optimizing patient safety and outcomes.

## Course Outcome

The course on Anaesthetic Considerations in ENT and Ophthalmic Surgeries aims to equip students with the skills to:

a) Anesthetic considerations for ear, nose, and throat surgeries: Demonstrate understanding of challenges and techniques involved in providing Anaesthesia for ENT procedures, apply appropriate methods and strategies for maintaining airway patency, and implement pain management protocols.
b) Airway management in ENT procedures: Use advanced techniques like fibreoptic intubation, supraglottic airway devices, and video laryngoscopy to maintain airway patency and manage complications.
c) Anesthetic techniques for ophthalmic surgeries: Understand the unique challenges and challenges in providing Anaesthesia, apply appropriate techniques for different procedures, and implement patient positioning, sedation, and monitoring protocols.
d) Local and regional anesthesia techniques for head and neck procedures: Demonstrate proficiency in administering local anaesthetics and performing nerve blocks, and select and apply regional techniques based on surgical requirements.
e) Management of complications specific to ENT and ophthalmic surgeries: Identify potential complications and adverse events, implement preventive measures, and address complications promptly and appropriately to ensure patient safety and optimize outcomes.

## Advanced Anaesthesia Techniques (ENT and Ophthalmic Surgeries):

- Anaesthetic considerations for ear, nose, and throat surgeries: Understanding the specific challenges and techniques involved in providing Anaesthesia for ENT procedures such as tonsillectomy, adenoidectomy, and sinus surgery. - 20 Hours
- Airway management in ENT procedures: Learning about advanced airway management techniques, such as fibreoptic intubation, supraglottic airway devices, and video laryngoscopy, for securing the airway during ENT surgeries. - 20 Hours
- anaesthetic techniques for ophthalmic surgeries: Studying the unique considerations for providing Anaesthesia during eye surgeries, including cataract extraction, retinal surgeries, and glaucoma procedures. - 20 Hours
- Local and regional Anaesthesia techniques for head and neck procedures: Exploring the principles and administration techniques for local anaesthetics, nerve blocks, and regional Anaesthesia for head and neck surgeries. - 20 Hours
- Management of complications specific to ENT and ophthalmic surgeries: Understanding the potential complications and adverse events related to Anaesthesia in ENT and ophthalmic surgeries and learning strategies for their prevention and management. - 20 Hours

## Practical Sessions: (50 Hours)

- Considerations for Anesthesia in ENT Surgery:
- Tonsillectomy and Adenoidectomy: Patient Positioning and Airway Access: During tonsillectomy and adenoidectomy operations, students will practice optimal patient positioning and techniques for preserving a patent airway.
- Anesthetic Agent Selection and Administration: Students will learn about the proper selection of anaesthetic agents for ENT operations, including inhalational and intravenous agents. They will put their administration and monitoring skills to the test.
- Anesthetic Techniques for Sinus Surgery: Students will learn about the anaesthetic considerations unique to sinus surgery, such as keeping a clear operative field, limiting bleeding, and managing patient placement. They will put these strategies to the test in simulated circumstances.

## Airway Control in ENT Procedures:

- Fibreoptic Intubation Techniques: Students will practice fiberoptic intubation with airway manikins. They will learn how to use the fiberscope correctly to secure the airway in difficult ENT cases.
- Supraglottic Airway Devices: Insertion and Positioning of Supraglottic Airway Devices: In simulated ENT settings, students will practice the insertion and correct positioning of supraglottic airway devices such as laryngeal mask airways (LMAs).

- Ophthalmic Surgery Anaesthesia Techniques:
- Topical Anaesthesia Techniques for Cataract Extraction: Students will learn and practice different topical anesthetic approaches for cataract extraction, such as eye drops, subconjunctival injections, and intracameral anaesthesia.

### Retinal Surgery and Glaucoma Treatments:

- Blocks for the peribulbar and retrobulbar areas: Students will study and practice peribulbar and retrobulbar blocks, which are often used to provide anaesthesia during retinal and glaucoma treatments. On manikins, they will practice proper needle insertion and pharmaceutical deposition techniques.

### Complication Management in ENT and Ophthalmic Surgery:

- Difficult Airway Scenarios and Airway Obstruction:
- Airway blockage Simulation: Students will take part in simulated scenarios involving airway blockage and difficult airway circumstances in ENT surgery. They will practice effective management strategies such as emergency airway maneuvers and the placement of an alternate airway device.

### Complications of Ophthalmic Surgery:

- Ocular Emergencies Simulation: During ophthalmic procedures, students will encounter simulated ocular emergencies such as rapid loss of vision or high intraocular pressure.
- They will learn and practice the necessary emergency management strategies.

Students will be able to apply their theoretical knowledge in a simulated clinical setting during these practical sessions, allowing them to develop skills and confidence in managing anaesthetic considerations, airway management, and complications specific to ENT and ophthalmic surgeries.

## BAOTT-017 Advanced Surgical Procedures (100 Hours) Learning Objectives

The learning objectives for this course include understanding surgical procedures in ear, nose, and throat (ENT), diseases in otolaryngology (ENT), eye diseases, laser precautions, surgical techniques in ophthalmology, endoscopic procedures in ENT and ophthalmology, laser-assisted surgical procedures in ENT and ophthalmology, minimally invasive approaches in ENT and ophthalmology, and management of complications in ENT and ophthalmology.

The course covers various surgical procedures, diseases, and complications in ENT, ophthalmology, laser-assisted surgical procedures, minimally invasive approaches, and management of complications. Students will gain knowledge about the etiology, pathophysiology, clinical presentation, and diagnostic approaches for each ENT disease, as well as the medical and surgical treatment options available for managing ENT diseases.

The course also covers laser safety training, proper laser warning signage, and interlock systems. Students will also learn about the instruments and techniques involved in ophthalmic surgeries, as well as the preoperative, intraoperative, and postoperative considerations for these procedures.

The course also covers endoscopic procedures, laser-assisted surgical procedures, and minimally invasive approaches in ENT and ophthalmology. Students will explore the advantages, limitations, and patient selection criteria for these approaches and evaluate the outcomes and potential complications.

In conclusion, this course provides a comprehensive understanding of surgical procedures, diseases, and complications in ENT and ophthalmology. By understanding these areas, students will be better equipped to manage and optimize patient outcomes during these procedures.

The course teaches students to demonstrate knowledge of surgical procedures in ear, nose, throat, and ophthalmology, apply specialized instruments and techniques, understand positioning requirements, and diagnose common ENT diseases. It also covers medical and surgical treatment options, ophthalmic diseases, laser safety protocols, and ophthalmic surgical principles. Students will perform endoscopic procedures, safely and effectively utilize lasers, evaluate minimally invasive approaches, apply preventive measures, and optimize patient outcomes and safety in ENT and ophthalmic surgical interventions.

## Advanced Surgical Procedures

- Surgical procedures in ear, nose, and throat (ENT): Learning about the various surgical procedures performed in ENT, including tonsillectomy, septoplasty, laryngectomy, and sinus surgery, and understanding the specialized instruments and techniques used, and positioning for each surgery. - 15 Hours
- Diseases in Otolaryngology (ENT) : Chronic Sinusitis, Tonsillitis, Deviated Septum Otitis Media, Vocal Cord Nodules or Polyps, Obstructive Sleep Apnea (OSA),Laryngeal Cancer ,Nasal Polyps, Salivary Gland Disorders, Cochlear Implantation. - 15 Hours
- Diseases in Ophthalmology: - 20 Hours
    - Cataracts - Cataract Extraction and Intraocular Lens (IOL) Implantation,
    - Glaucoma - Trabeculectomy, Shunt Implantation, Laser Therapy
    - Age-related Macular Degeneration (AMD) - Intravitreal Injections, Laser Therapy, Photodynamic Therapy
    - Diabetic Retinopathy - Vitrectomy, Laser Therapy
    - Retinal Detachment - Retinal Detachment Repair
    - Dry Eye Syndrome - Punctal Occlusion Surgery
    - Conjunctivitis - Symptomatic Treatment (Medications, Eye Drops)
    - Corneal Diseases - Corneal Transplantation (Keratoplasty)
    - Refractive Errors - LASIK (Laser-Assisted in Situ Keratomileusis), PRK (Photorefractive Keratectomy)
    - Retinoblastoma - Chemotherapy, Radiation Therapy, Enucleation (Eye Removal)

- Laser Precautions: Laser Safety Training, Protective Eyewear, Fire Safety Laser Plume Management, Patient Safety, Laser Device Maintenance, Laser Warning Signage, Laser Interlock Systems, Laser Hazard Assessment Compliance with Regulatory Standards. - 6 Hours
- Surgical techniques in ophthalmic surgery: Exploring the specific surgical procedures performed in ophthalmology, such as cataract extraction, corneal transplantation, vitrectomy, and refractive surgeries, and understanding the instrumentation and surgical principles involved. - 10 Hours
- Endoscopic procedures in ENT and ophthalmic surgery: Understanding the principles and techniques of endoscopic surgeries in ENT and ophthalmology, including endoscopic sinus surgery, laryngoscopy, tracheostomy, and arthroscopy. - 4 Hours
- Laser-assisted surgical procedures in ENT and ophthalmology: Learning about the use of lasers in surgical procedures in ENT and ophthalmology, including laser-assisted tonsillectomy, laser-assisted stapedotomy, and laser refractive surgeries. - 10 Hours
- Minimally invasive approaches in ENT and ophthalmic surgery: Exploring minimally invasive surgical techniques, such as laparoscopic and robotic-assisted procedures, in ENT and ophthalmology, and understanding their advantages and limitations. - 10Hours
- Management of complications in ENT and ophthalmic surgeries: Understanding the potential complications and adverse events that may arise during ENT and ophthalmic surgeries, and learning strategies for prevention, recognition, and management -10 Hours

## Practicals: (50 Hours)

- Surgical procedures in ear, nose, and throat (ENT) include tonsillectomy, septoplasty, sinus surgery, endoscopic sinus surgery, chronic sinusitis, tonsillitis, ophthalmic surgery, cataract extraction, corneal transplantation, and laryngoscopic examination. Students will know the identification of all surgical instruments of the above specialties.
- Students will practice arrangement techniques for cold knife dissection, electrocautery, and coblation, as well as the proper use of specialized instruments like tonsil snares, dissectors, and hemostatic agents. They will also learn the principles of maintaining nasal airway patency and proper positioning of nasal packing.
- Endoscopic sinus surgery involves hands-on experience with endoscopic instruments, including sinus scopes and instrumentation.
- Endoscopic procedures in ENT and ophthalmic surgery include simulated endoscopic sinus surgery scenarios using anatomical models, focusing on sinus visualization, polyp removal, and ostium widening. Students will also practice arranging instruments required for laryngoscopic examination using laryngoscope models, learning proper insertion, and positioning of laryngoscope blades, visualization of vocal cords, and identification of laryngeal structures. These practical sessions provide students with hands-on experience and simulation-based training to develop skills and competence in advanced arrangement for surgical procedures, disease assessment, surgical techniques, and management of complications in ENT and ophthalmic surgeries.

