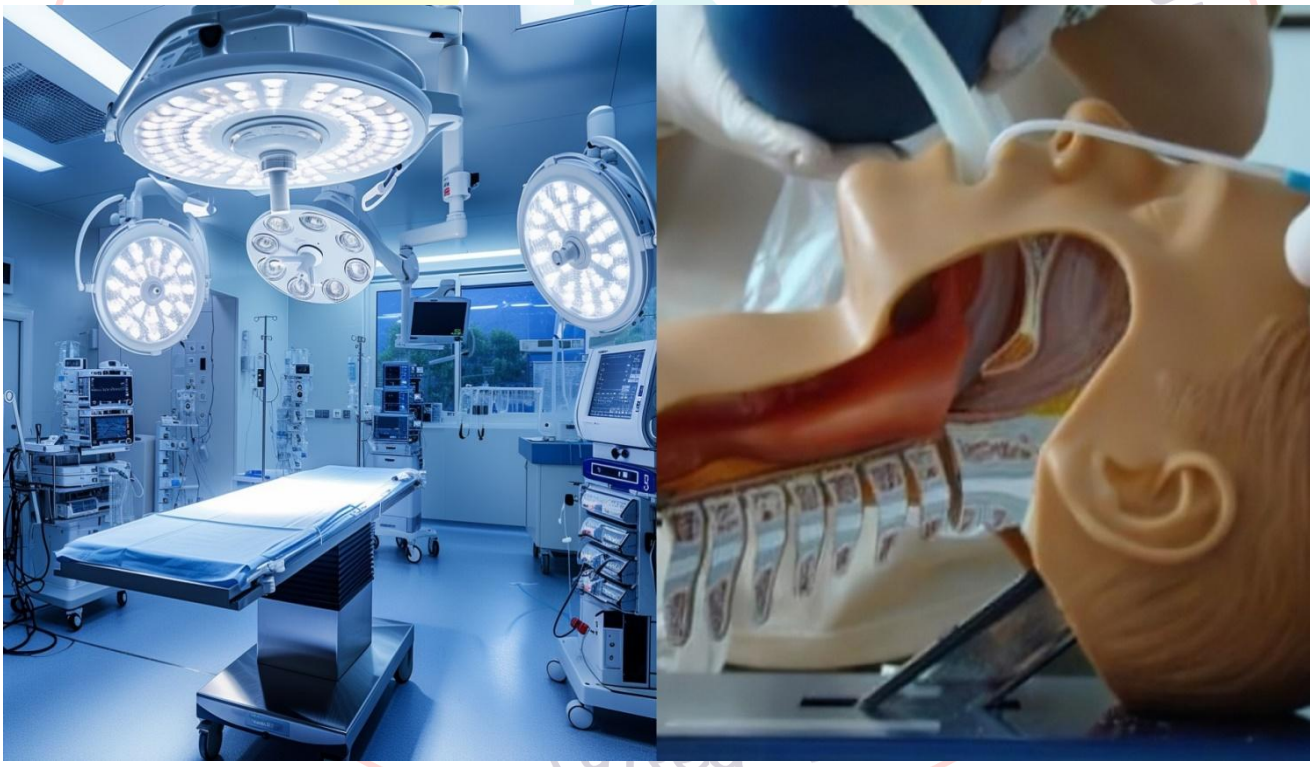
सत्यमेव जयते

National Commission for Allied and Healthcare Professions

COMPETENCY BASED CURRICULUM

for

"ANAESTHESIA & OPERATION THEATRE TECHNOLOGY"



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Ministry of Health & Family Welfare


NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
राष्ट्रीय सहबद्ध और स्वास्थ्य देखभाल पेशा आयोग
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NCAHP
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List of Abbreviations

AED	Automated External Defibrillator
AHP	allied and healthcare Professionals
AIDS	Acquired Immuno Deficiency Disease
BLS	Basic life support
BOTT	Bachelor in Operation Theatre Technology
BMW	Bio Medical Waste
BVM	Bag Value Masks
CATS	Credit Accumulation and Transfer System
CBC	Complete Blood Count
CBCS	Choice-Based Credit System
CbD	Case-based discussion
CEX	Case Evaluation Exercise
CHC	Community Health Centre
CMP	Comprehensive Metabolic Panel
CPR	Cardiopulmonary Resuscitation
CPU	Central Processing Unit
CSF	Cerebrospinal fluid
CSSD	Central Sterile Supplies Department
DH	District Hospital
DOTT	Diploma in Operation Theatre Technology
DOPs	Direct observation of procedures
ECG	Electro cardiogram
ESWL	Extracorporeal shock wave therapy
HIS	Hospital Information System
HOD	Head of Department
HSSC	Healthcare Sector Skill Council
ILO	International Labor Organization
JCI	Joint Commission International
LFT	Liver Function Tests
CEX	Mini Case Evaluation Exercise
NAAC	National Assessment and Accreditation Council
NABH	National Accreditation Board for Hospitals & Healthcare
NCRC	National Curricula Review Committee
NIAHS	National Initiative for Allied and Healthcare Sciences
NSDA	National Skills Development Agency
NSQF	National Skills Qualification Framework
OBG	Obstetrics and Gynecology
OSCE	Objective Structured Clinical Examination
OT	Operation Theatre
OTT	Operation Theatre Technology
OSLER	Objective Structured Long Examination Record
OSPE	Objective Structured Practical Examination
PPE	Personal Protective Equipment

PHC	Primary Health Centre
RFT	Renal Function Tests
SDL	Self-directed learning
SCA	Sudden Cardiac Arrest
SC	Sub Centre
SDH	Sub District Hospital
TFT	Thyroid Function Test
TURP	Transurethral Resection of the Prostate
TURBT	Transurethral Resection of Bladder Tumors
UGC	University Grants Commission
UHC	Universal Health Coverage
WWW	World Wide Web


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Chapter 1
Introduction to the Handbook

Chapter 1: Introduction to the Handbook

The report 'From Paramedics to Allied Health Professionals: Landscaping the Journey and Way Forward' that was published in 2012, marked the variance in education and training practices for the allied and healthcare courses offered by institutions across the country. This prompted the Ministry of Health and Family Welfare to envisage the creation of national guidelines for education and career pathways of allied and healthcare professionals, with a structured curriculum based on skills and competencies. Thus, this handbook has been designed to familiarize universities, colleges, healthcare providers as well as educators offering allied and healthcare courses with these national standards.

Individually, created for different professional groups of allied and healthcare, this handbook aims to reduce the variation in education by comprising of a standardized curriculum, career pathways, nomenclature and other details for each profession. The change from a purely didactic approach will create better skilled professionals and improve the quality of overall patient care. Approved by National Commission for Allied & Healthcare Professions (NCAHP) i.e. National standard-setting authority, a statutory regulatory body set up by an Act of Parliament in 2021, this handbook will guide thousands of young adults who choose healthcare as a profession – not as doctors or nurses but to play several other critical roles – on the appropriate course of action to enable them to be skilled allied and healthcare professionals of the future.

Who is an Allied and Healthcare Professional?

The Ministry of Health and Family Welfare, accepted in its entirety the definition of an allied and healthcare professional based on the afore-mentioned report, though the same has evolved after multiple consultations and the recommended definition is now as follows-

'Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions. They work in multidisciplinary health teams in varied healthcare settings including doctors (physicians and specialist), nurses and public health officials to promote, protect, treat and/or manage a person('s) physical, mental, social, emotional, environmental health and holistic well-being."

Since the past few years, many professional groups have been interacting and seeking guidance on all those who would qualify under the purview of "allied and healthcare professionals". In the healthcare system, statutory bodies existed for clinicians, nurses, pharmacists and dental practitioners; but a regulatory structure for around 50 professions was absent in India till 2021 when Government of India established a regulatory body "National Commission for Allied & Healthcare Professions" enacted by an Act of Parliament. The Government has kept these 56 professions (as listed Annex-1) under the ambit of the Allied and Healthcare system and regulated these 56 allied health professionals under 10 different groups by establishing 10 professional councils for each of the group of professions. However, this number is subject to changes and modifications over time, particularly considering how quickly new technologies and new clinical avenues are expanding globally, creating newer cadres of such professionals.

Scope and need for allied and healthcare professionals in the Indian healthcare system

The quality of medical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses.[1] Professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. In fact, diagnosis is now so dependent on technology, that allied and healthcare professionals (AHPs) are vital to successful treatment delivery.

Effective delivery of healthcare services depends largely on the nature of education, training and appropriate orientation towards community health of all categories of health personnel, and their capacity to function as an integrated team. For instance in the UK, more than 84,000 AHPs, with a range of skills and expertise, play key roles within the National Health Service, working autonomously, in multi-professional teams in various settings. All of them are first-contact practitioners and work across a wide range of locations and sectors within acute, primary and community care. Australia's health system is managed not just by their doctors and nurses, but also by the 90,000 university-trained, autonomous AHPs vital to the system.[2,3]

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. AHPs also play a significant role to care for patients who struggle mentally and emotionally in the current challenging environment and require mental health support; and help them return to well-being.[2] Children with communication difficulties, the elderly, cancer patients, patients with long term conditions such as diabetes people with vision problems and amputees; the list of people and potential patients who benefit from AHPs is indefinite.

Thus, the breadth and scope of the allied and healthcare practice varies from one end to another, including areas of work listed below:

- Across the age span of human development from neonate to old age;
- With patients having complex and challenging problems resulting from systemic illnesses such as in the case of diabetes, cardiac abnormalities/conditions and elderly care to name a few;
- Towards health promotion and disease prevention, as well as assessment, management and evaluation of interventions and protocols for treatment;
- In a broad range of settings from a patient's home to community, primary care centers, to tertiary care settings; and
- With an understanding of the healthcare issues associated with diverse socio-economies and cultural norms within the society.

Learning goals and objectives for allied and healthcare professionals

The handbook has been designed with a focus on performance-based outcomes pertaining to different levels. The learning goals and objectives of the undergraduate and graduate education program will be based on the performance expectations. They will be articulated as learning goals (why we teach this) and learning objectives (what the students will learn). Using the framework, students will learn to integrate their knowledge, skills and abilities in a hands-on manner in a professional healthcare setting. These learning goals are divided into nine key areas, though the degree of required involvement may differ across various levels of qualification and professional cadres:

1. Clinical care
2. Communication
3. Membership of a multidisciplinary health team
4. Ethics and accountability at all levels (clinical, professional, personal and social)
5. Commitment to professional excellence
6. Leadership and mentorship
7. Social accountability and responsibility
8. Scientific attitude and scholarship (only at higher levels-Master's & Ph.D.)
9. Lifelong learning

1. Clinical Care[4]

Using a patient/family-centered approach and best evidence, each student will organize and implement the prescribed preventive, investigative and management plans; and will offer appropriate follow-up services. Program objectives should enable the students to:

- Apply the principles of basic science and evidence-based practice
- Use relevant investigations as needed
- Identify the indications for basic procedures and perform them in an appropriate manner
- Provide care to patients – efficiently and in a cost-effective way – in a range of settings, and maintain foremost the interests of individual patients
- Identify the influence of biological, psychosocial, economic, and spiritual factors on patients' well-being and act in an appropriate manner
- Incorporate strategies for health promotion and disease prevention with their patients

2. Communication[4,5]

The student will learn how to communicate with patients/clients, care-givers, other health professionals and other members of the community effectively and appropriately. Communication is a fundamental requirement in the provision of health care services. Program objectives should enable the students to:

- Provide sufficient information to ensure that the patient/client can participate as actively as possible and respond appropriately to the information

- Clearly discuss the diagnosis and options with the patient, and negotiate appropriate treatment plans in a sensitive manner that is in the patient's and society's best interests
- Explain the proposed healthcare service – its nature, purpose, possible positive and adverse consequences, its limitations, and reasonable alternatives wherever they exist
- Use effective communication skills to gather data and share information including attentive listening, open-ended inquiry, empathy and clarification to ensure understanding
- Appropriately communicate with, and provide relevant information to, other stakeholders including members of the healthcare team
- Use communication effectively and flexibly in a manner that is appropriate for the reader or listener
- Explore and consider the influence that the patient's ideas, beliefs and expectations have during interactions with them, along with varying factors such as age, ethnicity, culture and socioeconomic background
- Develop efficient techniques for all forms of written and verbal communication including accurate and timely record keeping
- Assess their own communication skills, develop self-awareness and be able to improve their relationships with others
- Possess skills to counsel for lifestyle changes and advocate health promotion

3. Membership of a multidisciplinary health team[6]

The student will put a high value on effective communication within the team, including transparency about aims, decisions, uncertainty and mistakes. Team-based health care is the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively to accomplish shared goals within and across settings to achieve coordinated, high quality care. Program objectives will aim at making the students being able to:

- Recognize, clearly articulate, understand and support shared goals in the team that reflect patient and family priorities
- Possess distinct roles within the team; to have clear expectations for each member's functions, responsibilities, and accountabilities, which in turn optimizes the team's efficiency and makes it possible for them to use division of labor advantageously, and accomplish more than the sum of its parts
- Develop mutual trust within the team to create strong norms of reciprocity and greater opportunities for shared achievement
- Communicate effectively so that the team prioritizes and continuously refines its communication channels creating an environment of general and specific understanding
- Recognize measurable processes and outcomes, so that the individual and team can agree on and implement reliable and timely feedback on successes and failures in both the team's functioning and the achievement of their goals. These can then be used to track and improve performance immediately and over time.

4. Ethics and accountability

Students will understand core concepts of clinical ethics and law so that they may apply these to their practice as healthcare service providers. Program objectives should enable the students to:

- Describe and apply the basic concepts of clinical ethics to actual cases and situations
- Recognize the need to make health care resources available to patients fairly, equitably and without bias, discrimination or undue influence
- Demonstrate an understanding and application of basic legal concepts to the practice
- Employ professional accountability for the initiation, maintenance and termination of patient-provider relationships
- Demonstrate respect for each patient's individual rights of autonomy, privacy, and confidentiality

5. Commitment to professional excellence[7]

The student will execute professionalism to reflect in his/her thought and action a range of attributes and characteristics that include technical competence, appearance, image, confidence level, empathy, compassion, understanding, patience, manners, verbal and non-verbal communication, an anti-discriminatory and non-judgmental attitude, and appropriate physical contact to ensure safe, effective and expected delivery of healthcare. Program objectives will aim at making the students being able to:

- Demonstrate distinctive, meritorious and high quality practice that leads to excellence and that depicts commitment to competence, standards, ethical principles and values, within the legal boundaries of practice
- Demonstrate the quality of being answerable for all actions and omissions to all, including service users, peers, employers, standard-setting/regulatory bodies or oneself
- Demonstrate humanity in the course of everyday practice by virtue of having respect (and dignity), compassion, empathy, honour and integrity
- Ensure that self-interest does not influence actions or omissions, and demonstrate regards for service-users and colleagues

6. Leadership and mentorship[8]

The student must take on a leadership role where needed in order to ensure clinical productivity and patient satisfaction. They must be able to respond in an autonomous and confident manner to planned and uncertain situations, and should be able to manage themselves and others effectively. They must create and maximize opportunities for the improvement of the health seeking experience and delivery of healthcare services. Program objectives should enable the students to:

- Act as agents of change and be leaders in quality improvement and service development, so that they contribute and enhance people's wellbeing and their healthcare experience
- Systematically evaluate care; ensure the use of these findings to help improve people's experience and care outcomes, and to shape clinical treatment protocols and services

- Identify priorities and effectively manage time and resources to ensure the maintenance or enhancement of the quality of care
- Recognize and be self-aware of the effect their own values, principles and assumptions may have on their practice. They must take charge of their own personal and professional development and should learn from experience (through supervision, feedback, reflection and evaluation)
- Facilitate themselves and others in the development of their competence, by using a range of professional and personal development skills
- Work independently and in teams. They must be able to take a leadership role to coordinate, delegate and supervise care safely, manage risk and remain accountable for the care given; actively involve and respect others' contributions to integrated person-centered care; yet work in an effective manner across professional and agency boundaries. They must know when and how to communicate with patients and refer them to other professionals and agencies, to respect the choices of service users and others, to promote shared decision-making, to deliver positive outcomes, and to coordinate smooth and effective transition within and between services and agencies.