# BAOTT-018 Basic Intensive Care

## Learning Outcomes

a) Recognize proper care and maintenance practices for ventilators, suction machines, and monitoring equipment.
b) Check, clean, and troubleshoot this equipment on a regular basis.
c) Recognize prevalent flaws and take corrective action.
d) Understand the concepts of ventilator sterilization and disinfection.
e) Recognize the proper sterilization processes and disinfectants for ventilators.
f) Know how to care for, maintain, and operate beds, lights, and other pieces of equipment.
g) Recognize the significance of air conditioning and pollution control in the ICU setting.
h) Recognize HVAC systems and air filtration procedures in order to maintain air quality.
i) Be familiar with the attachment and intraoperative use of ventilators and monitoring devices.
j) Adult and pediatric patients who are unconscious are cared for.
k) Recognize unique care requirements, such as posture, hygiene, and monitoring.
l) Recognize and manage any potential difficulties or crises that may arise while caring for unconscious patients.
m) Become familiar with physiotherapy procedures, feeding, Ryle's tube insertion, and hyperalimentation.
n) recognize suctioning and posture techniques in semiconscious and unconscious patients.
o) Understand the concepts and procedures of oxygen therapy, including identifying and selecting appropriate delivery systems and masks based on patient needs.
p) Assess ventilation during a patient emergency.
q) Assist with ventilation using mouth-to-mouth, mouth-to-ET tube, or bag-valve mask construction procedures.
r) Depending on the patient's condition and response, implement suitable ventilation methods.

## Course Outcomes:

Students will leave with knowledge and abilities in ventilator care, maintenance, and troubleshooting, as well as basic sterilization and disinfection practices. It explains how to care for, maintain, and operate beds, lights, and other regularly used ICU equipment. Students will also learn to control air conditioning and pollution in the ICU environment, attach and configure ventilators and monitoring devices intraoperatively, provide appropriate care for unconscious adult and paediatric patients, perform physiotherapy techniques, suctioning, administer oxygen therapy, provide ventilation support, understand the principles of ventilator and monitoring equipment, measure blood pressure, temperature, and expired gases, and understand laryngeal anatomy.

## Basic Intensive Care

- Care and maintenance of ventilators, suction machine, monitoring devices. - 2 Hours
- Sterilization and disinfection of ventilators. - 1 Hour
- Care, maintenance and operational capabilities of beds, lights and other apparatus. -1 Hour
- Air conditioning and control of pollution in ICU. - 1 Hour
- Attachment and intraoperative utility of ventilators and monitoring devices. - 1 Hour
- Care of unconscious adult and paediatric patients. - 3 Hour
- Physiotherapy techniques, feeding, Ryle‟s tube insertion and hyper alimentation. -3 Hours
- Suctioning and posturing of semiconscious and unconscious patients. - 2 Hours
- Oxygen therapy, maintenance of clear Airway, Various types of masks. - 6 Hours
- Ventilation of patient in crisis: - 2 Hours
- Resuscitator/ bag valve mask assembly - 2 Hours
- Different types of Airways. - 2 Hours
- Short term ventilation/ Transport ventilators. - 1 Hour
- ABG techniques & analysis. - 3 Hours
- Management of asepsis. - 4 Hours
- Psychological aspects of the patient, relative and staff. - 2 Hours
- Hemofiltration and hemodialysis. - 4 Hours
- Jet Ventilation. - 2 Hours
- Ventilators: Principles of working of different ventilators: - 8 Hours
- Volume cycled/Time cycled/Pressure cycled ventilators.
- High frequency ventilators and other types.
    - Methods of measuring the expired gases from the patient; Types of spirometers, Principles of working of spirometers. Clinical application of above apparatus.
    - Apparatus and techniques of measuring of blood pressure and temperature; Principle and working of direct/indirect blood pressure monitoring apparatus; structure, principle and working of the Oscillo tonometer. Principles and working of aneroid manometer type B.P. instrument.
    - Laryngeal sprays; Types, material, principle, and mechanism.
    - Monitoring techniques and equipment; Cardiac monitors, Respiratory monitors, Spirometers, Temperature monitors.

## Practical/ Clinical Postings: ( 100 Hours)

- Ventilator Care and Maintenance:
    - Hands-on practice in the proper care and maintenance of ventilators, including cleaning, sterilization, and disinfection techniques.
    - Understanding the functions and operation of different modes and settings of ventilators.
    - Troubleshooting common ventilator issues and alarm management.

- Bed and Apparatus Care:
  - Practical demonstration of bed maintenance, including adjustment of height, positioning, and proper use of bed controls.
  - Familiarization with the operational capabilities of ICU lights and other apparatus, such as infusion pumps and monitors.
  - Cleaning and disinfection procedures for bed surfaces and equipment.
- Air Conditioning and Pollution Control in ICU:
  - Practical session on the management of air conditioning systems in the ICU to maintain optimal temperature, humidity, and air quality.
  - Understanding the importance of infection control measures and strategies to minimize airborne contaminants in the ICU environment.
- Care of Unconscious Patients:
  - Simulation-based training on the care and management of unconscious adult and pediatric patients, including monitoring vital signs, maintaining airway patency, and providing basic hygiene.
  - Practice in the proper positioning and turning techniques for unconscious patients to prevent pressure ulcers.
- Oxygen Therapy and Airway Management:
  - Hands-on practice in administering oxygen therapy using different types of masks and nasal cannulas.
  - Simulation of airway management techniques, including insertion and securing of endotracheal tubes, use of different types of airways, and bag-valve mask ventilation.
- Physiotherapy Techniques and Feeding Methods:
  - Practical demonstration and practice of physiotherapy techniques, such as chest physiotherapy and postural drainage, to promote airway clearance.
  - Training on safe and proper insertion of Ryle's tube for enteral feeding, followed by simulated feeding procedures and maintenance.
- Hemofiltration and Hemodialysis:
  - Introduction to the principles and techniques of hemofiltration and hemodialysis for renal replacement therapy.
  - Simulation-based training on the setup and operation of hemofiltration and hemodialysis machines, including the monitoring of patients during the procedure.
- Psychological Aspects of Patients, Relatives, and Staff:
  - Interactive sessions focusing on the psychological aspects of patients, their relatives, and healthcare staff in the ICU setting.
  - Role-playing exercises to develop effective communication skills and strategies for providing emotional support to patients and their families.

## BAOTT-019 Clinical Medicine & Related Management (60 Hours)

### Learning Objectives

Practical topics for students in the field of respiratory and cardiovascular system include hands-on training in examinations and investigations, such as ECG interpretation and pulmonary function tests, as well as simulations for managing emergencies like cardiac arrest. They should also learn about specific conditions like ischemic heart disease, asthma, and pneumonia through case discussions and observation of relevant procedures. Additionally, practical sessions on airway management, chest tube insertion, and the use of diagnostic tools in diagnosing and managing lung diseases like tuberculosis and lung cancer are essential

## Clinical Medicine & Related Management

1.Diseases related to Cardiovascular system- - 4 Hours

- Examination and Investigations relevant to cardiovascular system - 4 Hours
- Ischemic heart disease - 2 Hours
- Valvular heart diseases - 4 Hours
- Common arrhythmias encountered in clinical practice - 2 Hours.
- Hypertension - 2 Hours
- Heart failure - 2 Hours
- Cardiomyopathies - 2 Hours

2. Respiratory System and related diseases

- Examination and Investigations relevant to respiratory system - 2 Hours
- Asthma and COPD - 4 Hours
- Pneumonia - 2 Hours
- Pulmonary tuberculosis - 4 Hours
- Bronchiectasis - 2 Hours
- Lung abscess - 4 Hours
- Pneumothorax - 2 Hours
- Pleural effusion - 4 Hours
- Respiratory failure-types, causes and management - 6 Hours.
- Carcinoma lung - 6 Hours

3.Disorder of haemopoesis - Anaemia - iron deficiency anaemia - 4 Hours

## Fifth Semester

**BAOTT-020 Specialized Anaesthesia-1 (100 Hours)**

**Learning Objectives**

The learning goals span a wide range of anesthetic procedures, including orthopedic, pediatric, urological, regional, and regional anaesthesia. Comprehending special anaesthetic concerns and problems is required for orthopedic surgery, whereas comprehending distinct physiological and pharmacological aspects is required for paediatric anaesthesia. Exploring problems and considerations, understanding the influence of individual anomalies on anaesthetic management and perioperative care, and establishing strategies to optimize results and minimize risks are all part of anaesthetic management of patients with congenital anomalies. Understanding specialized anesthesia management procedures, such as prostatectomy, nephrectomy, and cystoscopy, as well as controlling probable problems and perioperative issues, are required for urological surgery. Regional anesthesia techniques for orthopedic and urological procedures entail learning pain management principles and techniques, performing peripheral nerve blocks and spinal anaesthesia, and comprehending indications, contraindications, and potential complications associated with regional anaesthesia.

Students will learn how to grasp anaesthetic considerations, techniques, and challenges in orthopedic surgeries, how to use appropriate techniques for paediatric patients, how to address congenital anomalies in paediatric patients, and how to use regional anaesthesia techniques for pain control. It also addresses potential problems and adverse events, provides safe and effective care, and exhibits expertise in monitoring techniques and management tactics. Students work with the surgical team to improve patient outcomes, use evidence-based practices, and keep their knowledge and abilities up to date. The course also promotes a proactive approach to anaesthesia difficulties

### Specialized Anaesthesia-1

a) Anesthetic considerations for orthopedic surgeries: Studying the specific Anaesthesia considerations, techniques, and challenges associated with orthopedics procedures such as joint replacements, fracture fixation, and spine surgeries. - 20 Hours
b) Paediatric Anaesthesia techniques and considerations: Understanding the unique physiological and pharmacological considerations for providing Anaesthesia to paediatric patients, including preoperative preparation, induction, airway management, and pain management. - 20 Hours
c) Anaesthetic management of paediatric patients with congenital anomalies: Exploring the Anaesthesia challenges and considerations when managing paediatric patients with congenital anomalies undergoing surgical procedures. - 20 Hours
d) Anaesthesia for urological surgeries: Learning about the specific Anaesthesia considerations and techniques for urological procedures such as prostatectomy, nephrectomy, and cystoscopy. - 20 Hours
e) Regional Anesthesia techniques for orthopedics and urological procedures: Studying the principles and techniques of regional Anaesthesia, including peripheral nerve blocks and spinal Anaesthesia, for pain management during orthopedic and urological surgeries. - 20 Hours

Practical Topics: Specialized Anaesthesia-1 (50 Hours)

## Orthopedic Surgery:

- Simulation-based training on anaesthetic considerations and techniques for joint replacement surgeries, such as patient positioning, regional anaesthesia techniques, and intraoperative pain management.
- Anesthetic treatment for fracture fixation procedures, including the use of various types of anaesthesia and monitoring measures, is demonstrated in practice.
- Role-playing scenarios to better grasp the problems and decision-making involved in giving spinal anaesthesia.

## Paediatric Surgery:

- Hands-on practice in pediatric airway care using suitable devices and techniques, such as mask ventilation, intubation, and supraglottic airway devices.
- Simulation scenarios concentrating on the special issues for inducing and maintaining anaesthesia in paediatric patients, including as dose calculation, monitoring, and intraoperative care.
- A hands-on session on juvenile pain management strategies, such as regional anaesthesia and multimodal analgesia.
- Anaesthesia for Paediatric Patients with Congenital abnormalities: Interactive sessions addressing anesthetic problems and considerations when caring for children with congenital abnormalities.
- Case studies and role-playing exercises are used to learn about preoperative evaluation, anaesthesia planning, and intraoperative care of unique congenital abnormalities.
- Simulations of emergency situations and crisis management in paediatric patients with congenital abnormalities.

## Urological surgeries:

- Anaesthesia for Urological Surgeries: This course provides a practical demonstration of anaesthetic considerations and techniques for various urological surgeries such as prostatectomy, nephrectomy, and cystoscopy.
- Training in urological surgery positioning and patient preparation, including the use of regional anaesthetic and intravenous sedation procedures.
- Scenarios based on simulation to better understand intraoperative problems and management of fluid balance, hemodynamic, and pain control during urological procedures.
- Techniques of Regional Anesthesia for Orthopedic and Urological Procedures:
- Practical experience with peripheral nerve blocks, including landmark recognition, needle insertion, and local anaesthetic administration.
- Training in spinal anaesthetic procedures using simulation, including patient placement, sterile technique, and dose calculation.

## Anaesthesia Considerations:

- Case-based discussions on anesthesia considerations specific to orthopedic, Pediatric, and urological surgeries, focusing on patient assessment, anesthesia induction, and intraoperative monitoring.
- Interactive sessions on pain management strategies for surgical patients in these specialties, including the use of regional anesthesia techniques, multimodal analgesia, and patient-controlled analgesia.
- Simulation scenarios to practice crisis management during surgery, such as intraoperative bleeding, anaphylactic reactions, or airway emergencies.

Postoperative Care and Rehabilitation:

- Practical demonstration of postoperative care protocols for orthopedic, pediatric, and urological surgical patients, including wound care, monitoring vital signs, and early mobilization techniques.
- Role-playing exercises to simulate patient education and discharge planning, including instructions on medication management, activity restrictions, and follow-up appointments.
- Hands-on practice with rehabilitation exercises specific to orthopedic, pediatric, and urological surgical patients, focusing on maintaining joint mobility, strengthening, and functional recovery.

## BAOTT-021: Specialized surgery 1 (100 Hours)

## Learning Objectives:

The learning objectives cover various aspects of orthopedics, Pediatric surgery, urological diseases, and related surgeries. orthopedic diseases include osteoarthritis, fractures, herniated discs, scoliosis, and ligament injuries. Orthopedic surgical procedures include joint replacement, fracture fixation, spinal surgeries, and carpal tunnel release. Understanding the principles and techniques involved in surgical management of orthopedic conditions is crucial.

C-arm and radiation safety are also covered, including pregnancy and Paediatric radiology considerations, contrast media safety, infection control, equipment maintenance, calibration, patient identification and consent, emergency preparedness, and radiation dose optimization. Effective communication, documentation, quality assurance, and accreditation are also essential in the use of C-arm.

Paediatric surgical procedures include hernia repair, pyloromyotomy, congenital anomaly correction, and laparoscopic surgeries. Specimens, techniques, and patient positioning are also discussed. Postoperative care protocols, pain management, and patient education are also covered.

Urological diseases and related surgeries include kidney stones, urinary tract infections, urinary incontinence, benign prostatic hyperplasia, bladder cancer, prostate cancer, erectile dysfunction, and vesicoureteral reflux. Understanding surgical treatment options and techniques for urological

diseases is essential. Anaesthesia considerations and specialized techniques are also discussed, along with the principles of postoperative care and rehabilitation specific to urological surgical patients.

The course is designed to give learners a thorough awareness of prevalent disorders in orthopedics, pediatric surgery, and urology, as well as suitable surgical procedures and techniques. Patient positioning, pain management, perioperative care, C-arm fluoroscopy, anaesthesia, postoperative care protocols, and rehabilitation programmes are all covered. Through continued professional development, students will also learn to effectively work with the surgical team, use evidence-based practices, and regularly update their knowledge and abilities in orthopedic, pediatric, and urological surgery.

## Specialized surgery 1

a) **Diseases in Orthopedics** **- 12 Hours**

- Osteoarthritis: Degenerative joint disease-causing joint pain and stiffness. Surgeries include joint replacement (e.g., total hip replacement, total knee replacement).
- Fractures: Broken bones that require surgical intervention for realignment and stabilization. Surgeries may include open reduction and internal fixation (ORIF), external fixation, or intramedullary nailing.
- Herniated Disc: Protrusion of intervertebral disc causing nerve compression. Surgical options include discectomy or spinal fusion.
- Scoliosis: Abnormal curvature of the spine. Surgery may be performed in severe cases to correct the curvature, such as spinal fusion or insertion of spinal rods.
- Carpal Tunnel Syndrome: Compression of the median nerve in the wrist. Surgical treatment involves carpal tunnel release to alleviate pressure on the nerve.
- Rotator Cuff Tears: Tears in the tendons of the rotator cuff in the shoulder. Surgical repair or reconstruction may be required, such as arthroscopic rotator cuff repair.
- Ligament Injuries: Injuries to ligaments, such as anterior cruciate ligament (ACL) tear in the knee. Surgical reconstruction may be performed using grafts, such as ACL reconstruction.
- Spinal Stenosis: Narrowing of the spinal canal, causing compression of the spinal cord or nerves. Surgery options include laminectomy or spinal decompression to relieve pressure.
- Bone Tumors: Abnormal growths in bones that may require surgical removal, such as tumor resection or limb-sparing surgeries.
- Osteoporosis: Loss of bone density, leading to increased fracture risk. Surgical procedures may include vertebroplasty or kyphoplasty for spinal compression fractures.

- orthopedic surgical procedures: Studying the specific orthopedic surgical procedures, including joint replacement surgeries (such as total knee replacement and total hip replacement), fracture fixation (fracture table), and spine surgeries, and understanding the instrumentation, implants, techniques involved and positioning for each surge -20 Hours
- C-arm. Radiation Safety: Pregnancy and Pediatric Radiology, Contrast Media Safety, Infection Control, Equipment Maintenance and Calibration, Patient Identification and Consent, Emergency Preparedness, Radiation Dose Optimization, Communication and Documentation, Quality Assurance and Accreditation. -3Hours

b) **Diseases in Pediatric Surgery:** - 15 Hours

- Cleft Lip and Palate: Facial birth defects involving the lip and/or palate. Surgical procedures are performed to repair and reconstruct the cleft lip and palate, typically in multiple stages.
- Pediatric Hernias: Abnormal protrusions of organs or tissues through weak spots or openings in the abdominal wall, such as inguinal hernia or umbilical hernia. Surgical treatment involves hernia repair to close the defect.
- Pediatric Urological Conditions: Disorders affecting the urinary system in children, such as hypospadias, cryptorchidism (undescended testicles), or vesicoureteral reflux (VUR), PUJO. Surgical interventions may include hypospadias repair, orchidopexy, or ureteral reimplantation.
- Pediatric Gastrointestinal Disorders: Conditions like pyloric stenosis, malrotation, or Hirschsprung's disease that affect the digestive system in infants and children. Surgical procedures are performed to correct the underlying issues, such as pyloromyotomy or bowel resection.
- Pediatric orthopedic Conditions: Disorders involving the musculoskeletal system in children, such as clubfoot, developmental dysplasia of the hip (DDH), or scoliosis. Surgeries may include corrective procedures like clubfoot correction, hip reduction, or spinal fusion.
- Pediatric Neurosurgical Conditions: Neurological disorders affecting children, such as hydrocephalus, spina bifida, or brain tumors. Surgical interventions may involve shunt placement for hydrocephalus, repair of spina bifida defects, or tumor resection.
- Pediatric Trauma: Surgical management of traumatic injuries in children, including fractures, burns, or lacerations. Surgeries aim to repair and stabilize the injured areas.

c) Paediatric surgical procedures: Exploring the surgical procedures performed in Paediatric surgery, such as Pediatric hernia repair, pyloromyotomy, congenital anomaly correction, and Paediatric laparoscopic surgeries, and understanding the specialized considerations, techniques for Paediatric patients and positioning for each surgery.
15 Hours

d) Urological Diseases and Related Surgeries: - 20 Hours

- Kidney Stones: Surgical procedures may include:
- Extracorporeal Shock Wave Lithotripsy (ESWL): Non-invasive procedure that uses

shock waves to break down kidney stones into smaller pieces, making them easier to pass.