7. Social Accountability and Responsibility[9]

The students will recognize that allied and healthcare professionals need to be advocates within the health care system, to judiciously manage resources and to acknowledge their social accountability.[10] They have a mandate to serve the community, region and the nation and will hence direct all research and service activities towards addressing their priority health concerns. Program objectives should enable the students to:

- Demonstrate knowledge of the determinants of health at local, regional and national levels and respond to the population needs
- Establish and promote innovative practice patterns by providing evidence-based care and testing new models of practice that will translate the results of research into practice, and thus meet individual and community needs in a more effective manner
- Develop a shared vision of an evolving and sustainable health care system for the future by working in collaboration with and reinforcing partnerships with other stakeholders, including academic health centres, governments, communities and other relevant professional and non-professional organizations
- Advocate for the services and resources needed for optimal patient care

8. Scientific attitude and Scholarship[10]

The student will utilize sound scientific and/or scholarly principles during interactions with patients and peers, educational endeavors, research activities and in all other aspects of their professional lives. Program objectives should enable the students to:

- Engage in ongoing self-assessment and structure their continuing professional education to address the specific needs of the population
- Practice evidence-based by applying principles of scientific methods
- Take responsibility for their educational experiences
- Acquire basic skills such as presentation skills, giving feedback, patient education and the design and dissemination of research knowledge; for their application to teaching encounters

9. Lifelong learning[11]

The student should be committed to continuous improvement in skills and knowledge while harnessing modern tools and technology. Program objectives will aim at making the students being able to:

- Perform objective self-assessments of their knowledge and skills; learn and refine existing skills; and acquire new skills
- Apply newly gained knowledge or skills to patient care
- Enhance their personal and professional growth and learning by constant introspection and utilizing experiences
- Search (including through electronic means), and critically evaluate medical literature to enable its application to patient care
- Develop a research question and be familiar with basic, clinical and translational research in its application to patient care
- Identify and select an appropriate, professionally rewarding and personally fulfilling career pathway

Introduction of new elements in allied and healthcare education

Competency-based curriculum

A significant skill gap has been observed in the professionals offering healthcare services irrespective of the hierarchy and level of responsibility in the healthcare settings. The large variation in the quality of services is due to the diverse methodologies opted for healthcare education and the difference in expectations from a graduate after completion of a course and at work. What one is expected 'to perform' at work is assumed to be learned during the course, however, the course design focuses on what one is expected 'to know'. The competency-based curriculum thus connects the dots between the 'know what' and 'do how'.

The efficiency and effectiveness of any educational programme largely depends on the curriculum design that is being followed. With emerging medical and scientific knowledge, educators have realized that learning is no more limited to memorizing specific lists of facts and data; in fact, by the time the professional aims to practice in the healthcare setting, the acquired knowledge may stand outdated. Thus, competency-based education is the answer; a curricular concept designed to provide the skills that professionals need. A competency-based program is a mix of skills and competencies based on individual or population needs (such as clinical knowledge, patient care, or communications approaches), which is then developed to teach relevant content across a range of courses and settings. While the traditional system of education focuses on objectives, content, teacher-centric approach and summative evaluation; competency-based education has a focus on competencies, outcomes, performance and accomplishments. In such a case, teaching activities are learner-centered, and evaluation is continuous and formative in structure. The competency-based credentials depend on the demonstration of a defined set of competencies which enables a professional to achieve targeted goals. Competency frameworks comprise of a clearly articulated statement of a person's abilities on the completion of the credential, which allows students, employers, and other stakeholders to set their expectations appropriately.[12] [13]

Considering the need of the present and future healthcare delivery system, the curriculum design depicted in this handbook thus will be based on skills and competencies.

Promoting self-directed learning of the professionals

The shift in the focus from traditional to competency-based education has made it pertinent that the learning processes may also be revisited for suitable changes. It is a known fact that learning is no more restricted to the boundaries of a classroom or the lessons taught by a teacher. The new tools and technologies have widened the platform and introduced innovative modes of how students can learn and gain skills and knowledge. One of the innovative approaches is learner-centric and follows the concept of **self-directed learning.**

Self-directed learning, in its broadest meaning, describes a process in which individuals take the initiative with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying resources for learning, choosing and implementing learning strategies and evaluating learning outcomes (Knowles, 1975).[14]

In self-directed learning, learners themselves take the initiative to use resources rather than simply reacting to transmissions from resources, which helps them learn more in a better way.[15] Lifelong, self-directed learning (SDL) has been identified as an important ability for medical graduates (Harvey, 2003)[16] and so is applicable to other health professionals including AHPs. It has been proven through many studies worldwide that the self-directed method is better than the teacher-centric method of learning. Teacher-directed learning makes learners more dependent and the orientation to learning becomes subject-centred. If a teacher provides the learning material, the student is usually satisfied with the available material, whereas if a student is asked to work on the same assignment, he or she invariably has to explore extensive resources on the subject.[15]

Thus the handbook promotes self-directed learning, apart from the usual classroom teaching and opens the platform for students who wish to engage in lifelong learning.

Credit hours vs traditional system

Recently the National Assessment and Accreditation Council (NAAC) and the University Grants Commission (UGC) have highlighted the need for the development of a Choice-Based Credit System (CBCS), at par with global standards and the adoption of an effective grading system to measure a learner's performance.[17] All the major higher education providers across the globe are operating a system of credits. The European Credit Transfer System (ECTS), the 'National Qualifications Framework' in Australia, the Pan-Canadian Protocol on the Transferability of University Credits, the Credit Accumulation and Transfer System (CATS) in the UK as well as the systems operating in the US, Japan, etc. are examples of these. Globally, a need now exists for the use of a fully convertible credit-based system that can be accepted at other universities. It has now become imperative to offer flexible curricular choices and provide learners mobility due to the popularity of initiatives such as 'twinning programmes', 'joint degrees' and 'study abroad' programmes.[18]

In order to ensure global acceptability of the graduates, the current curriculum structure is divided into smaller sections with focus on hours of studying which can be converted into credit hours as per the international norms followed by various other countries.

Integrated structure of the curriculum

Vertical integration, in its truest sense, is the interweaving of teaching clinical skills and knowledge into the basic science years and, reinforcing and continuing to teach the applications of basic science concepts during the clinical years. (Many efforts called 'vertical integration' include only the first half of the process).

Horizontal integration is the identification of concepts or skills, especially those that are clinically relevant, that cut across (for example, the basic sciences), and then putting these to use as an integrated focus for presentations, clinical examples, and course materials. e.g. Integration of some of the basic science courses around organ systems, e.g., human anatomy, physiology, pathology; or incorporating ethics, legal issues, finance, political issues, humanities, culture and computer skills into different aspects of a course like the Clinical Continuum.

The aim of an integrated curriculum is to lead students to a level of scientific fluency that is beyond mere fact and concept acquisition, by the use of a common language of medical science, with which they can begin to think creatively about medical problems.[19]

This innovative new curriculum has been structured in a way such that it facilitates horizontal and vertical integration between disciplines; and bridges the gaps between both theory & practice, and between hospital-based practice and community practice. The amount of time devoted to basic and laboratory sciences (integrated with their clinical relevance) would be the maximum in the first year, progressively decreasing in the second and third year of the training, making clinical exposure and learning more dominant.[11] However it may differ from course to course depending on the professional group.

Introduction of foundation course in the curriculum

The foundation course for allied and healthcare professions is an immersive programme designed to impart the required knowledge, skills and confidence for seamless transition to the second semester of a professional allied and healthcare course. Post admission, the foundation course is designed for a period of 6 months to prepare a student to study the respective allied and healthcare course effectively and to understand the basics of healthcare system. This aims to orient the student to national health systems and the basics of public health, medical ethics, medical terminologies, communication skills, basic life support, computer learning, infection prevention and control, environmental issues and disaster management, as well as orientation to the community with focus on issues such as gender sensitivity, disability, human rights, civil rights etc. Though the flexibility to the course designers have been provided in terms of – modifying the required numbers of hours for each foundation subject and appropriate placement of the subject across various semesters.

Learning methodologies

With a focus on self-directed learning, the curriculum will include a foundation course that focuses on communication, basic clinical skills and professionalism; and will incorporate clinical training from the first year itself. It is recommended that the primary care level should have sufficient clinical exposure integrated with the learning of basic and laboratory sciences. There should also be an emphasis on the introduction of case scenarios for classroom discussion/case-based learning.

Healthcare education and training is the backbone of an efficient healthcare system and India's education infrastructure is yet to gain from the ongoing international technological revolution. The report '*From Paramedics to Allied Health: Landscaping the Journey and way ahead*', indicates that teaching and learning of clinical skills occur at the patient's bedside or other clinical areas such as laboratories, augmented by didactic teaching in classrooms and lecture theatres. In addition to keeping up with the pace of technological advancement, there has been a paradigm shift to outcome-based education with the adoption of effective assessment patterns.

However, the demand for demonstration of competence in institutions where it is currently limited needs to be promoted. The report also mentions some of the allied and healthcare schools in India that have instituted clinical skill centres, laboratories and high-fidelity simulation laboratories to enhance the practice and training for allied and healthcare students and professionals. The report reiterates the fact that simulation is the replication of part or all of a clinical encounter through the use of mannequins, computer-assisted resources and simulated patients. The use of simulators addresses many issues such as suboptimal use of resources and equipment, by adequately training the manpower on newer technologies, limitations for imparting practical training in real-life scenarios, and ineffective skills assessment methods among others.[1] The table mentioned below lists various modes of teaching and learning opportunities that harness advanced tools and technologies.

Table 1 Clinical learning opportunities imparted through the use of advanced techniques[1,20]

Teaching modality	Learning opportunity examples
Patients	Teach and assess in selected clinical scenarios
	Practice soft skills
	Practice physical examination
	Receive feedback on performance
Mannequins	Perform acquired techniques
	Practice basic procedural skills
	Apply basic science understanding to clinical problem solving
Simulators	Practice teamwork and leadership
	Perform cardiac and pulmonary care skills
	Apply basic science understanding to clinical problem solving
Task under trainers	As specific to Anaesthesia & Operation Theatre Technology

Assessment methods

Traditional assessment of students consists of the yearly system of assessments. In most institutions, assessments consist of internal and external assessments, and a theory examination at the end of the year or semester. This basically assesses knowledge instead of assessing skills or competencies. In competency-based training, the evaluation of the students is based on the performance of the skills as per their competencies. Hence, all the three attributes – knowledge, skills, and attitudes – are assessed as required for the particular competency.

Several new methods and tools are now readily accessible, the use of which requires special training. Some of these are given below:

- Objective Structured Clinical Examination(OSCE), Objective Structured Practical Examination (OSPE), Objective Structured Long Examination Record(OSLER)
- Mini Case Evaluation Exercise(CEX)
- Case-based discussion(CBD)

- Direct observation of procedures(DOPs)
- Portfolio
- Multi-source feedback
- Patient satisfaction questionnaire

An objective structured clinical examination (OSCE) is used these days in a number of allied and healthcare courses, e.g. Optometry, Physiotherapy, and Radiography. It tests the performance and competence in communication, clinical examination, and medical procedures/prescriptions. In physiotherapy, orthotics, and occupational therapy, it tests exercise prescription, joint mobilization/manipulation techniques; and in radiography it tests radiographic positioning, radiographic image evaluation, and interpretation of results. The basic essential elements consist of functional analysis of the occupational roles, translation of these roles ("competencies") into outcomes, and assessment of trainees' progress in these outcomes on the basis of demonstrated performance. Progress is defined solely by the competencies achieved and not the underlying processes or time served in formal educational settings. Most methods use predetermined, agreed assessment criteria (such as observation check-lists or rating scales for scoring) to emphasize on frequent assessment of learning outcomes. Hence, it is imperative for teachers to be aware of these developments and they should suitably adopt them in the allied and healthcare education system.[21]


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Chapter 2
Methodology of Curriculum Development

Chapter 2: Methodology of curriculum development

With the release of the report 'From Paramedics to Allied Health: Landscaping the journey and the way ahead', the Ministry of Health and Family Welfare prioritized the key recommendations and concerns raised by various allied and healthcare professionals groups and experts as indicated in the report. One of the major recommendations in the report was the need for standardization of curriculum and pedagogic requirements for the major allied and healthcare professional courses.

The MoHFW had identified 12 priority professional streams in the phase-I for the purpose of standardization. The expertise of over 50 leading public and private allied and healthcare educational institutions for 12 different disciplines has been sought as part of this exercise. Additionally, international experts from Canada, Sweden, USA and UK were also being roped in, to arrive at a comprehensive and globally acceptable set of educational standards based on a skills and competencies approach. The opinions were sought from experts for all the courses, though curricula for the following two professions were not redesigned as they fall under the ambit of regulatory body- Rehabilitation Council of India governed by Ministry of Social Justice and Empowerment –

- Audiology and Speech Pathology
- Orthotics and Prosthetics

The National Skills Development Agency has also developed the National Skills Qualification Framework (NSQF). Under the aegis of the NSDA, the Healthcare Sector Skill Council (HSSC) has undertaken a similar process for a few entry level allied and healthcare courses (Certificate and Diploma level). The focus of Ministry of Health and Family Welfare is thus to preempt duplication of efforts and arrive at a comprehensive set of minimum standards for the allied and healthcare professions but for higher level professional qualifications. This would ensure that the key considerations and obligations of both the public and the private sector are adequately addressed.

In view of the above, the Ministry of Health and Family Welfare instituted 12 National Curricula Redesign Taskforce groups comprising of academicians and professionals from the best institutes and colleges across the country. These people served as subject experts and redesigned the curricula based on a standardized framework developed by the NIAHS TSU (National Initiative for Allied Health Sciences-Technical Support Unit), which is the technical arm supporting this project. The final curriculum has been reviewed and approved by the National Curricula Review Committee (NCRC), (constituted by the MoHFW), that consists of experts with versatile and immense experience in their respective streams, to assess the applicability of the curricula drafted in view of the healthcare system as a whole.

Steps undertaken in the curricula review process –

1. Curricula were sought from various States and institutions across the country in response to which the NIAHS TSU reviewed–
    a. 118 curricula of allied and healthcare courses (different levels and different professions) from 10 states across the country;
    b. 133 curricula of various allied and healthcare courses collected during phase-I of the NIAHS project.
2. Literature review – a comprehensive literature review was undertaken resulting in a detailed curriculum of the allied and healthcare courses, which included competency and skills-based models followed nationally as well as internationally, methodologies of curriculum development, assessment protocols, and many such aspects of curriculum development. The literature review helped the TSU to develop a reference document that comprised of a standard framework for a competency-based curriculum to be followed for the curricula review and redesign. A detailed mapping of all the resources was undertaken and shared with the task group experts via email.
3. Constitution of the National Curricula Redesign Taskforces for various professional groups – Specific taskforces were then instituted comprising of technical as well as subject experts who were engaged in the process of redesigning the curriculum.
4. Constitution of the National Curricula Review Committee (NCRC) – The NCRC comprising of experts with versatile and immense experiences of their respective domain, was then constituted for final review and approval on the curriculum drafted by the taskforce and NIAHS TSU.
5. National Curricula Redesign Taskforce Consultations– a series of consultations were conducted with subject experts including both regional and national task group experts to develop a 'skill and competency' framework for education and career pathways. The consultations were facilitated by the NIAHS TSU members and were led by the chairperson of the group. Post this, the draft version and recommendations were compiled by the TSU members and sent to the experts for final review and consent.
6. Local consultations – These were also conducted in different hospitals and other healthcare settings to get suggestions, feedbacks and ideas from the subject experts for their respective curricula.
7. Response draft – Comments and suggestions were received on the draft and a response draft curriculum was prepared, which was then re-circulated for final consent and validation by the task group experts.
8. Submission and approval of draft curriculum – The final draft of the curriculum handbook was then submitted by the taskforce chairman to the National Curricula Review Committee for approval and final sign-off.
9. Public opinion – The handbook was uploaded to seek public opinion from national and international experts, students, faculty, and practitioners of the respective professional groups.

10. Final approval by the NCRC- The comments and suggestions by the public were then reviewed and considered for any possible modification by the taskforce group. The final approval and sign off for the overall structure was then sought from NCRC.
11. Dissemination- The final handbook (guidelines) is disseminated by the Ministry of Health and Family Welfare for further adoption and incorporation by institutes/universities as applicable to ensure standardization.

Review of Model Curricula in 2023-24.

National Taskforce was reconstituted by the Interim Commission/National Commission for Allied and Healthcare Professions to review the existing curricula for all major allied health professions. Reconstituted taskforce was provided the draft curricula prepared by the previous taskforce in the year 2015-16 and approved by NCRC to review and to recommend the necessary changes required into this under the guidance and supervision of Committee for Curriculum Standardization and other Standards under National/Interim Commission for Allied and Healthcare Professions, Ministry of Health & Family Welfare, Government of India. Taskforce was provided the guiding principles and parameters while reviewing the curricula.

Taskforce reviewed the draft curricula and find the Bachelor's degree program curriculum substandard and outdated and decided to prepare a fresh curriculum for the bachelor's degree program retaining the some course content from the previous curriculum and designing the curriculum afresh keeping in view the technological advancements and progress happened in this rapidly evolving field of allied health sciences. Similarly taskforce designed the Master's course curriculum as the master's course curriculum was not prepared by the previous taskforce and it was not part of the draft Curricula Handbook for Operation Theatre Technology.

Following process was followed by the Taskforce in the review of draft curriculum for Anaesthesia & Operation Theatre Technology (AOTT):

1. Curricula were collected from all the major Institutions/Universities conducting the undergraduate and postgraduate courses in Anaesthesia & Operation Theatre Technology with varied nomenclature and course duration. Taskforce studied all the curricula taught in major Government as well private sector Institutions/Universities in order to prepare a competency and skills based curricula which meets the future expectations and prepare the well trained professionals who have in depth knowledge and who can work in the challenging environment of modern healthcare delivery system.
2. Taskforce decided to change the nomenclature of the undergraduate as well as postgraduate program due to following reasons:

    a) Clarity of Focus: The proposed name, "Baccalaureate or Bachelors in Anaesthesia & Operation Theatre Technology (B.AOTT)," clearly communicates the dual specialization of the program, providing prospective students and stakeholders with a more accurate representation of the curriculum.
    b) Alignment with Industry Trends: The healthcare industry is witnessing an increasing demand for professionals with expertise in both Anesthesia and Operation Theatre Technology. Aligning the program's nomenclature with this industry trend will enhance its marketability and relevance.

c) Enhanced Employability: The revised nomenclature may attract a broader spectrum of students who are specifically interested in pursuing a career that involves both Operation Theatre procedures and Anesthesia Technology. The Taskforce has recommended the program nomenclature as "Baccalaureate in Anaesthesia and Operation Theatre Technology" due to its enhanced employability and acceptability at National level..

3. Literature review – a comprehensive literature review was undertaken by the Taskforce resulting in development of a detailed curriculum of "Anaesthesia & Operation Theatre Technology" courses, which included competency and skills-based models followed nationally as well as internationally, methodologies of curriculum development, assessment protocols, and many such aspects of curriculum development.
4. National Curricula Review Taskforce Consultations– a series of consultations were conducted with subject experts including both regional and national task group experts to develop a 'skill and competency' framework for education and career pathways. The consultations were facilitated and led by the Chairperson of the Committee for Curriculum Standardization and other Standards and local consultations in taskforce were led by the chairperson of the taskforce group. Post this, the draft version and recommendations were compiled by the Taskforce Team Leader and sent to all the experts for final review and consent.
5. Response draft – Comments and suggestions were received on the draft curricula from all the experts and a response draft curriculum was prepared, which was then re-circulated for final consent and validation by the task group experts.
6. Submission and approval of draft curriculum – The final draft of the curriculum handbook was then submitted by the taskforce lead expert to the Committee for Curriculum Standardization and other Standards for review and approval of the Committee.
7. Public opinion – The draft curricula handbook was uploaded on the Ministry of Health and Family Welfare website to seek public opinion from national and international experts, students, faculty, practitioners and other various stake holders of Anaesthesia & Operation Theatre Technology.
8. Modifications after the public opinion- The comments and suggestions received from stake holders were then reviewed and considered for any possible modification by the taskforce group in a meeting held under the chairmanship of Hon'ble Chairperson of National Commission of Allied and Healthcare Professions. The necessary modifications agreed upon in the meeting were incorporated into the curricula by the Task force.
9. Final Approval and Dissemination: The final draft of Curricula was submitted to the NCAHP through the Chairperson of the Committee for Curriculum Standardization and other Standards constituted under NCAHP. The curricula were finally reviewed by this empowered Committee for Curriculum Standardization and other Standards for final approval and dissemination.


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Chapter 3
Background of the profession

Chapter 3: Background of the profession

Statement of Philosophy– Why this profession holds so much importance

A latest study by the Harvard School of Public Health has found that while the South-East Asia region has just 2.6 OTs per 1 lakh population, the number is as low as 1.3 OT per 1 lakh population in India and Pakistan. Whereas, developed regions like Eastern Europe have the highest number of OTs per 1 lakh population - 25.1, followed by Asia Pacific (high income countries) 24.3, Central Europe 15.7, Western Europe 14.7, North America and Australasia 14.3, Central Asia 11.7 and the Caribbean 10.4 OTs). So we may interpret that there is an enormous scope and need for the profession not only in India as well as in other developing countries but at the same time along with skilled manpower we need adequate manpower.

Moreover, a variety of electrical and electronic equipment are in use in modern operation theatres for monitoring anesthesia & surgical procedures, the success of the procedures and safety of patients depend largely on the reliability, smooth and trouble free performance of these equipment's and ability of skilled manpower to operate the same. Thus, there is increased need for qualified and trained professionals in the system. This course is aimed at satisfying this need.

About Anaesthesia & Operation Theatre Technology

An Anaesthesia & operation theatre (OT) technologist forms an intrinsic part of any hospital. To become a trained professional one must undertake Anaesthesia & operation theatre technology course. An AOT professional is the one, who facilitates the surgical procedures, planned and emergency both, by preparing in advance the equipment that are necessary for any surgical procedures. He/she also looks after all the work and management of the operation theatre which includes managing the patients in & out of operation theatre, looking after all the surgical equipment, arrangement of operation theatre table, dressing table, anesthesia table as well as management of the staff. As the surgical branch has various specialties including General Surgery, OBG, Cardiac, Ortho and genito-urinary, the OT technologist needs to know about these various specialties.

Scope of practice

a. Setup, check, and maintain anesthesia machine, monitors life support equipment like airway equipment, ventilator, emergency equipment, defibrillator, anesthetic and resuscitation drugs.
b. Orders, Maintains and keep records of all anesthesia equipment and drug.
c. Assist Anesthetist in patient procedures like setting up of invasive lines, airway management, setting up of monitors and administer anesthesia to patient
d. Assists during emergency situations by assisting in basic and advanced life support, critical events
e. Prepares and maintains operation table, light, electric cautery, tourniquets etc.
f. Management of central sterile services department. Packing of equipment and linen. Sterilization procedures like autoclaving, plasma sterilization and disinfection procedures as per guidelines, checking, storage and dispatch.
g. Management in Intensive Care unit and emergency department of equipment like ventilators, monitors, infusion pumps, defibrillators etc.

h. Assist disaster team in disaster situations and national emergencies on field and safe transport in ambulance.
i. Assist anesthesia and surgical team in all kinds of surgical disciplines.
j. Assist anesthetist during anesthesia procedures outside operation theatres like CT and MRI suits, Cardiac catheterization laboratory, pain relief procedures etc.

Recognition of Title and qualification

Within the multidisciplinary team, the professional responsible for the facilitation and preparation of the surgical procedures is the Anaesthesia & Operation theatre technologist.

The recommended title thus stands as the Anaesthesia & Operation Theatre Technologist with the acronym - AOTT for this group of professionals.

It is a known fact that with the career advancement, the nomenclature will also vary and will also depend on the sector and profile of the professional. Considering the 10 NSQF levels designed by the NSDA, the following level progression table has been proposed by the taskforce to map the nomenclature, career pathways and progression in different sectors of professional practice for Anaesthesia & Operation Theatre Technologist. **The proposed progression is for further discussion and deliberation, the implementation time of the same may vary depending on the current system and regulations in place**.

The table 2 below indicates the various channels of career progression in three distinct sectors such as clinical setting, academic and industry (management/sales or technical) route. It is envisaged that the AOTT will have two entry pathways – students with diploma or baccalaureate. The level of responsibility will increase as the career progresses and will starts with NSQF level four (4) for diploma holders and NSQF level five (5) for baccalaureate degree holders. The table also indicates the corresponding level of qualification with experience required by the professional to fulfill the requirements of each level. Considering the degree of patient dealing in anaesthesia & operation theatre technology and such other professions, government aims to phase out the Diploma and PG Diploma level courses and promote Bachelors' and Masters' degree courses. In the academic front, as per UGC guidelines, to work at the position of a Lecturer/Assistant Professor the candidate must attain master degree. At present there are limited master degree seats in Anaesthesia & Operation Theatre Technology in India, and thus it has been decided that Universities will be promoted to start master degree courses. The table also indicates that career progression is up to the level 10 of NSQF, however it needs to be stated that the ultimate signatory authority on patient documentation stands with the surgeon on role, the chief technical officer of the OT unit (clinical route) will be the ultimate authority for the management responsibilities, the final authority for the clinical decisions will be with the doctor.

Table 2: Nomenclature based on career progression for Anaesthesia & Operation Theatre Technologist (Proposed)

Nomenclature in various sectors			Qualification and experience
Clinical	**Academic**	**Industry**	
Junior Anaesthesia & Operation Theatre Technologist		Technical associate	• Diploma AOTT with 0 - 5 years post Diploma AOTT experience
Anaesthesia & Operation Theatre Technologist	Demonstrator	Anaesthesia & Operation Theatre Technologist	• B. AOTT • Diploma AOTT with 6-10 years post AOTT)
Senior Anaesthesia & Operation Theatre Technologist	Tutor/ Lecturer (Post Graduate)	Senior Anaesthesia & Operation Theatre Technologist	• B. AOTT with 4 years' experience at Level-5. • M. AOTT (for academic role) • Diploma AOTT 11-15 years' experience. (only for Industry pathway)
Technical Officer (AOTT)	Assistant Professor	Chief Anaesthesia & OT Technologist	• B. AOTT with 4 years' experience at Level -6 • M. AOTT with 4 years post M.AOTT experience. for academic role • Ph.D. AOTT for Academic role.
Senior Technical Officer (AOTT)	Associate Professor	Deputy Manager for Anaesthesia & OT Technology	• B. AOTT with 4 years' experience at Level-7 • M. AOTT with 8 years post M.AOTT experience. • Ph.D. AOTT with 4 years post PhD experience for Academic pathway
Chief Technical Officer (AOTT)	Additional Professor	Additional Director for Anaesthesia & OT Technology	• B. AOTT with M.AOTT with 4 years' experience at Level-8 • M. AOTT with 12 years post M.AOTT experience. • Ph.D. AOTT with 8 years post PhD experience for Academic pathway
Chief Manager (AOTT)/ AOTT Head/	Professor/ Principal	Director for Anaesthesia & OT Technology	• B. AOTT with M.AOTT with 4 years (only clinical/industry role) experience at Level-9 • Master's in AOTT with 15 years post M.AOTT experience. • Ph.D. AOTT with 12 years post PhD experience.

Career progression

Abbreviations

* B. AOTT – Baccalaureate in Anaesthesia & Operation Theatre Technology.

* M. AOTT – Master's in Anaesthesia & Operation Theatre Technology.

*AOTT – Anaesthesia & Operation Theatre Technology.

IMPORTANT NOTES:

1. Diploma AOTT, Bachelor in AOTT and Master's AOTT completed before implementation of this scheme shall be considered at par with the current scheme of Diploma AOTT, Bachelors in AOTT and Masters in AOTT respectively, irrespective of their course duration for concerned level.

2. Existing in-service Anaesthesia & Operation Theatre Technologists should be considered at par in the present scheme at their respective levels.

3. *Diploma should be phased out in next 5 years and the minimum required qualification should be Bachelor in AOTT with 4 years duration course (3 years + 1 year internship).

Definition of Anaesthesia & Operation Theatre Technologist

Anaesthesia & Operation theatre Technologist is a member of a multidisciplinary team in operation theatres who prepare and maintain an operating theatre. Assists anaesthetist and surgical team during peri-operative period and provides support to patients in the recovery room.

Education of the Anaesthesia & operation theatre technologist

When developing any education programme it is necessary that programme planning should be outcome-based, meeting local and national manpower requirements, personal satisfaction and career potential for the professionals with supporting pathway in the development of the profession. One of the major changes is the shift from a focus based on traditional theoretical knowledge and skills to competency based education and training. Optimal education/training requires that the student is able to integrate knowledge, skills and attitude in order to be able to perform a professional act adequately in a given situation.

Thus, the following curriculum aims to focus on skills and competencies based approach for learning and is designed accordingly. The curriculum is prescriptive and is designed with an aim to standardize the content across the nation.

Entry requirements

It is recommended that the students entering the AOTT programme should have completed the recognized secondary school studies as the qualification, stipulated for AOTT course (diploma/degree) is **10+2 or equivalent examination with science subjects (Physics, Chemistry and Biology)** from a recognized university or board which would provide the foundation for and prepare them for higher education studies with minimum 50% aggregate marks at HSC for open category and minimum 45% aggregate marks for reserve category.