- Ureteroscopy with Laser Lithotripsy: Minimally invasive procedure where a thin tube is inserted into the ureter to remove or break down stones using a laser.
- Urinary Tract Infections (UTIs): Surgeries are not typically required for UTIs. Treatment usually involves antibiotics to eliminate the infection.
- Urinary Incontinence: Surgical options for urinary incontinence include:
- Sling Procedures: Placement of a sling or mesh to support the urethra and prevent leakage of urine.
- Bladder Neck Suspension: Surgical procedure to provide support to the bladder neck and urethra.
- Artificial Urinary Sphincter: Placement of an artificial valve around the urethra to control urine flow.
- Benign Prostatic Hyperplasia (BPH): Surgical procedures for BPH include:
- Transurethral Resection of the Prostate (TURP): Removal of excess prostate tissue using a resectoscope inserted through the urethra.
- Laser Surgery: Techniques like photo selective vaporization of the prostate (PVP) or holmium laser enucleation of the prostate (HoLEP) can be used to remove or vaporize prostate tissue.
- Bladder Cancer: Surgical treatment options for bladder cancer include:
- Transurethral Resection of Bladder Tumor (TURBT): Removal of bladder tumors using a resectoscope inserted through the urethra.
- Radical Cystectomy: Surgical removal of the entire bladder, often followed by the creation of a urinary diversion.
- Prostate Cancer: Surgical procedures for prostate cancer include:
- Testicular Cancer: Surgical treatment for testicular cancer typically involves:
- Radical Inguinal Orchiectomy: Surgical removal of the affected testicle through an incision in the groin area.
- Erectile Dysfunction: Surgical options for erectile dysfunction include:
- Penile Implants: Surgical insertion of inflatable or malleable implants to restore erectile function.
- Vascular Surgery: Procedures to improve blood flow to the penis, such as arterial bypass surgery or penile venous ligation.
- Vesicoureteral Reflux (VUR): Surgical options for VUR include:
- Deflux Injection: Endoscopic procedure where a bulking agent is injected into the bladder wall to create a flap that prevents urine from flowing back into the ureters.
- Ureteral Reimplantation: Surgical procedure to reposition the ureter and create a new valve mechanism to prevent reflux.
- Renal Tumors: Surgical treatment for renal tumors may include:
- Partial Nephrectomy: Removal of the tumor while preserving healthy kidney tissue.
- Radical Nephrectomy: Surgical removal of the entire affected kidney.

## Urological surgical procedures:

- Learning about urological surgical procedures, including nephrectomy, prostatectomy, urinary tract reconstruction, and cystectomy, and understanding the specific instrumentation, techniques, considerations involved and positioning for each surgery.
- Catheter types and sizes, Catheterization techniques, Different types of scopes used in Urology (Nephoscope, cystoscope, resectoscope, Ureteroscope).
- Minimally invasive techniques in orthopedic, Pediatric, and urological surgery: Understanding the principles and techniques of minimally invasive approaches, including arthroscopy, laparoscopy, and robotic-assisted surgeries, in Orthopedics, Pediatric surgery, and urology.

e) Anaesthesia considerations and specialized techniques in these surgical specialties: Gaining knowledge of the Anaesthesia considerations and specialized techniques required for orthopedic, Pediatric, and urological surgeries, including patient positioning, pain management, and perioperative care. -5 Hours

f) Postoperative care and rehabilitation in orthopedic, Pediatric, and urological surgeries: Understanding the postoperative care protocols, rehabilitation techniques, and patient education specific to orthopedic, Pediatric, and urological surgical patients.

-5 Hours

### Practical Topics - Specialized surgery 1 (50 Hours)

## Orthopedic Surgeries:

- Practical demonstration of surgical positioning techniques for different orthopedic procedures, such as joint replacement surgeries, fracture fixation, and spine surgeries.
- Hands-on practice with orthopedic surgical instruments, implants, and techniques used in specific procedures like total knee replacement or fracture fixation.
- Simulation-based training on postoperative care and rehabilitation exercises for orthopedic patients, including mobility assistance and range of motion exercises.

## Pediatric Surgery:

- Practical session on sterile techniques and instrument handling specific to pediatric surgeries, such as cleft lip and palate repair or hernia repair in children.
- Simulation scenarios focusing on the management of pediatric patients during different stages of surgery, including preoperative preparation, anesthesia induction, and intraoperative care.
- Role-playing exercises to understand the unique considerations in postoperative care for pediatric surgical patients, including pain management and family support.

### Urological Surgeries:

- Hands-on training on catheterization techniques, including different types of catheters and sizes used in urological procedures.
- Practical demonstration of the use of various urological scopes, such as nephroscope, cystoscope, and ureteroscope, for diagnostic and surgical purposes.
- Simulation-based scenarios to understand the perioperative management of urological surgical patients, including anesthesia considerations, positioning, and intraoperative complications.

### Minimally Invasive Techniques:

- Practical session on arthroscopy techniques used in orthopedic surgeries, including joint examination, instrument handling, and diagnostic procedures.
- Hands-on practice with laparoscopic instruments and techniques for pediatric and urological surgeries, including trocar insertion, camera navigation, and suturing.
- Simulation-based training on robotic-assisted surgical procedures, such as robotic-assisted prostatectomy or pediatric robotic surgeries, to understand the robotic system setup and surgical techniques.

## BAOTT-022 Recent Advancements in Anesthesia and Surgical Fields (100 Hours)

### Learning Objectives

Recent advances in anaesthesia and surgical fields offer exciting opportunities for students to expand their knowledge and skills. By exploring topics such as minimally invasive surgery, enhanced recovery after surgery (ERAS), patient safety in the operating room, advances in anaesthetic techniques, and perioperative pain management, students can achieve specific outcomes. The first set of outcomes focuses on understanding and appreciating these advancements. Students will develop a clear understanding of the principles, advantages, and limitations of minimally invasive surgical techniques, as well as the concept and significance of ERAS in improving surgical outcomes. They will also recognize the importance of patient safety protocols and their application in the operating room.

In the second set of outcomes, students will delve into the details of recent advancements. They will acquire knowledge about specific topics such as advanced anaesthetic techniques, including total intravenous anaesthesia (TIVA) and target-controlled infusion (TCI). Students will explore the use of neuromuscular monitoring and understand its relevance in anaesthesia management. Furthermore, they will grasp the principles of multimodal analgesia and gain insights into regional anaesthetic techniques for effective pain management. These outcomes will equip students with up-to-date information and enhance their ability to analyze the impact of these advancements on patient outcomes and safety.

The final set of outcomes emphasizes the application of knowledge and skills in practice. Students will develop critical thinking abilities by evaluating the benefits and potential risks associated with recent advances in anaesthesia and surgical fields. They will also learn strategies for preventing surgical site infections and other complications, as well as strategies for optimizing patient preparation and postoperative care within an enhanced recovery framework. By achieving these outcomes, students will be well-prepared to contribute to the evolving healthcare landscape, ensuring the delivery of high-quality care while prioritizing patient safety and optimal outcomes.

Overall, these outcomes and learning objectives provide a comprehensive framework for B.AOTT students to explore and understand recent advances in anaesthesia and surgical fields. By attaining these outcomes, students will be equipped with the necessary knowledge, skills, and mindset to adapt to the changing healthcare landscape and make a positive impact in their future professional practice.

## Recent Advancements in Anesthesia and Surgical Fields

- Minimally Invasive Surgery: Exploring the advancements in minimally invasive surgical techniques, such as laparoscopy, robotic surgery, and endoscopic procedures, and their benefits in terms of reduced trauma, faster recovery, and improved patient outcomes. -15 Hours
- Enhanced Recovery After Surgery (ERAS): Understanding the concept of ERAS protocols, which involve a multidisciplinary approach to optimize patient preparation, surgical techniques, anaesthesia management, and postoperative care, leading to shorter hospital stays, reduced complications, and enhanced recovery. - 15 Hours
- Patient Safety in the Operating Room: Discussing the importance of patient safety in the operating room and highlighting recent initiatives and technologies aimed at improving safety, such as surgical checklists, surgical site infection prevention measures, and the use of simulation training for healthcare professionals. - 15 Hours
- Advances in Anaesthetic Techniques: Exploring recent developments in anaesthetic techniques, including total intravenous anaesthesia (TIVA), target-controlled infusion (TCI), BIS monitoring, CNAP monitoring and the use of neuromuscular monitoring to improve drug dosing and patient safety during anaesthesia. - 15 Hours
- Perioperative Pain Management: Discussing novel approaches and advancements in perioperative pain management, such as the use of multimodal analgesia techniques, regional anaesthesia, and the role of non-opioid analgesics in reducing opioid consumption and improving pain control. - 10 Hours
- Advances in Imaging Technology: Exploring the use of advanced imaging techniques, such as intraoperative ultrasound, 3D imaging, and image-guided navigation systems, in surgical planning, intraoperative decision-making, and improved surgical accuracy. - 10 Hours

- Surgical Innovation and Emerging Technologies: Discussing the latest trends and innovations in surgical techniques and technologies, including the use of 3D printing for surgical models and implants, virtual reality and augmented reality in surgical training and planning, and the potential of artificial intelligence in surgical robotics and decision support systems. - 10 Hours
- Advances in Endoscopic Procedures: Examining the latest developments in endoscopic procedures, such as single-incision laparoscopy, natural orifice transluminal endoscopic surgery (NOTES), and advanced endoscopic imaging modalities, and their impact on minimally invasive surgery and patient outcomes.