Course Duration

It is recommended that any programme developed from this curriculum should have a minimum of the following duration to qualify as an entry level professional in AOTT -

- Diploma in Anaesthesia & Operation Theatre Technology (D. AOTT)- 2.5 year programme (including 6 months of clinical training/internship)- Diploma level
- Baccalaureate in Anaesthesia & Operation Theatre Technology (B. AOTT)- 4 year programme (including 1 year of clinical training /internship)- Bachelor's degree level
- Masters in Anesthesia & Operation Theatre Technology (M. AOTT)- 2-year programme – Master's degree programme.
- Ph.D. in Anaesthesia & Operation Theatre Technology.

IMPORTANT NOTE:

1. Diploma AOTT, Bachelor in AOTT and Master's AOTT completed before implementation of this scheme shall be considered at par with this scheme of Diploma AOTT, Bachelors in AOTT and Masters in AOTT respectively, irrespective of their course nomenclature, duration etc. for admission to higher program.
2. *Diploma should be phased out in the future (preferably in next 5 years) and the minimum required qualification should be Bachelor in AOTT with 4 years duration course (3 years + 1 year internship).

The emphasis initially should be on the academic content establishing a strong scientific basis and in the latter year on the application of theory to clinical/reflective practice. In Bachelor degree programme minimum one year should be devoted to clinical practice and this should be on a continuum of rotation from theory to practice over the programme. The aim of the 4 year degree programme is to enable the development of the AOTT as a key member of the multidisciplinary team and to enable him/her to execute his/her role with ensuring quality.

With the change in the disease dynamics and multifold increase in the, it is imperative that a well-structured programme of postgraduate education is also encouraged so as to enhance research capacity within the country to widen the scope of clinical practice for the profession. Thus, **a master's degree programme is recommended with minimum of two years of education in specialized field**. The post graduate students can contribute significantly in research and academics. Presently, there are limited master degree courses in the country and institutes and universities should be encouraged to start master and doctorate courses.

Teaching Faculty and Infrastructure

The importance of providing an adequate learning environment for the students cannot be over emphasized. Both the physical infrastructure and the teaching staff must be adequate.

Teaching areas should facilitate different teaching methods. Where students share didactic lectures with other disciplines (e.g. nurses) large lecture theatres may be appropriate, but smaller teaching areas should also be provided for tutorial and problem/case-based learning approaches. In all venues where students are placed the health and safety standards must be adhered to.

The recommended teachers to student ratio in the UG level should be -1:25.

Job availability

As per ILO documentation, employers worldwide are looking for job applicants who not only have technical skills that can be applied in the workplace, but who also can communicate effectively, including with customers; can work in teams, with good interpersonal skills; can solve problems; have good ICT skills; are willing and able to learn; and are flexible in their approach to work.[22] After completion of the courses mentioned in following chapters, the individual will find a challenging career in a hospital, nursing homes, trauma / emergency centers, Intensive Care units, CSSD etc. Graduates are eligible for employment overseas where their qualifications, training and experience are highly regarded. With further experience, graduates may be employed by medical equipment manufacturers and development specialists.

Graduates have good employment prospects, and will enter a field in which the demand for professionals has increased in recent years and will keep on increasing due to changing environment and conditions.


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Chapter 4
Model Curriculum of Anaesthesia & Operation Theatre Technology (AOTT) Courses

Chapter 4: Model Curriculum

Background

The need for accuracy in preparation and delivery is a critical component of modern technology driven healthcare and requires knowledge and understanding of the basic sciences as well as the interaction between the technology used in operation theatres and the site within the body that needs the surgical intervention. In an era of greater complexity of technology and techniques, the role of the Anaesthesia & operation theatre technologist (AOTT) and his/her level of responsibility is continually evolving and expanding. Education programmes should provide the AOTT with the scientific theoretical foundation of the profession and enable them, as practitioners, to be able to synthesize, evaluate and apply their knowledge in a clinical setting.

The aims of the recommended curriculum are to produce AOTTs who are

- Technically and clinically competent;
- Aware of safety issues and the importance of quality assurance;
- Understand the theoretical basis for evidence based practice;
- Effective members of the multidisciplinary team;
- Prepared to participate in or initiate research into practice;
- Can work according to registration requirements on the respective continents.

All aspects of anaesthesia & operation theatre technology have been considered in the development of this curriculum together with the identification of the roles expected for different levels based on their qualification and experience. The need for connecting the dots between the education and employment practices has been the road map for devising this curriculum.

The National Curriculum Taskforce on Anaesthesia & Operation theatre technology has successfully designed the career and qualification map indicating the growth opportunities for a professional in the career pathway based on the level as indicated in the National Skills Qualification Framework (NSQF). The career pathway indicates **NSQF level 4 corresponding Pay level - 7 as per 7th CPC as the entry level** after the completion of a minimum 2.5 years of diploma level programme in Anaesthesia & operation theatre technology (Diploma in Anaesthesia & Operation Theatre Technology) as well as **NSQF level 5 (Pay level - 8 as per 7th CPC) as the entry level** after completion of a minimum 4 years of Baccalaureate level programme on Anaesthesia & operation theatre technology (Bachelor in Anaesthesia & Operation Theatre Technology). The component of the programmes starting from diploma and above has been detailed out in the coming chapters.

Foundation course has also been designed to bring all the students at the same level of understanding with respect to basic healthcare related norms before the start of a career in a healthcare professional course. The foundation course is mandatory for all the allied and healthcare professional courses and for both entry level courses – diploma as well as degree. If a diploma holder has completed the foundation course and is willing to pursue the degree course, the candidate will directly get entry for next semester, however a pre- qualifier skill test will have to be satisfactorily completed, if not, then the candidate will have to undergo the first semester of foundation course again.


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4.1 Diploma in Anaesthesia & Operation Theatre Technology (D. AOTT)

Diploma in Anaesthesia & Operation Technology

Introduction

The Anaesthesia & operation theatre (AOT) technologist is an integral person in the dynamic operating theatre team. The success of the procedures and safety of patients depends largely on the reliability of the AOT technologist. This course aims in providing the technical and interpersonal skills required to work under the supervision of anesthetists and surgical personnel.

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

1. Be able to understand the basics of -Ethics, Discipline, Layout, and Equipment in OT.
2. Be able to understand the basics of Anesthesia related modalities and procedures.
3. Be able to position the patients in different operating procedures and for anesthesia procedures in operation theatres and intensive care units.
4. Have knowledge of basic principles of IV line, fluids, transfusion and C.P.R.
5. Demonstrate knowledge and skills related to routine care and endoscopes, Anesthetic Machines, Monitors etc.
6. Demonstrate knowledge and skilled related to Sterilization of OT Room, Instruments, Endoscopes, CSSD procedures, work flow and management.
7. Demonstrate knowledge and skilled related to Disposal of waste.
8. Be able to keep records and stock maintenance of Anaesthesia drugs including narcotics and emergency drugs.
9. Be able to collect data and compute information.

Expectation from the future diploma holders:

1. The coursework is designed to train students to work in conjunction within the OT team including surgeon, anesthesiologist, nurses and other members.
2. The student will be skilled in surgical preparation, supporting the team in peri operative procedure and also ensure patient support.
3. Employment opportunities can be found in hospitals in both private and public sectors as well as in independent trauma centres.
4. Diploma holder is encouraged to pursue further qualification to attain senior position in the professional field, also to keep abreast with the advance and new technology; the professional should opt for continuous professional education credits offered by national and international institutes.

Eligibility for admission

Selection procedure

1. Candidate should have passed 10 + 2 with Science.
2. Minimum percentage of marks: 50% aggregate in PCB/ (Physics, Chemistry & Biology)
3. Reservation for SC/ST/OBC categories: As per Govt. of India rules

Provision of Lateral Entry:

Lateral entry at Diploma level will not be there, as this is the basic entry level for the professionals.

Duration of the course

Duration of the course is 2.5 years or 5 semesters (inclusive of six months of internship) with 1020 hours of Theory & 1020 hours of Practical Classes and another 720 hours dedicated for internship.

Total number of hours – 2760 for the total course

Medium of instruction:

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

Attendance:

A candidate has to secure minimum -

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.

Teaching Tools:

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

1. Lecture Materials:
    - Comprehensive lecture notes.
    - Presentations and slides.
    - Handouts and reading materials.
2. Demonstration Models:
    - Anatomical models /simulators for demonstrating surgical techniques.
    - Simulators for practicing instrument handling and airway management.
3. Surgical Instruments:
    - Real surgical instruments (including laparoscopic, arthroscopic and Robotic instruments) for hands-on practice.
    - Simulated instruments for familiarization.

4. Audiovisual Aids:
    - Educational videos demonstrating surgical procedures.
    - Interactive simulations or virtual reality tools.
5. Anaesthesia Equipment:
    - Anaesthesia machines.
    - Monitors for vital signs and anaesthesia administration.
    - Airway management devices.
    - Intravenous equipment.
6. Sterile Technique Supplies:
    - Sterile drapes.
    - Surgical gowns and gloves.
    - Sterile instruments and supplies.
7. Monitoring Equipment:
    - Monitors for vital signs, oxygen saturation, and end-tidal carbon dioxide levels, Neuromuscular monitoring, BIS.
8. Simulation Training:
    - High-fidelity patient simulators or mannequins for I.V Cannulation, Intubation, BLS & ACLS.
9. Clinical Observations:
    - Opportunities to observe actual surgical procedures.
    - Assistance in real-world clinical settings.
10. Case Studies and Scenarios:
    - Customized case studies and scenarios for problem-solving and decision-making practice.
11. Assessment Tools:
    - Workshop, Quizzes and written exams.
    - Practical assessments on instrument handling, sterile technique, and anaesthesia administration.
    - 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 baccalaureate 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.

Teaching faculty and infrastructure

Institute should mandatorily be associated with the state medical colleges whereby they can make use of the available patient load and medical infrastructure as a part of their training curriculum (May be through MOU).

- Standalone institutions must have a MoU with either a medical college or hospital or healthcare facility as per the guidelines (desired number of Operation Theatres/ICU beds/HDU beds) defined in the curriculum to ensure practical exposure to the students.
- MoU to also define the clinical supervision of the students –institutional staff or clinical preceptors can be considered.

For the institutes to be capable of providing high quality training to the students and exposure to all the related specialties, it should have the following:

- Operating Theatres.
- Intensive Care Units. (Surgical and Medical)
- High Dependency Units (HDUs)
- Simulation Labs.
- Central Sterile Supply Department.
- Post-Operative Care Unit (PACU)

The teaching faculty (with annual intake of up to 30 students) for the BAOTT course should have a minimum of Master's in the MAOTT or MAOTT with PhD in relevant subject.

- 1 Professor
- 2 Associate Professors
- 4 Asst. Professors.
- 8 Demonstrators/Tutors.

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

Infrastructure requirements:

- Minimum 4 classrooms with minimum seating capacity of 30 students
- Faculty rooms, Common rooms for students
- Auditorium/Conference room with minimum seating capacity of 150 students.
- Library
- Student canteen/cafeteria
- Office rooms for staff

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.

Stipend: All students shall be paid a stipend amount of Rupees 6000/- per month during first 4 semesters and stipend amount of Rupees 15000/- per month during internship.

Model Curriculum Outline

First Semester– Foundation Course

Teaching resources (tutors) should be made available at every institute for basic subjects such as – Biology and English for students who wish to undertake the extra classes for the same.

First Semester– Foundation Course

Sl. No.	Course Titles	Hours per week				Marks			CR
		T	P	CLP	Total	Internal	External	Total	
DAOTT-001	Introduction to Healthcare Delivery System in India	2	0	0	2	15	35	50	2
DAOTT-002	Medical Terminology and Record keeping	2	0	0	2	15	35	50	2
DAOTT-003	Anatomy	4	2	0	6	30	70	100	5
DAOTT-004	Physiology	4	2	0	6	30	70	100	5
DAOTT-005	Health Care Quality & Patient Safety	3	2	8	13	30	70	100	6
DAOTT-006	Medical Law and Ethics, Professionalism & Values, Principles of Management	3	2	0	5	30	70	100	4
	Total	**18**	**8**	**8**	**34**	**150**	**350**	**500**	**24**
Total Hours in semester		**270**	**120**	**120**	**510**				

Second Semester

Sl. No.	Course Titles	Hours per week				Marks			CR
		T	P	CLP	Total	Internal	External	Total	
DAOTT-007	Basic computers and information Science, Communication and soft skills.	3	2	0	5	30	70	100	4
DAOTT-008	Lab Sciences	3	2	3	8	30	70	100	5
DAOTT-009	Basic Concepts in Pharmacology	4	0	3	7	50	70	100	5
DAOTT-010	Basics of Biomedical sciences in surgery and Anaesthesia	3	3		6	30	70	100	5
DAOTT-011	Anaesthesia Equipment's & Devices	3	2	3	8	30	70	100	5
	Total	**16**	**9**	**9**	**34**	**150**	**350**	**500**	**24**
Total Hours in semester		**240**	**135**	**135**	**510**				

Third Semester

Sl. No.	Course Titles	Hours per week				Marks			CR
		T	P	CLP	Total	Internal	External	Total	
DAOTT-012	Basic techniques of Anaesthesia	4	2	3	9	30	70	100	6
DAOTT-013	Basics of Surgical procedures	4	2	3	9	30	70	100	6
DAOTT-014	CSSD & Manifold Area.	3	2	0	5	50	70	100	4
DAOTT-015	Basic Intensive Care	3	2	3	8	30	70	100	5
DAOTT-016	Disaster Management & Environmental Sciences	3	0	0	3	30	70	100	3
	Total	**17**	**8**	**9**	**34**	**150**	**350**	**500**	**24**
Total Hours in semester		**255**	**120**	**135**	**510**				

Fourth Semester

Sl. No.	Course Titles	Hours per week				Marks			CR
		T	P	CLP	Total	Internal	External	Total	
DAOTT-017	Advanced Anaesthesia Techniques	4	2	3	9	30	70	100	6
DAOTT-018	Advanced Surgical procedures	4	2	3	9	30	70	100	6
DAOTT-019	Specialized Anaesthesia & Surgery	3	2	3	8	50	70	100	5
DAOTT-020	Recent Advancements in Anaesthesia & Surgery	3	2	0	5	30	70	100	4
DAOTT-021	Research Methodology & Biostatics	3	0	0	3	30	70	100	3
	Total	**17**	**8**	**9**	**34**	**150**	**350**	**500**	**24**
Total Hours in semester		**255**	**120**	**135**	**510**				

Fifth Semester

Sl. No.	Course Titles	Hours		
		Theory	Practical	Total
DAOTT-022	DAOTT Internship		720	720

First Semester

DAOTT-001 – Introduction to Healthcare Delivery System in India (30 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 programmes 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:

1. Introduction to healthcare delivery system -5 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
2. National Health Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme. -5 Hours
3. Introduction to AYUSH system of medicine. -5 Hours
    a. Introduction to Ayurveda.
    b. Yoga and Naturopathy
    c. Unani
    d. Siddha
    e. Homeopathy
    f. Need for integration of various system of medicine

4. Health scenario of India- past, present and future. - 2 Hours
5. Demography & Vital Statistics- - 3 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
6. Epidemiology -10 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.

DAOTT-002 Medical Terminology and Record keeping (including anatomical terms) (30 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.[23]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 system.

DAOTT-003 Anatomy (60 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

a) Introduction to Anatomy: Basic Anatomical terminology

- Osteology- -10 Hours
  - Upper limb – clavicle, scapula, humerus, radius, ulna,
  - Lower limb - femur, hipbone, sacrum, tibia, fibula &Vertebral column
- Thorax – Intercostal space, pleura, bony thoracic cage, ribs sternum &thoracic vertebrae - 5 Hours
  - Lungs – Trachea, bronchial tree. - 5 Hours
  - Heart – Surface anatomy of heart, chambers of the heart, valves of the heart, and major blood vessels of heart, pericardium, and coronary arteries. - 5 Hours
  - Skeleton-muscular system – Muscles of thorax, muscles of upper limb (arm & forearm) Flexor and extensor group of muscles (origin, insertion, action) - 5Hours
- Excretory system – Kidneys, ureters, bladder. - 5 Hours
- Digestive System: - 10 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
- Nervous System: -10 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

Practicals in Anatomy (30 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.

DAOTT-004 Physiology (60 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: - 2 Hours
  - Acid base balance and disturbances of acid base balances (Alkalosis, Acidosis)
- The Blood: - 5 Hours
  - Composition of Blood, functions of the blood and plasma proteins, classification and protein, Blood Cascade, Bleeding and Clotting time.
  - Pathological and Physiological variation of the RBC.
  - Function of Hemoglobin
  - Erythrocyte Sedimentation Rate.
  - Detailed description about WBC-Total count (TC), Differential count (DC) and functions.
  - Platelets – formation and normal level and functions.
  - Blood groups and Rh factor.
- Cardio-Vascular System: - 6 Hours
  - Physiology of the heart.
  - Heart sounds.
  - Cardiac cycle, Cardiac output.
  - Auscultation
  - Arterial pressures, blood pressure.
  - Hypertension.
  - Electrocardiogram (ECG.)
- Respiratory system: - 5 Hours
  - Respiratory ventilation
  - Oxygenation
  - Definitions and Normal values of Lung volumes and Lung capacities.

- Excretory system: - 6 Hours
  - Renal System:
  - Urine volume and specific gravity measurements
  - Renal function tests, including assessment of glomerular filtration rate (GFR)
  - Analysis of renal tubular function
  - Study of renal handling of electrolytes and water
  - Assessment of acid-base balance and renal regulation of pH.
- Reproductive system: - 4 Hours
  - Formation of semen and spermatogenesis.
  - Brief account of menstrual cycle.
  - Central Nervous system: -8 Hours
  - Functions of CSF.
  - Endocrine system: -8 Hours
  - Functions of the pituitary, thyroid, parathyroid, adrenal and pancreatic Hormones.
- Digestive system: - 8 Hours
  - Physiological Anatomy of the GIT.
  - Food Digestion in the mouth, stomach, intestine
  - Absorption of foods
  - Role of bile in the digestion.
- Special Senses: - 8 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 (30 Hours)

- Determination of Blood Groups.
- 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.
- 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.
- 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.
- Examination of Respiratory system to count respiratory rate and measure inspiration and respiration.

DAOTT-005 Health Care Quality & Patient Safety (45 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.

a) Basics of emergency care and life support skills. (15 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:

- Vital signs and primary assessment
- Basic emergency care – first aid and triage
- Ventilations including use of bag-valve-masks (BVMs)
- Choking, rescue breathing methods
- One- and Two-rescuer CPR
- Using an AED (Automated external defibrillator).
- 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.

b) **Infection prevention and control.** **(10 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 –

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

c) **Bio medical waste management and environment safety.** **(8 Hours)**

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

- Definition of Biomedical Waste
- Waste management.
- BMW – Segregation, collection, transportation, treatment, and disposal (including color coding)
- Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
- BMW Management & methods of disinfection
- Modern technology for handling BMW
- Use of Personal protective equipment (PPE)
- Monitoring & controlling of cross infection (Protective devices)

d) **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.

- Concepts of Quality of Care
- Quality Improvement Approaches
- Standards and Norms
- Quality Improvement Tools
- Introduction to NABH guidelines

DAOTT-006 Medical Law and Ethics, Professionalism & Values, Principles of Management (45 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 (15 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.[24]

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:

- Medical ethics – Definition – Goal – Scope
- Introduction to Code of conduct
- Basic principles of medical ethics – Confidentiality
- Malpractice and negligence – Rational and irrational drug therapy
- Autonomy and informed consent – Right of patients
- Care of the terminally ill- Euthanasia
- Organ transplantation
- 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.
- Professional Indemnity insurance policy
- Development of standardized protocol to avoid near miss or sentinel events.
- 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)

1. Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
2. Personal values- ethical or moral values
3. Attitude and behavior- professional behavior, treating people equally
4. Code of conduct, professional accountability and responsibility, misconduct
5. Differences between professions and importance of team efforts

Cultural issues in the healthcare environment

Principals of Management (20 Hours)

1. 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.

g. 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.

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

i. Acts: CPA Act (1986 & 2019), BMW Act(1998,2016), Drugs Act(1940), IMC Act(1956), Patient Privacy – IT Rules, 2011
Medical Malpractice sections: - 304A, 337 and IPC 1860.

2. Personnel management:

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.

3. **Financial management:**

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.

Second Semester

DAOTT-011 Basic computers and information Science, Communication, and soft skills. (45 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 (25 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:

- Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
- 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).
- Processor and memory: The Central Processing Unit (CPU), main memory.
- Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
- 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.).
- 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.
- Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
- Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
- Introduction of Operating System: introduction, operating system concepts, types of operating system.
- Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

- 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.
- 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: - 20 Hours

- Basic Language Skills: Grammar and Usage. - 2 Hours
- Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation. - 4 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 - 4 Hours
- Types & process of communication - 2 Hours
- Barriers of communication & how to overcome - 2 Hours

Practicals in Communication & Soft Skills

- 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.
-

DAOTT-008: Lab Sciences (45 Hours)

Biochemistry - 15 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 sulphur)- Trace elements – Calorific value of foods – Basal metabolic rate (BMR) – respiratory quotient(RQ).
- Acids and bases: Definition, pH, Henderson – Hassel Balch equation, Buffers, Indicators, Normality, Molarity, Molality.

Haematology. (10 Hours)

- Haemoglobin, blood cell counts, differential count.
- Anaemia, polycythaemia
- Thrombocytopenia
- Coagulation parameters- BT, CT, PT, INR, APTT
- Coagulation disorders.
- Blood transfusion-hazards and complications

Clinical Microbiology (20 Hours)

- Morphology

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

- Growth and nutrition.

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

- Culture media Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test.
- Sterilization and Disinfection: Principles and use of equipment of sterilization namely hot air oven, autoclave, and serum inspissator, pasteurization, antiseptic and disinfectants.
- Immunology.
- 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).

Systematic Bacteriology:

- 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.

Parasitology:

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

Mycology:

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

Virology.

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

DAOTT-009: Basic Concepts in Pharmacology (60 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

- Introduction to Pharmacology. - 2 Hours
- Pharmacokinetic & Pharmacodynamics & routes of drugs administration - 4 Hours
- NSAIDs Drugs. - 4 Hours
- Ant sialagogues: Atropine, Glycopyrrolate. - 4 Hours

- Sedatives *I* Anxiolytics: Diazepam, Midazolam, Phenergan, Lorazepam, Chlorpromazine, and Triclofos. - 4 Hours
- Narcotics: Morphine, Pethidine, Fentanyl, Pentazocine, tramadol. - 4 Hours
- Antiemetic's: Metoclopramide, Ondansetron, Dexamethasone - 2 Hours
- Induction Agent: Thiopentone, Diazepam, Midazolam, Ketamine, Propofol, Etomidate. - 4 Hours
- Muscle Relaxants: Depolarizing - Suxamethonium, Non depolarizing - Vecuronium, Atracurium, rocuronium. - 4 Hours
- Inhalational Gases: Gases-02, N20, Air, Agents-Ether ,Halothane, Isoflurane, Sevoflurane, Desflurane - 4 Hours
- Reversal Agents: Neostigmi*ne,* Glycopyrrolate, Atropine, Naloxone, Flumazenil (Diazepam). - 2 Hours
- Local Anesthetics: Xylocaine, Bupivacaine - Topical, Prilocaine-jelly, Emla - Ointment, Etidocaine. Ropivacaine. - 5 Hours
- Emergency Drugs : Mode or administration, dilution, dosage and effects - 15 Hours
  - Adrenaline, Atropine
  - Ephedrine, Mephentramine
  - Bicarbonate, calcium, potassium.
  - Inotropes: dopamine, dobutamine, amiodrone
  - Aminophylline, hydrocortisone, antihistaminic,
  - Antihypertensive –Beta-blockers, Ca-channel blockers.
  - Antiarrhythmic- xylocard
  - Vasodilators- nitroglycerin & sodium nitroprusside
  - Respiratory system- Bronchodilators
  - Renal system- Diuretics, frusemide, mannitol

DAOTT-010 Basics of Biomedical sciences in surgery and Anaesthesia (45 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 Anaesthesia 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 Transducer, EtCO2 monitor, Pulse oximeter, Blood pressure monitor. - 15 Hours

- Surgical Microscope. - 2 Hours
- Laparoscopic cart (including various scopes), Veress needle, Trocars and various instruments. - 4 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.
- Anaesthesia Delivery and Monitoring. - 12 Hours

  Anaesthesia machines and delivery systems

  Design and development of Anaesthesia monitoring devices

  Physiological monitoring parameters and their interpretation during Anaesthesia

  Advances in Anaesthesia technology, such as closed-loop Anaesthesia delivery systems.

DAOTT-011: Anaesthesia Equipments and Devices (45 Hours)

Learning Objectives:

Students will be learning about the Anaesthesia equipments and devices in this module and they will learn in details about the equipments and devices including their working principles, troubleshooting etc. which is very essential for safe practices of Anaesthesia. Student will be able to manage all the equipment and devices and their general troubleshooting in day to day working.

Course content:

1. Medical gas supply
   a. Compressed gas cylinders
   b. Color coding
   c. Cylinder valves; pin index.
   d. Gas piping system
   e. Recommendations for piping system
   f. Alarms & safety devices.
   g. Scavenging of waste anesthetic gases

2. Anesthesia machine
    a. Hanger and yoke system
    b. Cylinder pressure gauge
    c. Pressure regulator
    d. Flow meter assembly
    e. Vaporizers - types, hazards, maintenance, filling and draining, etc.

3. Breathing system
    a. General considerations: humidity & heat
    b. Common components - connectors, adaptors, reservoir bags.
    c. Capnography
    d. Pulse oximetry
    e. Methods of humidification.
    f. Classification of breathing system
    g. Mapleson system - a b c d e f
    h. Jackson Rees system, Bain circuit
    i. Non rebreathing valves - Ambu valves
    j. The circle system

4. Face masks & Airway laryngoscopes
    a. Types, sizes
    b. Endotracheal tubes - Types, sizes.
    c. Cuff system
    d. Fixing, removing and inflating cuff, checking tube position, complications..

5. Monitoring
    a. Electrocardiography(ECG)
    b. Pulse oximetry(Sp02)
    c. Temperature- central and peripheral
    d. End tidal carbon dioxide(EtCO2)
    e. Anesthesia gas monitoring
    f. Non-invasive blood pressure (NIPB) and Invasive blood pressure(IBP)
    g. Central venous pressure(CVP)
    h. PA Pressure, LA Pressure & cardiac output
    i. Anesthesia depth monitor
    j. Neuromuscular transmission monitor

Third Semester

DAOTT-012 Basic techniques of Anaesthesia (60 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.

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. - 4 Hours

b. Anaesthesia Machine: Design, Components, and Functionality. - 6 Hours

c. Safety systems in Anaesthesia machine. Flow systems, CO2 Absorbents, Circuit types, Humidification devices. - 6 Hours

d. Perioperative Fluid Management: Strategies and Considerations. (Crystalloids and Colloids). - 4 Hours

e. Perioperative Emergency Medications: Indications, Administration, and Management. – 4 Hours

f. Anaesthetic induction and airway management: Learning about various induction techniques, airway devices, and strategies for maintaining a patent airway during surgery. - 8 Hours

g. Brief Idea about Pre medication, Pre oxygenation or Denitrogenating, Induction and inducing agents, Sellick's maneuverer, Vaporizers, Principles and types, Intubation and reversal agents. - 6 Hours

h. Maintenance of Anaesthesia 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. - 6 Hours

i. Pain management and analgesia: Exploring different methods of perioperative pain management, including systemic analgesics, regional Anaesthesia, and patient-controlled analgesia. - 4 Hours

j. Anaesthetic 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. - 4 Hours

k. Anaesthetic 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. - 4 Hours

l. Management of Anaesthesia-related complications: Understanding the recognition and management of potential complications and adverse events related to Anaesthesia, including cardiovascular, respiratory, and allergic reactions. - 4 Hours

Practical or Clinical posting topics: (75 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.

DAOTT-013 Basics of Surgical procedures (60 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

a. Layout of Operation Theatre, WHO Checklist, Carbolization and Fumigation: - 6 Hours
b. Introduction to general surgical procedures: Understanding the principles, indications, and techniques of common general surgical procedures, such as appendectomy, cholecystectomy, and hernia repair. - 6 Hours
c. 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. - 6 Hours
d. Diseases in General Surgical Practice : Appendicitis, Hernias, cholecystitis, Gastrointestinal (GI) Cancers, Peptic Ulcer Disease. - 6 Hours
e. Diseases in Obstetric/ Gynaecologic Practice" : Ectopic Pregnancy, Pelvic Inflammatory Disease (PID), Endometriosis, Fibroids, Ovarian Cysts, Cervical and Ovarian Cancers. - 6 Hours
f. Incision and wound closure techniques: Studying various surgical incision types, wound closure methods (such as sutures, staples, and adhesive tapes), and wound dressing principles. - 6 Hours
g. Surgical instrument identification and handling: Familiarizing with surgical instruments commonly used in general surgery and obstetrics and gynaecology, and understanding their functions, proper handling, and maintenance. - 6 Hours
h. 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. - 6 Hours
i. Anaesthesia 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. - 6 Hours
j. Common general surgical procedures in obstetrics and gynaecology: Studying the specific surgical procedures performed in obstetrics and gynaecology, such as caesarean section, hysterectomy, and ovarian cystectomy, and their related considerations. - 6 Hours

Practical / Clinical Postings topics: (75 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 of keeping a sterile area and avoiding contamination during surgical procedures. Gloving, Gowning and Draping Techniques.

Identification and uses of surgical instruments.

Anaesthesia and patient positioning: Demonstration and practice of patient positioning techniques for general surgical operations, taking into account 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 (45 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 - 30 Hours

a. 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
b. 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
c. Decontamination processes: Learning about the decontamination procedures involved in CSSD, including manual cleaning, mechanical cleaning (using ultrasonic cleaners), and enzymatic cleaning. - 4 Hours
d. 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
e. 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 labeling and documentation. - 2 Hours
f. 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. - 4 Hours

g. 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. - 2 Hours

h. 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. - 2 Hours

Manifold: **(15 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 Labeling, Liquid Medical Oxygen,

Emergency Response and Gas Shutdown Procedures,

1. Troubleshooting and Problem-solving,
2. Regulations and Compliance.

Practical Sessions for CSSD & Manifold Area: **(30 Hours)**

CSSD Procedures: **25 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: (5 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.