  - 10 Hours

## BAOTT-023: Disaster Management & Environmental Sciences (60 Hours)

### Learning Objectives

Studying environmental sciences equips students with a deep understanding of ecological concepts, environmental issues, and scientific principles, while also fostering practical skills for data analysis, resource management, and environmental assessment. By developing critical thinking, problem-solving abilities, and effective communication skills, students are empowered to address real-world environmental challenges, promote sustainability, and advocate for the protection of our planet. These outcomes enable students to make informed decisions, contribute to sustainable practices, and create positive change for the environment and future generations

### Disaster preparedness and management- (30 Hours)

The objective of this section will be to provide knowledge on the principles of on-site disaster management. Concepts to be taught should include-

- Fundamentals of emergency management,
- Psychological impact management,
- Resource management,
- Preparedness and risk reduction,
- Key response functions (including public health, logistics and governance, recovery, rehabilitation, and reconstruction), information management, incident command and institutional mechanisms.

## Environmental science- (30 Hours)

- Water-safe water, reservoir
- Water pollution
- Water related diseases.
- Purification of water
- Composition of air
- Air pollution
- Environment protection act
- Noise pollution
- Radiation & Its hazards
- Housing and health
- Disposal of solid waste-solid, liquid & biochemical waste
- Disposal of liquid waste
- Disposal of biochemical waste
- Sanitation & general hygiene

## Sixth Semester

**BAOTT-024 Specialized Anaesthesia-2 (100 Hours)**

**Learning Objectives**

The learning objectives include anaesthetic considerations for cardiovascular and thoracic surgery, as well as hemodynamic management strategies and monitoring approaches. They also cover central venous catheters, arterial line insertion, cardiac bypass and valve replacement procedures, controlling hemodynamic changes during cardiothoracic surgeries, and neurosurgery. To guarantee patient safety and ideal surgical conditions, the objectives also involve Neuro-Anesthesia procedures and monitoring, such as total intravenous anaesthesia (TIVA). Understanding the principles and methods of neurophysiological monitoring is essential for ensuring patient safety and optimal surgical circumstances.

The course aims to teach students about anaesthesia considerations for cardiovascular and thoracic surgeries, including hemodynamic management techniques and monitoring methods. It covers anaesthesia protocols for coronary artery bypass grafting, valve replacement, and lung resection surgeries. Students will also demonstrate proficiency in selecting and inserting central venous catheters and applying infection control measures during insertion. They will also perform arterial line insertion with precision and safety, and assess collateral circulation using Allen's test.

The course also covers anaesthesia techniques for cardiac bypass and valve replacement procedures, managing cardiopulmonary bypass effectively during open-heart procedures, and ensuring stable hemodynamics throughout the procedure. Students will also manage hemodynamic changes during cardiothoracic surgeries, including hypotension and hypertension, using transesophageal echocardiography (TEE) for accurate hemodynamic monitoring.

The course also covers anaesthesia considerations for neurosurgical procedures, including patient positioning, intracranial pressure management, and neurophysiological monitoring. It also emphasizes patient safety during brain and spine surgeries. Neuro-anesthesia techniques and monitoring in neurosurgery include total intravenous Anaesthesia (TIVA) and neurophysiological monitoring methods to optimize surgical conditions and patient outcomes.

### Specialized Anaesthesia-2

- Anesthetic considerations for cardiovascular and thoracic surgeries: Understanding the specific Anaesthesia considerations, hemodynamic management, and monitoring techniques for cardiac and thoracic surgeries such as coronary artery bypass grafting, valve replacement, and lung resection. 15 Hours
- Central Venous catheter and various insertions techniques (IJV, Femoral, PICC and subclavian) 6 Hours
- Arterial Line insertion and various techniques (including Allen‟s test) - 4 Hours

- Anesthesia techniques for cardiac bypass and valve replacement procedures: Learning about the specific anaesthetic protocols, cardiopulmonary bypass management, and strategies for maintaining stable hemodynamic during open-heart surgeries. - 15 Hours
- Management of hemodynamic changes during cardiothoracic surgeries: Exploring the principles and techniques for managing hemodynamic changes, such as hypotension and hypertension, during cardiothoracic surgeries and TEE. - 20 Hours
- Anaesthetic considerations for neurosurgical procedures: Understanding the unique challenges and considerations in providing Anaesthesia for brain and spine surgeries, including patient positioning, intracranial pressure management & neurophysiological monitoring. - 20 Hours
- Neuro-Anesthesia techniques and monitoring in neurosurgery: Learning about the specific anaesthetic techniques, such as total intravenous Anaesthesia (TIVA) and neurophysiological monitoring, used in neurosurgical procedures to ensure patient safety and optimal surgical conditions. -20 Hours

## Practical- Specialized Anaesthesia-2: (50 Hours)

- Cardiovascular and Thoracic Surgeries: Simulation-based training on hemodynamic monitoring techniques for cardiovascular and thoracic surgeries, such as non-invasive blood pressure measurement, pulse oximetry, and capnography.
- Techniques for Inserting a Central Venous Catheter: Hands-on practice with simulation models or manikins to learn the many techniques for inserting a central venous catheter, including the internal jugular vein (IJV), femoral vein, peripherally inserted central catheter (PICC), and subclavian vein.
- Arterial Line Insertion and skills: A hands-on session with simulation models or manikins to explore the stages needed and practice aseptic skills.
- Cardiac Bypass and Valve Replacement Anaesthesia Techniques
- Case studies and video presentations illustrate the anaesthesia techniques and considerations unique to cardiac bypass and valve replacement procedures.
- Scenarios concentrate on the management of hemodynamic changes after cardiac procedures, such as preserving cardiopulmonary stability and dealing with probable consequences.
- During cardiac bypass procedures, role-playing exercises are used to simulate communication and cooperation among the anesthesia team, perfusionists, and surgeons.
- Management of Hemodynamic Changes During Cardiothoracic Surgery: Interactive sessions and case discussions on the management of typical hemodynamic changes observed during cardiothoracic surgery, such as hypotension, hypertension, and volume status optimization.
- Simulation-based training in the use of non-invasive approaches to monitor hemodynamic parameters like stroke volume variation (SVV) or pulse pressure variation (PPV) to assist fluid management.

- Simulation scenarios concentrating on intracranial pressure management and cerebral ischemia prevention during neurosurgery procedures.
- Neuro-anesthesia Techniques and Monitoring in Neurosurgery: A hands-on seminar on the principles and techniques of total intravenous anaesthesia (TIVA) for neurosurgical procedures, including the use of TCI pumps.

## BAOTT-025: Specialized Surgery-2 (100 Hours)

### Learning Objectives

The learning objectives include understanding common diseases in cardiovascular and thoracic surgery, such as coronary artery disease, valvular heart disease, aortic aneurysm, congenital heart defects, arrhythmias, lung cancer, peripheral artery disease, and deep vein thrombosis, and their surgical interventions. Recognizing congenital heart defects and their anatomical and physiological implications, understanding surgical options and techniques for repairing or reconstructing congenital heart defects, understanding different cardiac and thoracic surgical procedures, and understanding specific neurosurgical procedures. Anaesthetic considerations and techniques for CTVS and neurosurgery are also discussed, along with appropriate monitoring techniques and management strategies. Intraoperative monitoring modalities, such as ECG, arterial pressure monitoring, TEE, and neurophysiological monitoring, are also discussed, with skills in interpreting data for optimizing patient outcomes. Perioperative management of complications is also discussed, identifying potential complications and adverse events, and acquiring strategies for preventing, recognizing, and managing them to ensure patient safety and positive surgical outcomes.

The course aims to teach students the pathophysiology of major disorders in cardiovascular and thoracic surgery, as well as congenital heart problems. Students will also learn about CTVS procedures such CABG, valve replacement, lung resection, and thoracotomy, as well as how to use specialized techniques for safe and effective surgeries. They will also study neurosurgical operations such as craniotomy, spinal fusion, tumor removal, and deep brain stimulation, as well as patient placement and instrumentation. Anaesthetic concerns and approaches for CTVS and neurosurgery, as well as suitable monitoring techniques and management strategies for preserving hemodynamic stability, fluid balance, and neurophysiological monitoring, will be covered. To improve patient outcomes, intraoperative monitoring modalities such as ECG, arterial pressure monitoring, TEE, and neurophysiological monitoring will be used. Complication care during surgery will be critical, including recognizing and managing potential complications and adverse events, as well as adopting preventive initiatives to maintain patient safety and excellent surgical results.

## Specialized Surgery-2

a) Diseases in CTVS: - 25 Hours

- Coronary Artery Disease: Narrowing or blockage of the coronary arteries supplying blood to the heart. Surgeries include:
- Coronary Artery Bypass Grafting (CABG): Surgical procedure to bypass the blocked or narrowed coronary arteries using grafts from other blood vessels.
- Percutaneous Coronary Intervention (PCI): Minimally invasive procedure to open blocked coronary arteries using balloon angioplasty and stent placement.
- Valvular Heart Disease: Dysfunction or damage to the heart valves. Surgeries may include:
  - Valve Repair: Restoration of the valve structure and function through surgical techniques.
  - Valve Replacement: Surgical removal of the damaged valve and implantation of a prosthetic valve.
- Aortic Aneurysm: Abnormal enlargement of the aorta, the main blood vessel supplying blood to the body. Surgeries include:
- Aneurysm Repair: Surgical repair of the weakened or enlarged section of the aorta, often through open surgery or endovascular stent grafting.
- Congenital Heart Defects: Structural abnormalities in the heart present at birth. Surgeries depend on the specific defect and may include:
- Cardiac Defect Repair: Surgical correction of congenital heart defects, such as atrial septal defect (ASD), ventricular septal defect (VSD), or Tetralogy of Fallot.
- Arrhythmias: Abnormal heart rhythms. Surgeries may include:
  - Pacemaker Implantation: Surgical placement of a device that helps regulate the heart's electrical activity.
  - Ablation Procedures: Minimally invasive techniques to destroy or isolate abnormal electrical pathways in the heart.
- Lung Cancer: Malignant tumors in the lungs. Surgeries for lung cancer include:
  - Lobectomy: Surgical removal of a lobe of the lung.
  - Pneumonectomy: Surgical removal of an entire lung.
  - Wedge Resection: Surgical removal of a small, localized portion of the lung.
- Peripheral Artery Disease (PAD): Narrowing or blockage of arteries outside the heart, typically in the legs. Surgeries may include:
- Peripheral Artery Bypass: Surgical creation of a bypass using a graft to restore blood flow to the affected area.
- Angioplasty and Stenting: Minimally invasive procedures to open blocked arteries and place stents to maintain blood flow.