DAOTT-015 Basic Intensive Care (45 Hours)

Learning Outcomes

- Recognize proper care and maintenance practices for ventilators, suction machines, and monitoring equipment.
- Check, clean, and troubleshoot this equipment on a regular basis.
- Recognize prevalent flaws and take corrective action.
- Understand the concepts of ventilator sterilization and disinfection.
- Recognize the proper sterilization processes and disinfectants for ventilators.
- Know how to care for, maintain, and operate beds, lights, and other pieces of equipment.
- Recognize the significance of air conditioning and pollution control in the ICU setting.
- Recognize HVAC systems and air filtration procedures in order to maintain air quality.
- Be familiar with the attachment and intraoperative use of ventilators and monitoring devices.
- Adult and pediatric patients who are unconscious are cared for.
- Recognize unique care requirements, such as posture, hygiene, and monitoring.
- Recognize and manage any potential difficulties or crises that may arise while caring for unconscious patients.
- Become familiar with physiotherapy procedures, feeding, Ryle's tube insertion, and hyperalimentation.
- Recognize suctioning and posture techniques in semiconscious and unconscious patients.
- Understand the concepts and procedures of oxygen therapy, including identifying and selecting appropriate delivery systems and masks based on patient needs.
- Assess ventilation during a patient emergency.
- Assist with ventilation using mouth-to-mouth, mouth-to-ET tube, or bag-valve mask construction procedures.
- 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 pediatric 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 Hours
- 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. - 4 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. - 2 Hours
- Management of asepsis. - 2 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 oscillotonometer. 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.

Practicals/ Clinical Postings: (75 Hours)

a) 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.

b) 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.

c) 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.

d) 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.

e) 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.

f) 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.

g) 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.

h) 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.

DAOTT- 016: Disaster Management & Environmental Sciences (45 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- (20 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- (25 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

Fourth Semester

DAOTT-017: Advanced Anaesthesia Techniques (60 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 advanced anaesthesia techniques. Anaesthetic considerations 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.

Course Outcome

The course aims to equip students with the skills to:

1. Anaesthetic considerations for advanced surgeries: Demonstrate understanding of challenges and techniques involved in providing Anaesthesia for advanced procedures, apply appropriate methods and strategies for maintaining airway patency, and implement pain management protocols.
2. Airway management in difficult airway cases: Use of advanced techniques like Fibreoptic intubation, supraglottic airway devices, and video laryngoscopy to maintain airway patency and manage complications.
3. Local and regional anaesthesia 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.

Advanced Anaesthesia Techniques

- 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.
- Airway management in difficult airway conditions and procedures: Learning about advanced airway management techniques, such as fibreoptic intubation, supraglottic airway devices, and video laryngoscopy, for securing the airway during ENT surgeries.
- Anaesthetic 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.
- Paediatric Anaesthesia techniques and considerations: Understanding the unique physiological and pharmacological considerations for providing Anaesthesia to paediatric patients, including preoperative preparation, induction, airway management.

- Anaesthesia for urological surgeries: Learning about the specific Anaesthesia considerations and techniques for urological procedures such as prostatectomy, nephrectomy, and cystoscopy.
- Regional Anaesthesia 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

Practical Topics: Advanced Anaesthesia Techniques (30 Hours)

- Hands-on practice in paediatric 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.
- This course provides a practical demonstration of anaesthetic considerations and techniques for various urological, orthopedic and pediatric surgeries.
- Training in patient positioning and patient preparation, including the use of regional anaesthetic and intravenous sedation procedures.
- Techniques of Regional Anaesthesia.
- 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.

DAOTT-018: Advanced Surgical Procedures (45 Hours)

Learning Objectives:

The learning objectives cover various aspects of Ear Nose & Throat (ENT), Ophthalmology, orthopedics, Paediatric surgery, urological surgeries. Understanding the principles and techniques involved in surgical management of these patients.

The course is designed to give learners a thorough awareness of prevalent disorders in these patients 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 the field of Anaesthesia & Operation Theatre Technology.

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.
- 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 surgery.
- Urological Surgeries including Ureteroscopy, Transurethral Resection of the Prostate (TURP), Transurethral Resection of Bladder Tumor (TURBT), Radical Cystectomy, Nephrectomy etc. and patient positing for these surgeries.
- Pediatrics surgical procedures such as Pediatric hernia repair, pyloromyotomy, congenital anomaly correction, and Paediatric laparoscopic surgeries, and understanding the specialized considerations, techniques for Paediatric patients and positioning.
- Common Surgeries in Ophthalmology like Cataract Extraction and Intraocular Lens (IOL) Implantation, Trabeculectomy, Shunt Implantation, Laser Therapy, Vitrectomy, Retinal Detachment Repair, Corneal Transplantation (Keratoplasty) etc.

DAOTT- 019: Specialized Anesthesia and Surgery (45 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.

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

Course Content

- Anaesthetic 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.
- Central Venous catheter and various insertions techniques(IJV, Femoral, PICC and subclavian), Arterial Line insertion and various techniques(including Allen's test)
- Anaesthesia techniques for cardiac bypass and valve replacement procedures: Learning about, cardiopulmonary bypass management, and strategies for maintaining stable hemodynamic during open-heart surgeries.
- 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.
- Anaesthetic considerations for neurosurgical procedures: Understanding the unique challenges and considerations in providing Anaesthesia for brain and spine surgeries, including patient positioning.
- Common cardiothoracic and vascular surgeries like Coronary Artery Bypass Grafting (CABG), Valve Repair and Valve Replacement surgeries: (Surgical removal of the damaged valve and implantation of a prosthetic valve.), Aneurysm Repair, Cardiac Defect Repair: such as atrial septal defect (ASD), ventricular septal defect (VSD), or Tetralogy of Fallot.

  Common 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.

DAOTT-020 Recent Advancements in Anesthesia and Surgery (75 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 outcomes focus 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.

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. - 10 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. - 10 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. - 10 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. - 5 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.

- 5 Hours

DAOTT-021: Research Methodology and Biostatistics (45 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 - 5 Hours
- Basic Concepts of Biostatistics - 5 Hours
- Types of Data - 5 Hours
- Research tools and Data collection methods - 5 Hours
- Sampling methods - 5 Hours
- Developing a research proposal - 5 Hours

Fifth Semester – Internship

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in simulation and service delivery. Students will demonstrate competence in beginning, intermediate, and advanced procedures in both areas. Students will participate in advanced and specialized 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.

Stipend

There should be provision to provide the stipend to the students while undergoing internship after successfully completing the course curriculum. The amount of stipend provided every month to the student interns should not be less than Rupees 20000 keeping in mind the occupational hazards and challenges faced while working full time in patient care areas including operation theatres and intensive care units of the hospitals housing the highly infectious and critical patients.

Professionalism in the Operating Room and Anaesthesia Technologists:

As an Anaesthesia & Operation Theatre Technologist, it is critical to maintain a high standard of professional behavior in order to guarantee patient safety, maintain workplace professionalism, and contribute to the overall efficacy of the healthcare team.

In order to improve your abilities as a Surgical and Anaesthesia Technologist, look for possibilities for professional growth and development. Keep up with the most recent developments in anaesthesia control, surgical technique, and patient safety.

Here are some crucial professional conduct guidelines to remember:

- Patient Security: To reduce the risk of mistakes and problems during surgical and anaesthesia operations, adhere to established protocols and recommendations.
- Maintain a clean and sterile operating room environment by following infection control procedures.
- Competence and Professional Development: Strive for excellence in your profession on a regular basis.
- Keep up to date on the most recent innovations and best practices in operation theatre and Anaesthesia Technology.
- Maintain a professional look and demeanor by following to the authorized dress code and wearing adequate personal protection equipment (PPE) in the operation theatre.
- Maintain a cheerful and polite demeanor towards patients, coworkers, and other healthcare professionals.
- Empathy, compassion, and attention to the needs and concerns of patients and their families are required.

- Communication abilities: Improve your verbal and written communication abilities.
- Policy and protocol adherence: Familiarize yourself with the institution's or facility's standard operating procedures and policies.
- Professional Honesty: Maintain the finest professional ethics.
- Be truthful, dependable, and accountable for your activities.
- Avoid any activity that may jeopardize the integrity of the profession or patient care.
- Recognize and appreciate the contributions of a diverse healthcare workforce.
- Continuous Improvement: Adopt a continuous improvement mentality.
- To improve your abilities and performance, seek feedback from superiors, coworkers, and patients.
- By following these professional behavior norms, Anaesthesia & Operation Theatre Technologists may help to provide safe, efficient, and compassionate treatment in the surgical context.

Competency Framework

Performance Criteria	Indicators		
	Knowledge	**Skill**	**Behavior**
• Capability to Anticipate and Prepare:	• Should have in depth knowledge about various general health conditions while examination • Should have essential knowledge about providing care to each individual who visits to your hospital • Should be aware of different types of disabilities and information on patients with additional needs • Should have essential knowledge about rights and dignity of the patients	• Proficiency in assisting surgeons/anaesthetist with equipment's, machines instruments, and suturing. • Competence in aiding anaesthetist with anaesthesia induction, airway management, and vital sign monitoring.	• Proactive attitude in preparing for procedures and anticipating the needs of the surgical team/Anesthesia team. • Attention to detail, ensuring proper organization of instruments and supplies. • Effective time management and collaboration with the surgical team. • Adaptability to handle unexpected situations and adjustments during surgery. • Professionalism, including confidentiality, ethical conduct, and respect for boundaries.
• Maintaining a strict sterile technique	• Thorough understanding of the principles of aseptic technique and sterile field maintenance.	• Proficiency in performing hand hygiene using appropriate hand washing or hand sanitization methods.	• Maintaining appropriate hand hygiene procedures both inside and outside the operating room.

	• Knowledge of infection control guidelines, including hand hygiene, proper gowning and gloving techniques, and disinfection protocols. • Familiarity with different types of sterilization methods, such as steam sterilization, ethylene oxide sterilization, and sterile packaging	• Competence in donning sterile gowns and gloves without contaminating them and in maintaining sterility while working within the sterile field. • Skill in handling sterile instruments, supplies, and drapes to prevent contamination and maintain a sterile environment. • Ability to assist surgeons and anesthetists in maintaining sterility during procedures, such as passing instruments or opening sterile packages.	• Diligently adhering to the recommended gowning and gloving procedures to protect oneself and the patient. • Pay close attention to protecting the sterile field's integrity by limiting air circulation, preventing needless movements, and contaminating it with non-sterile things. • Strict adherence to sterile procedure during instrument handling, making sure that instruments stay in the sterile field and maintaining the proper sterile instrument passes. • Addressing any breaches of sterile technique or potential contamination as soon as possible, taking corrective action, and, as necessary, informing the surgical team. • Maintaining sterility during the procedure with constant attention and awareness while aggressively looking out for any potential breaks or compromises.

• Instrumentation and Equipment	• Understanding of surgical instruments and their uses. • Familiarity with medical equipment, such as anesthesia machines and monitors. • Knowledge of equipment setup and placement.	• Proficiency in handling surgical instruments and ensuring their sterility. • Ability to set up and place medical equipment accurately. • Skill in operating equipment and adjusting settings. • Troubleshooting abilities for equipment malfunctions.	• Continuously update knowledge of instruments and equipment. • Ensure instruments are clean and organized. • Double-check equipment setup for patient safety. • Communicate effectively with surgeons and anesthetists. • Promptly address equipment issues during procedures. • Collaborate with appropriate personnel for complex troubleshooting.
• Surgical Assistance	• Understanding of surgical procedures, including laparoscopic, arthroscopic, and robotic techniques. • Knowledge of different surgical instruments, sutures, and their uses. • Familiarity with sterile techniques and maintaining a sterile field.	• Proficiency in directly supporting the surgeon during procedures. • Ability to anticipate the surgeon's needs and provide timely assistance. • Skill in passing sutures, instruments, and other necessary items accurately. • Competence in scrubbing for more technical procedures like laparoscopic, arthroscopic, and robotic surgeries.	• Adhere to the surgeon's directions promptly and accurately. • Anticipate the surgeon's demands and prepare instruments or sutures in advance. • Maintain clear and open communication with the surgeon throughout the procedure. • Collaborate with the surgical team to ensure effective teamwork.

			• Demonstrate attentiveness and responsiveness during the surgery. • Continuously enhance knowledge of surgical procedures and instruments. • Adhere to sterile techniques and maintain a sterile environment.
• Anesthesia Support	• Understanding of anesthesia administration and management. • Familiarity with the different stages of anesthesia induction and maintenance. • Awareness of monitoring vital signs, oxygen saturation, and end-tidal carbon dioxide levels taking ABG sample, BIS, NMT, Arterial line/CVP line insertion.	• Proficiency in assisting with the administration and supervision of Anaesthesia. • Ability to assist in securing and positioning patients during anaesthesia induction. • Ability to monitor and assess vital signs, oxygen saturation, and end-tidal carbon dioxide levels.	• Collaborate closely with the anaesthetist, following their instructions and assisting with anaesthesia administration. • Help secure and position patients during anaesthesia induction and throughout the procedure. • Pay close attention to any changes or irregularities in patient conditions. • Promptly communicate any significant changes to the anaesthetist and surgical team.
• Emergency Preparedness:	• Understanding of emergency procedures and protocols. • Knowledge of the locations and functions of emergency equipment/crash carts.	• Proficiency in identifying and accessing emergency equipment quickly. • Ability to remain calm and composed in high-stress situations.	• Proactively learn about emergency procedures and equipment locations. • Follow established protocols and guidelines for emergency situations.

	• Familiarity with potential postoperative complications and their management.	• Competence in following established emergency protocols. • Skill in assisting the surgical team during crises or postoperative difficulties.	• Assist the surgical team promptly and effectively during crises. • Continuously update knowledge of emergency procedures and best practices.
• Ability to manage confidentiality of patient's demographic and medical record data	• Should have adequate knowledge of data protection and how this will impact security, access and confidentiality of the patient's records. • Should have essential knowledge to ensure the patient environment will remain safe and user-friendly, in terms of access and facilities	• Conversant in using various digital devices, access cloud storage platforms and saves electronic medical records on system-based software programs and keeps them safe. • Demonstrates how to store and retrieve manual medical records	• Seeks consent of the patient before providing information to external stake holders. • Restricts self from discussing patient information and condition in any open forum/external communication
• Ability to promote ethical and cordial relationship with other health care professionals	• Should have essential knowledge of how to maintain practice in accordance with other professional health care standards	• Explains the condition that are treatable/correctable beyond your practice standards	• Honesty and understanding of own limitations

• Ability to handle critical, narcotic drugs	• Should have essential knowledge of how handle various drugs.	• Maintain the record, stock and documentation of drug uses in anaesthesia.	• Should have proper knowledge and protect misuse of drugs.
• Ability to comply with legal, professional and ethical guidelines, law and codes.	• Should have in depth knowledge of ethical practice and standard operating procedures followed in the clinical examination. • Should have vital knowledge of the law, codes and guidelines set by the regulatory body of profession and is fully aware of the consequences if not followed.	• Explains the uses of various diagnostic instruments and their importance in the process of examination. • Follows the code of conduct set down by the council/ appropriate authorities	

Skills based outcomes and monitorable indicators for Operation Theatre Technologist

Competency statements

1. Demonstrate ability to prepare and maintain Operation Theater
2. Demonstrate ability to maintain equipment support in an acute care environment
3. Identify and move to maintain a sterile field
4. Follow infection control policies and procedures
5. Manage and maintain theater equipment
6. Demonstrate ability to prepare the patient for operative procedures
7. Provide intra-operative equipment and technical support
8. Demonstrate skills and knowledge to assist anesthetist in handling emergencies outside of OT Room
9. Manage hazardous waste and follow biomedical waste disposal protocols
10. Ensure availability of medical and diagnostic supplies
11. Monitor and assure quality
12. Act within the limits of one's competence and authority
13. Work effectively with others
14. Manage work to meet requirements
15. Maintain a safe, healthy, and secure working

S. No.	Learning outcomes	Knowledge/ Comprehension	Applications / Synthesis /Evaluation	Hours
1	Prepare and maintain Operation Theatre	Be familiar with the Operation Theatre and all the equipment.	Prepare the OT for the operation along with all the necessary equipment.	200
		Know the protocols used in Operation Theatre	Interpret and understand all planning techniques to keep an OT functional.	
2	Maintain equipment support in an acute care environment	Use basic knowledge of surgical procedures to assist and identify the needs of equipment of Operating teams.	Clean and store equipment safely	200
			Position equipment in accordance with set up procedures	
3	Identify and move to maintain a sterile field	Knowledge of safety and environmental aspects related to workplace operation.	Perform aseptic techniques in the operating suite.	200
		Knowledge of relevant protocols, good practices, standards, policies and procedures while transferring the patient.	Transporting the patient in and out from operation theatre.	
4	Follow infection control policies and procedures	Knowledge of effective infection control strategy that ensures the safety of the patient.	Preform the standard precautions to prevent the spread of infection in accordance with organization requirements.	100
5	Manage and maintain theater equipment	Applying a broad knowledge base and a range of well-developed skills to select, prepare, operate, maintain and handle equipment within operating suite.	Set up equipment and consumables, correctly position and check in accordance with organization policy and procedures and manufacturer's specifications.	100
6	Prepare patient for operative procedures	Knowledge of preparing patients as required before the operation.	Safely position patient to meet the requirements of the anaesthetist and Surgeon.	200

S. No.	Learning outcomes	Knowledge/ Comprehension	Applications / Synthesis /Evaluation	Hours
7	Provide intra-operative equipment and technical support	Knowledge to assist the anaesthetist and provide technical support during surgical procedure.	Monitoring the performance of equipment used and adjusting surgical equipment.	200
8	Be able to demonstrate professional behavior	Explain the legal and ethical guidelines related to the profession	Promote collaborative practice	100
		Be aware of your own competency levels		
9	Be able to complete accurate treatment documentation	Recognize the importance of accurate documentation	Complete the treatment documentation accurately	40
10	Manage hazardous waste	Knowledge of Handle, collect and dispose of the hazardous waste.	Coordinate the hazardous waste management program.	80
			Properly identify, segregate, handle, label, and store waste.	
	Total			1420


NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
राष्ट्रीय सहबद्ध और स्वास्थ्य देखभाल पेशा आयोग
स्वास्थ्यम् सर्वार्थसाधनम्
NCAHP
Since-2021

4.2 Baccalaureate in Anaesthesia & Operation Theatre Technology (B.AOTT)

Baccalaureate in 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.

Expectation from the future graduate in the providing patient care.

1. The Course prepares the operating theatre technologist to work as a competent, reliable member of the health care team under the guidance and supervision of doctors in their delivery of patient care, training also focuses on the knowledge and skills of monitoring infection control policy and procedures in the operating theatre.
2. Employment opportunities can be found in hospitals in both private and public sectors as well as in independent trauma centres.
3. OTT graduate is encouraged to pursue further qualification to attain senior position in the professional field, also to keep abreast with the advance and new technology, the professional should opt for continuous professional education credits offered by national and international institutes.

Eligibility 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 in 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.

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 intake: 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 Baccalaureate in 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.

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

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.

Medium of instruction:

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

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.

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 baccalaureate 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.

Teaching faculty and infrastructure

Institute should mandatorily be associated with the state medical colleges whereby they can make use of the available patient load and medical infrastructure as a part of their training curriculum (May be through MOU).

- Standalone institutions must have a MoU with either a medical college or hospital or healthcare facility as per the guidelines (desired number of Operation Theatres/ICU beds/HDU beds) defined in the curriculum to ensure practical exposure to the students.
- MoU to also define the clinical supervision of the students –institutional staff or clinical preceptors can be considered.

For the institutes to be capable of providing high quality training to the students and exposure to all the related specialties, it should have the following:

- Operating Theatres.
- Intensive Care Units. (Surgical and Medical)
- High Dependency Units (HDUs)
- Simulation Labs.
- Central Sterile Supply Department.
- Post-Operative Care Unit (PACU)

The teaching faculty (with annual intake of up to 30 students) for the BAOTT course should have a minimum of Master's in the MAOTT or MAOTT with PhD in relevant subject.

- 1 Professor
- 2 Associate Professors
- 4 Asst. Professors.
- 8 Demonstrators/Tutors.

The recommended teachers to student ratio at the UG level should be - 1:30.

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

Infrastructure requirements:

- Minimum 4 classrooms with minimum seating capacity of 30 students
- Faculty rooms, Common rooms for students
- Auditorium/Conference room with minimum seating capacity of 150 students.
- Library
- Student canteen/cafeteria
- Office rooms for staff

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.

Model Curriculum Outline

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 & Haematology	(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

Subject: Remedial English

Theory hours	30
Practical/ Demonstration hours	
Lecture Practical/ Demonstration Method of Assessment	01 Hours per week Written examination

Course Description: The course is designed for the students from non-English Boards by introducing and improving their spoken English knowledge and speaking skills apropos their professional work.

Objectives: After completing this course the students will be able to:

- Read and write correct English.
- Communicate effectively in English language.
- Demonstrates skill in writing and speaking English language.

COURSE OUTCOMES

At the end of the course students should be able to...

CO1: Analyze and restate the meaning of a text in English
CO2: Demonstrate the skill to write in English without grammatical error
CO3: Practice listening effectively to communication in English
CO4: Develop the ability to speak English language with the right way of pronunciation.
CO5: Express the viewpoints with confidence in English
CO6: Express values and skills gained through effective communication to other disciplines
CO7: Compose articles and compositions in English
CO8: Discuss and socialize effectively in English

Unit I Language-Basic **(05 hours)**

- Content: Review of grammar, Remedial study of grammar, building vocabulary
- Introduction
- Parts of speech
- Exercise on use of grammar.
- Tense, Number, Gender
- Assessment methods: Objective type, Fill in the blanks.

Unit II (**03 hours)**

- Read and comprehend prescribed course books
- Reading, Summarizing, Comprehension
- Assessment methods: Fill in the blanks and One-mark questions.

Unit III (**06 hours)**

Various Forms of Composition

- Letter writing
- Note taking
- Precise writings
- Diary writing
- Reports on health problems etc.
- Official correspondence:
- Outgoing correspondence, replying to incoming correspondence, writing circulars, notices, charge memos, note taking, writing summaries, observation reports.

Teaching learning activities: Exercise on writing: Letter writing, resume/CV Essay writing.

Assessment methods: Applications, short reports to be written.

Unit IV **(10 Hours)**

- Objectives: Develop skill in spoken English
- Content: English- Spoken mode, Debates, Telephonic conversion, formal & informal conversation:
- Agreeing emphasizing, interrupting, politely, opinions, interviews, and visual presentation.
- Teaching learning activities: Participating in seminar, Telephonic conversion, conversation in
- different situations, practice in public speaking

Assessment methods: Assessment of the skills.

Unit V (**06 Hours)**

- Content: Listening to comprehension media, audio, video, speeches, definition of listening, types of listening, purposes of listening, obstacles for listening, contexts of listening, to be a good listener, listening to a lecture etc.
- Teaching learning activities: Listening to audio, video tapes and identify the key points.
- **Assessment methods:** Practical test of listening and filling out the blanks
- There shall be examination for 100 marks as the end of the academic year, which will be conducted by the college.

Reference Books:

Tom Koorkkakala, *Communicative English for General Nursing Students,* K.J. Publications, 2008.
King's English, Addone Publishing Group, Thiruvananthapuram.
John Ellison Kahn & others, *How to write and speak Better*

First Semester- Foundation course

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 programmes 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 Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme. -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 system.

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

Principals of Management (30 Hours)

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.

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.

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 Transducer, 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

- Respiratory & 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
- 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

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, paediatric 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

Practicals 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 in 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	…..	….	…..	150
BAOTT-0010	Basic Concept in Pharmacology	40	…… .	…..	2	40	10	50	…..	….	…..	100
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	CLP	CR	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 (Hours)		**510**			…….							**400**

Fourth 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-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	CLP	CR	SEE	IA	T	SEE	IA	T	
BAOTT-020	Specialized 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 Eighth Semester:

Course Code	Course Title	Time Period
BAOTT-028	B.AOTT 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, b. Ross and Wilson Anatomy and Physiology, c. Human Anatomy for Students, B.D Ghosh. d. Textbook of Anatomy (Vol-1,2,3) Samar Mitra.
2	Physiology	a. Essentials of Medical Physiology, K Sembulingam, b. Comprehensive Textbook of Medical Physiology, G K Pal. c. Ross and Wilson Anatomy and Physiology, d. Practical Physiology G K Pal & Pravati Pal 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) b. Handbook of medical instrumentation by R S Kanpur. c. The Anesthesia Technologist's Manual by Emily S Guimaraes, Matthew Davis, Jeffrey R Kirsch, Glenn Woodworth. d. Surgical Technology for the surgical technologist by association of surgical technologists
4	Biochemistry & Hematology	a. Biochemistry, U Satyanarayan, b. Biochemistry, DM. Vasudevan, c. An Introduction to Hematology, Nandini Mukherjee.
5	Pathology & Microbiology	a. Microbiology, Ananthanarayan and Paniker's, b. CP. Baveja. Textbook of Microbiology for nurses. c. A textbook of Microbiology-Chakraborty. d. Pathology, Harsh Mohan e. Basic Pathology by Robbins
6	Basic Concepts in Pharmacology	a. Essentials of Medical Pharmacology, KD Tripathi b. Medical Pharmacology, Uday Kumar (Author)
7	Basic Techniques of Anaesthesia	a. Drugs & Equipment in Anesthetic Practice by Arun Kumar Paul, b. Short textbook on Anesthesia, Ajay Yadav, c. Short Textbook of Anesthesia, Bajaj Kumar, d. Understanding Anesthesia Equipment Dorsch & Dorsch, e. Wards Anesthesia Equipment Andrew & Ali Diba, f. The Anesthesia Technician & Technologists Manual Glenn Woodworth.

8	Basics of Surgical procedures	a. Fullers Surgical Technology, Joanna Kotcher Fuller b. D C Dutta textbook OG Gynecology, Hiralal Konar. c. Laparoscopic Surgery, R. K. Mishra d. Surgical Technology for the surgical technologist by association of surgical technologists. e. Introduction to the Surgery by Marketa Duskova. f. Textbook on Operation Theatre Technology, Bhagwan Ramachandran. g. A PRACTICAL GUIDE TO OBSTETRICAL AND GYNECOLOGICAL INSTRUMENTS FOR Nurses, Chaitanya.C. 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. 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 Anaesthesia 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, b. Wards Anesthesia Equipment Andrew & Ali Diba, c. The Anesthesia Technician & Technologists Manual Glenn Woodworth. d. Miller's Anesthesia.
19	Specialized Surgery 2	a. Fullers Surgical Technology, Joanna Kotcher Fuller b. Surgical Technology for the surgical technologist by association of surgical technologists. c. The Neurosurgical Instrument Guide, Christopher.S. Eddleman d. Neurology & Neurosurgery illustrated, Lindsay,Bone, Fuller.
20	Specialized Anesthesia & Surgery 3	a. Miller's Anesthesia, b. Advances In Anesthesia For Laparoscopic Surgeries Regional Anesthesia And The Road Ahead 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, b. Paramedics 6 in 1 Handbook, GD Mogli, c. A First handbook of Medical Instruments, A Bhoomika/ G. Chatterjee, d. Hospital Acquired Infection, Neeta Patwardhan, Satish Patwardhan, e. Fluid Therapy, Rashmi Dutta, f. Manual of First Aid, LC Gupta, g. Instrument and Operative Surgery, AK Gvalani, h. The little ICU book, Paul L. Marino, i. Environmental studies for UG Courses, Erach Bharucha, UGC.

Stipend

There should be provision to provide the stipend to the students while undergoing internship after successfully completing the course curriculum. The amount of stipend provided every month to the student interns should not be less than Rupees 20000 keeping in mind the occupational hazards and challenges faced while working full time in patient care areas including operation theatres and intensive care units of the hospitals housing the highly infectious and critical patients

Professionalism in the Operating Room and Anaesthesia Technologists:

As an OT and Anaesthesia Technologist, it is critical to maintain a high standard of professional behavior in order to guarantee patient safety, maintain workplace professionalism, and contribute to the overall efficacy of the healthcare team.

In order to improve your abilities as a Surgical and Anaesthesia Technologist, look for possibilities for professional growth and development. Keep up with the most recent developments in anaesthesia control, surgical technique, and patient safety.

Here are some crucial professional conduct guidelines to remember:

- Patient Security: To reduce the risk of mistakes and problems during surgical and anaesthesia operations, adhere to established protocols and recommendations.
- Maintain a clean and sterile operating room environment by following infection control procedures.
- Competence and Professional Development: Strive for excellence in your profession on a regular basis.
- Keep up to date on the most recent innovations and best practices in operation theatre and Anaesthesia Technology.
- Maintain a professional look and demeanor by following to the authorized dress code and wearing adequate personal protection equipment (PPE) in the operation theatre.
- Maintain a cheerful and polite demeanor towards patients, coworkers, and other healthcare professionals.

- Empathy, compassion, and attention to the needs and concerns of patients and their families are required.
- Communication abilities: Improve your verbal and written communication abilities.
- Policy and protocol adherence: Familiarize yourself with the institution's or facility's standard operating procedures and policies.
- Professional Honesty: Maintain the finest professional ethics.
- Be truthful, dependable, and accountable for your activities.
- Avoid any activity that may jeopardize the integrity of the profession or patient care.
- Recognize and appreciate the contributions of a diverse healthcare workforce.
- Continuous Improvement: Adopt a continuous improvement mentality.
- To improve your abilities and performance, seek feedback from superiors, coworkers, and patients.
- By following to these professional behavior norms Anaesthesia & Operation Theater Technologists may help to provide safe, efficient, and compassionate treatment in the surgical context.

BAOTT INTERNSHIP LOGBOOK PROFORMA:

Institute Name & Logo

Logbook for BAOTT Internship Program

Student Name .....

Year & Month .....

Regd. No. .....

BIODATA OF THE STUDENT

Name	
D.O. B	
Parents Name	
Regd. No	
Year of Passing 10+2	
Date of Joining BAOTT	
Date of completion of Final Semester	
Permanent Address	
Postal Address	
Mobile No. of Student	
Mobile No. of Parents	
Email	
Other Achievements	

Guidelines for Logbook Entry Outcome:

Outcome: Morbidly/ Mortality/Any major complication should be indicated with measures taken for timely management.