- Deep Vein Thrombosis (DVT): Formation of blood clots in deep veins, commonly in the legs. Surgeries may involve:
  - Thrombectomy: Surgical removal of the blood clot from the affected vein.
  - Vein Bypass: Surgical creation of a bypass using a graft to redirect blood flow around the blocked vein.

b) Congenital Heart Defects: Structural abnormalities in the heart present at birth, such as atrial septal defect (ASD), ventricular septal defect (VSD), or Tetralogy of Fallot. Surgeries include heart repair or reconstruction, such as ASD/VSD closure or open-heart surgery. - 10 Hours.

c) Cardiovascular and thoracic surgical procedures (CTVS): Learning about the various cardiac and thoracic surgical procedures, including coronary artery bypass grafting (CABG), valve replacement, lung resection, and thoracotomy, and understanding the specialized equipment, techniques, and considerations in CTVS. - 15 Hours

d) Neurosurgical procedures: Exploring the specific neurosurgical procedures, such as craniotomy, spinal fusion, tumor resection, and deep brain stimulation, and understanding the principles, instrumentation, and patient positioning requirements in neurosurgery (Placement of horseshoe, Cranial pins and Stereotactic devices). -15 Hours

e) Anesthetic considerations and techniques for CTVS and neurosurgery: Understanding the unique Anaesthesia considerations, monitoring techniques, and management strategies for patients undergoing CTVS and neurosurgical procedures, including hemodynamic stability, fluid management, and neurophysiological monitoring. - 15 Hours

f) Intraoperative monitoring in CTVS and neurosurgery: Learning about the various intraoperative monitoring modalities used in CTVS and neurosurgery, such as electrocardiography (ECG), arterial pressure monitoring, transesophageal echocardiography (TEE), and neurophysiological monitoring, and their interpretation. -10 Hours

g) Perioperative management of complications in CTVS and neurosurgical procedures: Understanding the potential complications and adverse events that may occur during CTVS and neurosurgical procedures, and learning strategies for their prevention, early recognition, and appropriate management. - 10 Hours

## Practicals- Specialized Surgery-2: (50 Hours)

**a) Cardiovascular and Thoracic Surgical Procedures (CTVS):**

- Demonstration and hands-on practice of setting up and familiarizing with specialized equipment used in CTVS, such as heart-lung machines, cardiopulmonary bypass circuits, and intraoperative monitoring devices.
- Simulation-based training on patient positioning and draping techniques for different CTVS procedures, including CABG, valve replacement, and lung resection.
- Role-playing exercises to simulate communication and coordination among the surgical team, including anesthesiologists, surgeons, perfusionists, and nurses during CTVS procedures.

### b) Neurosurgical Procedures:

- Practical session on the instrumentation used in neurosurgical procedures, including the placement of horseshoe headrests, cranial pins, and stereotactic devices.
- Hands-on practice with simulation models or manikins to understand the principles of patient positioning and draping for different neurosurgical procedures, such as craniotomy and spinal fusion.
- Interactive discussions on the role of different instruments and equipment used in neurosurgery, including microscopes, drill systems, and neuro-endoscopes.
- Anesthetic Considerations and Techniques for CTVS and Neurosurgery:
- Case-based discussions and interactive sessions on the unique anesthesia considerations for CTVS and neurosurgical procedures, such as preoperative assessment, airway management, and selection of anesthetic agents.
- Simulation scenarios to practice anesthetic techniques specific to CTVS and neurosurgery, including induction and maintenance of anesthesia, hemodynamic management, and optimization of cerebral perfusion.
- Role-playing exercises to simulate communication and coordination between the anesthesia team and surgical team during CTVS and neurosurgical cases.

### c) Intraoperative Monitoring in CTVS and Neurosurgery:

- Practical training on the setup and interpretation of various intraoperative monitoring modalities used in CTVS and neurosurgery, such as ECG, arterial pressure monitoring, TEE, and neurophysiological monitoring.
- Case discussions and interactive sessions on the significance of intraoperative monitoring data and its role in decision-making during CTVS and neurosurgical procedures.
- Hands-on practice with simulation models or manikins to understand the proper placement and troubleshooting of monitoring devices commonly used in CTVS and neurosurgery.
- Perioperative Management of Complications in CTVS and Neurosurgical Procedures:

- Interactive sessions and case discussions on the potential complications and adverse events that may arise during CTVS and neurosurgical procedures, focusing on prevention, early recognition, and appropriate management strategies.
- Simulation-based training on managing hemodynamic instability, intraoperative bleeding, and neurologic complications in a simulated environment.
- Role-playing exercises to practice effective communication, teamwork, and crisis management skills during perioperative complications in CTVS and neurosurgery.

## BAOTT-026 Specialized Anaesthesia & Surgery 3 (100 Hours)

### Learning Objectives

The course aims to provide students with a comprehensive understanding of robotic-assisted surgical procedures, anesthetic considerations and techniques, and the role of operating theatre (OT) and Anaesthesia team (AT) professionals in assisting these procedures. It also covers the use of BIS, NMT, ultrasound, and navigation systems in Anaesthesia practice, their applications, principles, and interpretation in patient monitoring and procedural guidance.

The course also covers the role of NORA (Non-Operative Room Anaesthesia) in modern Anaesthesia practice, including radiation safety, sedation techniques, pediatric NORA, regional Anaesthesia in non-operating room settings, critical care Anaesthesia outside the ICU, safety and patient selection, teamwork and communication, equipment and resources, quality improvement, and patient outcomes.

The course also covers organ transplantation procedures, including kidney, liver, and heart transplants, and their perioperative management, immunosuppression strategies, and ethical considerations. Students will learn about preoperative assessment and optimization processes for transplant recipients, as well as the multidisciplinary approach to preoperative management.

Postoperative care and immunosuppression in transplant surgeries will be identified, including immunosuppressive drug regimens, infection prevention strategies, and long-term follow-up care. Students will demonstrate understanding of the unique challenges and considerations in postoperative management of transplant recipients.

## Course Outcomes

Upon completion of the course, students will be able to:

Demonstrate knowledge and understanding of robotic-assisted surgical procedures, collaborate effectively in OT team, apply appropriate Anaesthesia considerations and techniques, ensure patient safety, comfort, and optimal surgical conditions during robotic procedures.

By completing the course, students will be able to effectively collaborate in OT team, apply appropriate Anaesthesia considerations and techniques, and effectively manage transplant recipients' postoperative care and immunosuppression.

## Specialized Surgery-2

a) Robotic-assisted surgical procedures: Learning about the principles and techniques of robotic-assisted surgeries, such as robotic-assisted prostatectomy, robotic-assisted hysterectomy, and robotic-assisted colorectal surgeries, and understanding the roles and responsibilities of the OT and AT professionals in assisting these procedures. - 4 Hours

b) Anaesthetic considerations and techniques for robotic surgeries: Understanding the Anaesthesia considerations specific to robotic-assisted surgeries, including patient positioning, pneumoperitoneum management, and anesthetic agents and techniques suitable for these procedures. - 3 Hours

c) BIS, NMT, Ultrasound, Navigation. - 2 Hours

d) NORA (Non-Operative Room Anesthesia) is a field within anesthesia that focuses on providing anesthesia services outside the traditional operating room setting. Here are some potential topics related to NORA: - 36 Hours

- Introduction to NORA: Overview of Non-Operative Room Anesthesia, its scope, and its role in modern anesthesia practice.
- Procedures in Non-Operative Settings: Anesthetic management for various procedures performed outside the operating room, such as interventional radiology, endoscopy, cardiac catheterization, and bronchoscopy,
- Radiation Safety: Pregnancy and Pediatric Radiology, Contrast Media Safety, Infection Control, Equipment Maintenance and Calibration, Patient Identification and Consent, Emergency Preparedness, Radiation Dose Optimization, Communication and Documentation, Quality Assurance and Accreditation.
- Sedation Techniques: Techniques and protocols for sedation in non-operating room settings, including patient assessment, drug selection, monitoring, and managing complications.
- Pediatric NORA: Special considerations and techniques for providing anesthesia to pediatric patients in non-operating room settings, including sedation for imaging studies, dental procedures, and emergency department interventions.
- Regional Anesthesia in NORA: The use of regional anesthesia techniques, such as nerve blocks and epidurals, in non-operating room settings for pain management and surgical procedures.
- Critical Care Anesthesia Outside the ICU: Anesthetic management and monitoring of critically ill patients in non-operating room locations, such as the emergency department, radiology suite, or cardiac catheterization lab.
- Safety and Patient Selection: Strategies for patient selection, risk assessment, and ensuring patient safety during NORA procedures, including pre-procedure evaluation, informed consent, and appropriate monitoring.
- Teamwork and Communication: Effective collaboration and communication among anesthesia providers, proceduralists, and other healthcare professionals involved in NORA to optimize patient care and outcomes.

- Equipment and Resources: Considerations for equipment, resources, and infrastructure needed to provide safe and efficient anesthesia care in non-operating room settings, including portable anesthesia machines, monitoring devices, and emergency equipment.
- Quality Improvement and Patient Outcomes: Assessment of outcomes, patient satisfaction, and quality improvement initiatives specific to NORA, aiming to enhance patient care, safety, and efficiency.

e) Organ transplantation procedures: Exploring the principles and techniques of organ transplantation surgeries, such as kidney transplant, liver transplant, and heart transplant, and understanding the perioperative management, immunosuppression, and ethical considerations associated with transplant surgeries. - 25 Hours

f) Preoperative evaluation and management of transplant recipients: Studying the preoperative assessment, optimization, and management of transplant recipients, including organ allocation, cross-matching, and immunological considerations -15 Hours.

g) Postoperative care and immunosuppression in transplant surgeries: Understanding the postoperative care protocols, including immunosuppressive drug regimens, infection prevention strategies, and long-term follow-up care for transplant recipients. -15 Hours

## Practical in Specialized Surgery-2: (50 Hours)

**a) Robotic-Assisted Surgical Procedures:**

- Demonstration and hands-on practice with robotic surgical systems, such as da Vinci Surgical System, including instrument docking, console operation, and manipulation of robotic arms.
- Role-playing exercises to simulate the roles and responsibilities of OT and AT professionals during robotic-assisted surgeries, focusing on effective communication, teamwork, and coordination.
- Interactive discussions on patient positioning considerations, pneumoperitoneum management, and the role of anesthesia in facilitating robotic-assisted procedures.

**b) BIS, NMT, Ultrasound, Navigation:**

- Hands-on training on the use of monitoring devices like Bi-spectral Index (BIS) and neuromuscular monitoring (NMT), including electrode placement, calibration, and interpretation of data.
- Practical sessions on ultrasound-guided regional anesthesia techniques, such as nerve blocks, highlighting the principles of probe handling, needle visualization, and local anesthetic administration.
- Introduction to navigation systems used in surgeries, such as image-guided navigation for spine surgery, and demonstration of their use in surgical planning and intraoperative guidance.

**c) Non-Operative Room Anesthesia (NORA):**

- Case-based discussions and interactive sessions on the different procedures performed in non-operating room settings, including interventional radiology, endoscopy, and cardiac catheterization.
- Simulation-based training on sedation techniques in non-operating room settings, focusing on patient assessment, drug selection, monitoring, and management of sedation-related complications.
- Practical sessions on radiation safety protocols, infection control measures, and communication/documentation practices specific to NORA procedures.

**d) Organ Transplantation Procedures:**

- Interactive discussions on the principles and techniques of organ transplantation surgeries, such as kidney transplant, liver transplant, and heart transplant, including organ preservation, graft implantation, and vascular anastomosis.
- Simulation scenarios to understand the perioperative management of transplant recipients, including preoperative evaluation, optimization, and immunosuppressive drug regimens.
- Role-playing exercises to simulate postoperative care scenarios for transplant recipients, focusing on infection prevention strategies, long-term follow-up care, and coordination with multidisciplinary teams.

**e) Preoperative Evaluation and Management of Transplant Recipients:**

- Case discussions and interactive sessions on the preoperative assessment and management of transplant recipients, including organ allocation, cross-matching, and immunological considerations.
- Hands-on training on laboratory techniques used in transplant medicine, such as HLA typing and cross-matching tests.
- Interactive sessions on ethical considerations in organ transplantation, including organ donation, allocation policies, and patient selection criteria.

**f) Postoperative Care and Immunosuppression in Transplant Surgeries:**

- Practical training on the management of immunosuppressive drug regimens commonly used in transplant recipients, including drug interactions, dose adjustments, and monitoring of therapeutic levels.
- Simulation-based training on infection prevention strategies for transplant recipients, focusing on identifying and managing postoperative infectious complications.
- Role-playing exercises to simulate long-term follow-up care scenarios for transplant recipients, including monitoring graft function, managing complications, and promoting adherence to immunosuppressive therapies.

## BAOTT-027 Research Methodology and Biostatistics (60 Hours)

### Learning Objectives

The course's goal is to give learners a thorough understanding of research methodologies, their applications, and the necessity of expanding knowledge and solving issues. It discusses numerous research methodologies and their applications in various fields, as well as research ethics issues such as informed permission, confidentiality, and privacy. Students will also gain knowledge of research design, fundamental biostatistics principles, data kinds, research tools and data collection methods, sampling procedures, and formulating a research proposal.

The course also emphasizes the significance of ethical issues in research, such as informed consent, confidentiality, and privacy, as well as the significance of ethical rules and legislation. Students will also learn about different forms of data, data gathering methods, and the peer review and ethical approval procedure for research ideas.

After completing the course, students will be able to identify and formulate research problems and questions, evaluate ethical considerations, select appropriate research designs, apply basic biostatistics concepts, classify and handle different types of data in research analysis, effectively use various research tools and data collection methods, and develop a well-structured research report.

## Research Methodology and Biostatistics

The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

- Introduction to research methods - 5 Hours
- Identifying research problem - 5 Hours
- Ethical issues in research - 5 Hours
- Research design - 10 Hours.
- Basic Concepts of Biostatistics - 10 Hours
- Types of Data - 5 Hours
- Research tools and Data collection methods - 5 Hours.
- Sampling methods - 5 Hour
- Developing a research proposal - 10 Hours

## Seventh and Eighth Semester

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in simulation and treatment delivery. Students will demonstrate competence in beginning, intermediate, and advanced procedures in both areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

## Teaching and Examination Pattern

Here is a proposed teaching and examination pattern for the Bachelor of Anaesthesia & Operation Theatre Technology program.

(L - Lectures, T - Theory, P/D –Practical/Demonstration, CLP – Clinical Posting, CR - Credits. IA - Internal Assessment, SEE – Semester End Examination)

### First Semester:

| Course Code | Course Title | Teaching Hour | | | | Theory | | | Practical | | | Grand Total (Marks) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L hrs.) | P/D | CLP | CR | SEE | IA | T | SEE | IA | T | |
| BAOTT-001 | Basics of Healthcare Delivery System in India | 80 | ….. | ….. | 4 | 40 | 10 | 50 | ….. | ….. | ….. | 50 |
| BAOTT-002 | Medical Terminology & Record Keeping | 50 | ….. | ….. | 3 | 40 | 10 | 50 | ….. | ….. | ….. | 50 |
| BAOTT-003 | Anatomy | 100 | 40 | ….. | 6 | 80 | 20 | 100 | 40 | 10 | ….. | 150 |
| BAOTT-004 | Physiology | 100 | 40 | ….. | 6 | 80 | 20 | 100 | 40 | 10 | ….. | 150 |
| BAOTT-005 | Healthcare Quality & Patient Safety | 40 | 60 | ….. | 5 | 40 | 10 | 50 | 30 | 20 | 50 | 100 |
| **Total** | | **370** | **140** | **…..** | **24** | **…..** | **….** | **350** | **…..** | **…..** | **50** | **500** |
| **Grand Total** | | **510** | | | **……** | | | | | | | |

## Second Semester:

| Course Code | Course Title | Teaching Hour | | | | Theory | | | Practical | | | Grand Total (Marks) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L (hrs.) | P/D | CLP | CR | SEE | IA | T | SEE | IA | T | |
| BAOTT -006 | Medical Law & Ethics, Principles of Management | 60 | ….. | ….. | 4 | 40 | 10 | 50 | ….. | …. | ….. | 50 |
| BAOTT -007 | Basics of Biomedical Sciences in Surgery & Anesthesia | 40 | 60 | ….. | 3 | 40 | 10 | 50 | ….. | …. | ….. | 50 |
| BAOTT -008 | Biochemistry & Hematology | 40 + 30 | 0 + 30 | ….. | 3 | 40 + 40 | 10 + 10 | 100 | 30 | 20 | 50 | 150 |
| BAOTT -009 | Pathology & Microbiology | 50 + 50 | ……. | ….. | 4 | 40 + 40 | 10 + 10 | 100 | ….. | …. | ….. | 100 |
| BAOTT -0010 | Basic Concept in Pharmacology | 40 | ……. | ….. | 2 | 40 | 10 | 50 | ….. | …. | ….. | 50 |
| BAOTT -0011 | Basic Computer & Information Sciences, communication & Soft Skills | 40 | 60 | 0 | 4 | 40 | 10 | 50 | 30 | 20 | 50 | 100 |
| **Total** | | **350** | **150** | **…..** | **20** | **…..** | **….** | **400** | **…..** | **….** | **100** | **500** |

## Third Semester

| Course Code | Course Title | Teaching Hours | | | | Theory | | | Practical | | | Grand Total (Marks) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L (hrs.) | P/ D | CL P | C R | SEE | IA | T | SEE | IA | T | |
| BAOTT-012 | Basic Techniques of Anesthesia | 100 | ….. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT-013 | Basics of Surgical Procedures | 100 | ….. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT-014 | CSSD & Manifold area | 50 | ….. | 100 | 4 | 40 | 10 | 50 | ….. | ….. | ….. | 50 |
| BAOTT-015 | Industrial Orientation & Industrial Visit | 50 | ….. | 0 | 2 | 40 | 10 | 50 | ….. | ….. | ….. | 50 |
| **Total** | | **300** | **…..** | **200** | **16** | **…..** | **….** | **300** | **…..** | **…..** | **100** | |
| **Grand Total** | | **510** | | | **……** | | | | | | | **400** |
| **(Hours)** | | | | | | | | | | | | |

## Fourth Semester:

| Course Code | Course Title | Teaching Hour | | | | Theory | | | Practical | | | Grand Total (Marks) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L (hrs.) | P / D | CL P | CR | SEE | IA | T | SEE | IA | T | |
| BAOTT -016 | Advanced Anesthesia Techniques | 100 | …. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT -017 | Advanced Surgical Procedures | 100 | …. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT -018 | Basic Intensive CARE | 50 | …. | 100 | 4 | 40 | 10 | 50 | 30 | 20 | 50 | 100 |
| BAOTT -019 | Clinical Medicine & Management | 50 | …. | 0 | 2 | 40 | 10 | 50 | ….. | ….. | ….. | 50 |
| **Total** | | **300** | **…. ..** | **200** | **16** | **…..** | **….** | **300** | **…..** | **…..** | **150** | |
| **Grand Total (Hours)** | | **500** | | | **…… ……** | | | | | | | **450** |

## Fifth Semester:

| Course Code | Course Title | Teaching Hour | | | | Theory | | | Practical | | | Grand Total (Marks) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L (hrs.) | P/ D | CL P | CR | SEE | IA | T | SEE | IA | T | |
| BAOTT -020 | Specialize d Anesthesia | 100 | ….. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT -021 | Specialized Surgery | 100 | ….. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT -022 | Recent Advances in Anesthesia & Surgical Field | 50 | ….. | 50 | 5 | 80 | 20 | 100 | ….. | ….. | ….. | 100 |
| BAOTT -023 | Disaster Management & Environmental Science | 100 | ….. | 0 | 2 | 40 | 10 | 50 | ….. | ….. | ….. | 50 |
| **Total** | | **400** | **…..** | **150** | **17** | **…..** | **….** | **350** | **…..** | **…..** | **100** | **450** |
| **Grand Total (Hours)** | | | | **510** | **……** | | | | | | | |

## Sixth Semester:

| Course Code | Course Title | Teaching Hour | | | | Theory | | | Practical | | | Grand Total (Marks) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L (hrs.) | P / D | CLP | CR | SEE | IA | T | SEE | IA | T | |
| BAOTT-024 | Specialized Anesthesia-2 | 100 | …. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT-025 | Specialized Surgery-2 | 100 | …. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT-026 | Specialized Anesthesia & Surgical-3 | 100 | …. | 50 | 5 | 80 | 20 | 100 | 40 | 10 | 50 | 150 |
| BAOTT-027 | Research Methodology & Biostatics" | 50 | …. | 0 | 2 | 40 | 10 | 50 | ….. | ….. | ….. | 50 |
| **Total** | | **350** | **…..** | **150** | **17** | **…..** | **….** | **350** | **…..** | **…..** | **150** | **500** |
| **Grand Total (Hours)** | | **500** | | | **……** | | | | | | | |

## Seventh and Eight Semester:

| Course Code | Course Title | Time Period |
|---|---|---|
| BAOTT-028 | BAOTT Internship (Anesthesia, Surgery, Specialties) | One Year |

| **Reference Books Lists for Each Subject:** | | |
|---|---|---|
| **S. No.** | **Subject Name** | **Reference Books** |
| **1** | Anatomy | a. Human Anatomy (Vol-I, II, III) B D Chaurasia,<br>b. Ross and Wilson Anatomy and Physiology,<br>c. Human Anatomy for Students, B.D Ghosh.<br>d. Textbook of Anatomy (Vol-1,2,3) Samar Mitra. |
| **2** | Physiology | a. Essentials of Medical Physiology, K Sembulingam,<br>b. Comprehensive Textbook of Medical Physiology, G K Pal.<br>c. Ross and Wilson Anatomy and Physiology,<br>d. Practical Physiology G K Pal & Pravati Pal<br>e. Ganong's Review of Physiology by Barrett, Barman, Brooks and Yuan |
| **3** | Basics of Biomedical sciences in surgery and Anesthesia | a. Fundamentals of Biomedical Instrumentation by Dr. O.N. Pandey (Author)<br>b. Handbook of medical instrumentation by R S Kanpur.<br>c. The Anesthesia Technologist's Manual by Emily S Guimaraes, Matthew Davis, Jeffrey R Kirsch, Glenn Woodworth.<br>d. Surgical Technology for the surgical technologist by association of surgical technologists |
| **4** | Biochemistry & Hematology | a. Biochemistry, U Satyanarayan,<br>b. Biochemistry, DM. Vasudevan,<br>c. An Introduction to Hematology, Nandini Mukherjee. |
| **5** | Pathology & Microbiology | a. Microbiology, Ananthanarayan and Paniker's,<br>b. CP. Baveja. Textbook of Microbiology for nurses.<br>c. A textbook of Microbiology-Chakraborty.<br>d. Pathology, Harsh Mohan e. Basic Pathology by Robbins |
| **6** | Basic Concepts in Pharmacology | a. Essentials of Medical Pharmacology, KD Tripathi<br>b. Medical Pharmacology, Uday Kumar (Author) |

| | | |
|---|---|---|
| **7** | Basic Techniques of Anaesthesia | a. Drugs & Equipment in Anesthetic Practice by Arun Kumar Paul,<br>b. short textbook on Anesthesia, Ajay Yadav,<br>c. Short Textbook of Anesthesia, Bajaj Kumar, d. Understanding Anesthesia Equipment Dorsch & Dorsch, e. Wards Anesthesia Equipment Andrew & Ali Diba,<br>f. The Anesthesia Technician & Technologists Manual Glenn Woodworth. |
| **8** | Basics of Surgical procedures | a. Fullers Surgical Technology, Joanna Kotcher Fuller<br>b. D C Dutta textbook OG Gynecology, Hiralal Konar.<br>c. Laparoscopic Surgery, R. K. Mishra<br>d. Surgical Technology for the surgical technologist by association of surgical technologists.<br>e. Introduction to the Surgery by Marketa Duskova.<br>f. Textbook on Operation Theatre Technology, Bhagwan Ramachandran.<br>g. A PRACTICAL GUIDE TO OBSTETRICAL AND GYNECOLOGICAL INSTRUMENTS FOR Nurses, Chaitanya.C.<br>h. Instrument and Operative Surgery, A.K Gvalani, i. Operation Theatre Nursing, I. Clement. |
| **9** | CSSD & Manifold Area. | a. Essentials of Applied Microbiology for Nurses Including Infection Control and Safety by Apurba S Sastry, Sandhya Bhat.<br>b. medical gases: Health Technical Memorandum Medical gas pipeline systems, by Dept. of Health, UK Health Departments. |
| **10** | Advanced Anaesthesia Techniques | a. Drugs & Equipment in Anesthetic Practice by Arun Kumar Paul, b. short textbook on Anesthesia, Ajay Yadav, c. Understanding Anesthesia Equipment Dorsch & Dorsch, d. Handbook of Mechanical Ventilation, B Umesh Kumar, e. Wards Anesthesia Equipment Andrew & Ali Diba, f. The Anesthesia Technician & Technologists Manual Glenn Woodworth. g. Miller‟s Anesthesia. |

| | | |
|---|---|---|
| **11** | Advanced Surgical Procedures | a. Fullers Surgical Technology, Joanna Kotcher Fuller b. Diseases in ENT, Head & Neck Surgery, PL Dhingra & Shruti Dhingra. c. Laparoscopic Surgery, R. K. Mishra d. Surgical Technology for the surgical technologist by association of surgical technologists. e. Manipal manual of Surgery, Rajagopal Shenoy, Anitha Shenoy. |
| **12** | Basic Intensive Care | a. Principles of Critical Care, Udwadia Erach Farokh (Author) b. The Protocol Book of Intensive Care, Soumitra Kumar. c. Oxford's Handbook of Critical Care, M Singer, A. Webb. d. Essentials of Anesthesia & Critical Care, Anshul Jain, e. Essentials of Critical Care Nursing, Jaya Kuruvilla. f. The ECG made easy, John R. Hampton, g. Advanced Emergency Life Support Protocol, Gireesh Kumar K P. h. ICU manual, Goel, Joshi, Jain |
| **13** | Clinical Medicine & Related Management | a. Harrison's principles of Internal Medicine, b. Toohey's Medicine, R Indrani. |
| **14** | Specialized Anesthesia 1 | a. Drugs & Equipment in Anesthetic Practice by Arun Kumar Paul, b. short textbook on Anesthesia, Ajay Yadav, c. Understanding Anesthesia Equipment Dorsch & Dorsch, d. Wards Anesthesia Equipment Andrew & Ali Diba, e. The Anesthesia Technician & Technologists Manual Glenn Woodworth. f. Miller"s Anesthesia. |
| **15** | Specialized surgery 1 | a. Fullers Surgical Technology, Joanna Kotcher Fuller b. Laparoscopic Surgery, R. K. Mishra c. Surgical Technology for the surgical technologist by association of surgical technologists. d. Essential Orthopedics, Maheshwari & Makar, e. Orthopedic Surgical approach, Miller, Chhabra, Browne, Park, Shen. f. Urology Instrumentation, Ravindra B Sabnis, |
| **16** | Recent Advances in Anesthesia and Surgical Fields | a. Fullers Surgical Technology, Joanna Kotcher Fuller b. Laparoscopic Surgery, R.K.Mishra c. SRB"s manual of Surgery, Sriram Bhat M, d. Miller"s Anesthesia, e. Advances in Anesthesia for Laparoscopic Surgeries Regional Anesthesia and The Road Ahead. |
| **17** | Community Medicine & Environmental Sciences | a. Community advances with recent advances by Suryakantha b. Review of Preventive and Social Medicine (including biostatistics) by Dr. Vivek Jain c. Environmental Science by Y K Singh. |

| | | |
|---|---|---|
| **18** | Specialized Anesthesia 2 | a. Understanding Anesthesia Equipment Dorsch & Dorsch,<br>b. Wards Anesthesia Equipment Andrew & Ali Diba,<br>c. The Anesthesia Technician & Technologists Manual Glenn Woodworth. d. Miller‟s Anesthesia. |
| **19** | Specialized Surgery 2 | a. Fullers Surgical Technology, Joanna Kotcher Fuller<br>b. Surgical Technology for the surgical technologist by association of surgical technologists.<br>c. The Neurosurgical Instrument Guide, Christopher.S. Eddleman d. Neurology & Neurosurgery illustrated, Lindsay, Bone, Fuller. |
| **20** | Specialized Anesthesia & Surgery 3 | a. Miller‟s Anesthesia,<br>b. Advances In Anesthesia for Laparoscopic Surgeries Regional Anesthesia and The Road Ahead<br>c. Fullers Surgical Technology, Joanna Kotcher Fuller d. Laparoscopic Surgery, R. K. Mishra |

| | | |
|---|---|---|
| **21** | Research Methodology and Biostatistics | a. Research methodology by C R Kothari |
| **22** | Miscellaneous Books | a. ECG made easy, Atul Luthra,<br>b. Paramedics 6 in 1 Handbook, GD Mogli,<br>c. A First handbook of Medical Instruments, A Bhoomika/ G. Chatterjee,<br>d. Hospital Acquired Infection, Neeta Patwardhan, Satish Patwardhan,<br>e. Fluid Therapy, Rashmi Dutta,<br>f. Manual of First Aid, LC Gupta, g. Instrument and Operative Surgery, AK Gvalani,<br>h. The little ICU book, Paul L. Marino,<br>i. Environmental studies for UG Courses, Erach Bharucha, UGC. |