1.The candidate should make the entries in the logbook daily, countersigned by the Assistant Professor /Associate Professor / Professor / Head of the Department.

2.TheAssociate Professor / Professor must review & sign the logbook every week for short-duration postings & every month for long duration postings

3. In emergency OT posting the logbook will be countersigned by Senior Resident on duty.

4.The logbook is to be submitted through the Professor /Associate Professor at the time of the final examination.

5. Please use clear handwriting for filling the Logbook.

NOTE- Duration 12 months (Anesthesia- 6 months & Surgical Disciplines 6 months)

Protocol for Internship Postings

Department/Area of Posting	Nature of Posting	Duration of Posting
Anesthesia Department	Regular	5 Months
Critical Care Unit	Regular	1 Month
General Surgery, Obstetrics & Gynecology	Regular	1 Month
Uro surgery & Pediatric Surgery	Regular	1 Month
CTVS & Neurosurgery	Regular	1 Month
Emergency/Trauma OT & Orthopedics OT	Regular	1 Month
Robotic Surgery	Regular	1 Month
Minor Surgery	Regular	1 Month

Logbook Proforma: (B.AOTT INTERNSHIP)

Area of Posting…… Period…….to……

Date						
Patient ID						
Age/Sex						
Diagnosis						
Operative Procedure						
Anesthetic Technique						
Special Procedure						
In time						
Out time						
Observation/Work done/Newly learned things						
Signature of Faculty/Senior Resident						

Course Coordinator Signature: …….

GUIDELINES FOR INTERNSHIP:

1. The internship is compulsory.
2. Duration of the internship shall be one year.
3. Maintain professionalism at all times, including OT attire, communication and interactions with respect to patient confidentiality and adhere to Hospital and University rules & regulations.
4. Follow the chain of command and communicate effectively with supervisors and team members.
5. The degree of Baccalaureate in Anaesthesia and Operation Theatre Technology shall be awarded after the completion of internship.
6. The candidate should make the entries in the log book daily, countersigned by (Concern faculty) the Assistant Professor /Associate Professor / Professor / Head of the Department.
7. The logbook is to be submitted to the Department at the time of the final examination.

Evaluation of Internees:

A. Educative assessment/Assessment for learning: Assessment of the internees on daily basis during internship and postings should done by the Head of the Department. Objective – To develop minimum professional skills. Maintaining Log book by internees
B. Cumulative assessment: Under the observation of Technical staff/Faculty of the concerned department and maintained Log book by the interns. Certificate shall be issued after these two evaluations.
C. Duration of Internship: One year
Total working hours – Minimum 1440 hours
Total working hours/day - 8 hours/day
Lunch Time – 1 hour

Learning Objectives:

1. Develop proficiency in setting up and maintaining anaesthesia and surgical equipment.
2. Gain skills in assisting with patient preparation, positioning, and draping.
3. Learn to assist anaesthesia providers during induction, maintenance, and emergence phases.
4. Acquire knowledge of sterile technique and infection control practices.
5. Develop abilities to recognize and respond to intraoperative emergencies.
6. Enhance communication skills for effective patient interaction and advocacy.
7. Foster teamwork and collaboration within the interdisciplinary surgical team.
8. Demonstrate professionalism and ethical conduct in all interactions.
9. Engage in continuous learning and professional development activities.
10. Develop critical thinking and problem-solving abilities for perioperative challenges.

Expected Outcomes:

1. Demonstrated competence in anaesthesia and surgical equipment setup and maintenance.
2. Provision of compassionate and attentive care to surgical patients.
3. Effective collaboration and communication within the surgical team.
4. Ability to respond appropriately to intraoperative emergencies.
5. Adherence to professionalism and ethical standards in practice.

6. Engagement in on-going education and professional development.
7. Application of critical thinking skills to perioperative situations.
8. Accurate documentation of procedures and interventions.
9. Advocacy for patient safety, comfort, and well-being.
10. Adherence to infection control and safety protocols.

Note/Protocols

1. Documentation:

a) Accurately document all procedures, observations, and interventions in the patient's medical record.
b) Use clear and concise language following University/institutional guidelines for documentation.

2. Leave for Interns:

a) No leave / absence is allowed to an Intern except as may be permitted by University/Institute
b) Total leave allowed – Maximum 30 days during whole one year of internship
c) Maximum leave allowed at a time: 10 days.

3. Communication:

a) Communicate relevant information to the anesthesia team, surgeon, and nursing staff during handoffs and transitions of care.
b) Document any verbal orders or instructions received during procedures promptly.

4. Safety Precautions:

a) Adhere to protocols for infection control and aseptic technique in the operating room.
b) Verify patient identification, surgical site, and procedure before the start of each case.
c) Follow established procedures for the handling and disposal of biohazardous materials.

5. Incident Reporting:

a) Report any adverse events, near misses, or equipment malfunctions promptly to the appropriate personnel.
b) Document incidents accurately and thoroughly using the institution's incident reporting system.

6. Confidentiality:

a) Maintain patient confidentiality at all times, both in verbal communication and electronic documentation.
b) Avoid discussing patient information in public areas or with unauthorized individuals.

Competencies Statement

Performance Criteria	Indicators		
	Knowledge	**Skill**	**Behavior**
• **Capability to Anticipate and Prepare:**	• Should have in depth knowledge about various general health conditions while examination • Should have essential knowledge about providing care to each individual who visits to your hospital • Should be aware of different types of disabilities and information on patients with additional needs • Should have essential knowledge about rights and dignity of the patients	• Proficiency in assisting surgeons/anaesthetist with equipment's, machines instruments, and suturing. • Competence in aiding anesthetists with anesthesia induction, airway management, and vital sign monitoring.	• Proactive attitude in preparing for procedures and anticipating the needs of the surgical team/Anesthesia team. • Attention to detail, ensuring proper organization of instruments and supplies. • Effective time management and collaboration with the surgical team. • Adaptability to handle unexpected situations and adjustments during surgery. • Professionalism, including confidentiality, ethical conduct, and respect for boundaries.
• **Maintaining a strict sterile technique**	• Thorough understanding of the principles of aseptic technique and sterile field maintenance.	• Proficiency in performing hand hygiene using appropriate handwashing or hand sanitization methods.	• Maintaining appropriate hand hygiene procedures both inside and outside the operating room.

	• Knowledge of infection control guidelines, including hand hygiene, proper gowning and gloving techniques, and disinfection protocols. • Familiarity with different types of sterilization methods, such as steam sterilization, ethylene oxide sterilization, and sterile packaging	• Competence in donning sterile gowns and gloves without contaminating them and in maintaining sterility while working within the sterile field. • Skill in handling sterile instruments, supplies, and drapes to prevent contamination and maintain a sterile environment. • Ability to assist surgeons and anesthetists in maintaining sterility during procedures, such as passing instruments or opening sterile packages.	• Diligently adhering to the recommended gowning and gloving procedures to protect oneself and the patient. • Pay close attention to protecting the sterile field's integrity by limiting air circulation, preventing needless movements, and contaminating it with non-sterile things. • Strict adherence to sterile procedure during instrument handling, making sure that instruments stay in the sterile field and maintaining the proper sterile instrument passes. • Addressing any breaches of sterile technique or potential contamination as soon as possible, taking corrective action, and, as necessary, informing the surgical team. • Maintaining sterility during the procedure with constant attention and awareness while aggressively looking out for any potential breaks or compromises.

• **Instrumentation and Equipment**	• Understanding of surgical instruments and their uses. • Familiarity with medical equipment, such as anesthesia machines and monitors. • Knowledge of equipment setup and placement.	• Proficiency in handling surgical instruments and ensuring their sterility. • Ability to set up and place medical equipment accurately. • Skill in operating equipment and adjusting settings. • Troubleshooting abilities for equipment malfunctions.	• Continuously update knowledge of instruments and equipment. • Ensure instruments are clean and organized. • Double-check equipment setup for patient safety. • Communicate effectively with surgeons and anaesthetists. • Promptly address equipment issues during procedures. • Collaborate with appropriate personnel for complex troubleshooting.
• **Surgical Assistance**	• Understanding of surgical procedures, including laparoscopic, arthroscopic, and robotic techniques. • Knowledge of different surgical instruments, sutures, and their uses. • Familiarity with sterile techniques and maintaining a sterile field.	• Proficiency in directly supporting the surgeon during procedures. • Ability to anticipate the surgeon's needs and provide timely assistance. • Skill in passing sutures, instruments, and other necessary items accurately. • Competence in scrubbing for more technical procedures like laparoscopic, arthroscopic, and robotic surgeries.	• Adhere to the surgeon's directions promptly and accurately. • Anticipate the surgeon's demands and prepare instruments or sutures in advance. • Maintain clear and open communication with the surgeon throughout the procedure. • Collaborate with the surgical team to ensure effective teamwork.

			• Demonstrate attentiveness and responsiveness during the surgery. • Continuously enhance knowledge of surgical procedures and instruments. • Adhere to sterile techniques and maintain a sterile environment.
• **Anesthesia Support**	• Understanding of anesthesia administration and management. • Familiarity with the different stages of anesthesia induction and maintenance. • Awareness of monitoring vital signs, oxygen saturation, and end-tidal carbon dioxide levels taking ABG sample, BIS, NMT, Arterial line/CVP line insertion.	• Proficiency in assisting with the administration and supervision of Anaesthesia. • Ability to assist in securing and positioning patients during anaesthesia induction. • Ability to monitor and assess vital signs, oxygen saturation, and end-tidal carbon dioxide levels.	• Collaborate closely with the anaesthetist, following their instructions and assisting with anaesthesia administration. • Help secure and position patients during anaesthesia induction and throughout the procedure. • Pay close attention to any changes or irregularities in patient conditions. • Promptly communicate any significant changes to the anaesthetist and surgical team.
• **Emergency Preparedness:**	• Understanding of emergency procedures and protocols.	• Proficiency in identifying and accessing emergency equipment quickly .	• Proactively learn about emergency procedures and equipment locations.

	• Knowledge of the locations and functions of emergency equipment/crash carts. • Familiarity with potential postoperative complications and their management.	• Ability to remain calm and composed in high-stress situations. • Competence in following established emergency protocols. • Skill in assisting the surgical team during crises or postoperative difficulties.	• Follow established protocols and guidelines for emergency situations. • Assist the surgical team promptly and effectively during crises. • Continuously update knowledge of emergency procedures and best practices.
• **Ability to manage confidentiality of patient's demographic and medical record data**	• Should have adequate knowledge of data protection and how this will impact security, access and confidentiality of the patient's records. • Should have essential knowledge to ensure the patient environment will remain safe and user-friendly, in terms of access and facilities	• Conversant in using various digital devices, access cloud storage platforms and saves electronic medical records on system-based software programs and keeps them safe. • Demonstrates how to store and retrieve manual medical records	• Seeks consent of the patient before providing information to external stake holders. • Restricts self from discussing patient information and condition in any open forum/external communication
• **Ability to promote ethical and cordial relationship with other health care professionals**	• Should have essential knowledge of how to maintain practice in accordance with other professional health care standards	• Explains the condition that are treatable/correctable beyond your practice standards	• Honesty and understanding of own limitations

• **Ability to handle critical, narcotic drugs**	• Should have essential knowledge of how handle various drugs.	• Maintain the record, stock and documentation of drug uses in anaesthesia.	• Should have proper knowledge and protect misuse of drugs.
• **Ability to comply with legal, professional and ethical guidelines, law and codes.**	• Should have in depth knowledge of ethical practice and standard operating procedures followed in the clinical examination. • Should have vital knowledge of the law, codes and guidelines set by the regulatory body of profession and is fully aware of the consequences if not followed.	• Explains the uses of various diagnostic instruments and their importance in the process of examination. • Follows the code of conduct set down by the council/ appropriate authorities	

Skills based outcomes and monitorable indicators for Operation Theatre Technologist

Competency statements

1. Demonstrate ability to prepare and maintain Operation Theater
2. Demonstrate ability to maintain equipment support in an acute care environment
3. Identify and move to maintain a sterile field
4. Follow infection control policies and procedures
5. Manage and maintain theater equipment
6. Demonstrate ability to prepare the patient for operative procedures
7. Provide intra-operative equipment and technical support
8. Demonstrate skills and knowledge to assist anesthetist in handling emergencies outside of OT Room
9. Manage hazardous waste and follow biomedical waste disposal protocols
10. Ensure availability of medical and diagnostic supplies
11. Monitor and assure quality
12. Act within the limits of one's competence and authority
13. Work effectively with others
14. Manage work to meet requirements
15. Maintain a safe, healthy, and secure working

S. no.	Learning outcomes	Knowledge/comprehension	Applications / synthesis /evaluation	Hours
1	Prepare and maintain Operation Theatre	Be familiar with the Operation Theatre and all the equipment.	Prepare the OT for the operation along with all the necessary equipment.	300
		Know the protocols used in Operation Theatre	Interpret and understand all planning techniques to keep an OT functional.	
2	Maintain equipment support in an acute care environment	Use basic knowledge of surgical procedures to assist and identify the needs of equipment of Operating teams.	Clean and store equipment safely	300
			Position equipment in accordance with set up procedures	
3	Assist anaesthetist in handling emergencies outside of OT Room.	Knowledge of assisting anaesthetist outside OT Room.	Prepare emergency kit to handle areas outside OT Room.	300
			Ensure any signs or symptoms of a clinical emergency is identified correctly and reported to the appropriate clinician.	
4	Follow infection control policies and procedures	Knowledge of effective infection control strategy that ensures the safety of the patient.	Preform the standard precautions to prevent the spread of infection in accordance with organization requirements.	220
5	Ensure availability of medical and diagnostic supplies	Anticipating demand and ensuring availability of adequate medical and diagnostic supplies.	Maintain adequate supplies of medical and diagnostic supplies. Arrive at actual demand as accurately as possible	100
6	Prepare patient for operative procedures	Knowledge of preparing patients as required before the operation.	Safely position patient to meet the requirements of the anaesthetist and Surgeon.	200
7	Provide intra-operative equipment and technical support	Knowledge to assist the anaesthetist and provide technical support during surgical procedure.	Monitoring the performance of equipment used and adjusting surgical equipment.	200

S. no.	Learning outcomes	Knowledge/comprehension	Applications / synthesis /evaluation	Hours
8	Work effectively with others	Working with other people to meet requirements	Identify any problems with team members and other people and take the initiative to solve these problems.	100
		Communicating with other team members and people internal or external to the organisation	Communicate with other people clearly and effectively	
9	Be able to demonstrate professional behavior	Explain the legal and ethical guidelines related to the profession	Promote collaborative practice	100
		Be aware of your own competency levels		
10	Be able to complete accurate treatment documentation	Recognize the importance of accurate documentation	Complete the treatment documentation accurately	50
11	Manage hazardous waste	Knowledge of Handle, collect and dispose of the hazardous waste.	Coordinate the hazardous waste management program.	100
			Properly identify, segregate, handle, label, and store waste.	
12	Maintain a safe, healthy and secure working environment.	Complying the health, safety and security requirements and procedures for Workplace.	Identify individual responsibilities in relation to maintaining workplace health safety and security requirements.	100
			Follow the organization's emergency procedures promptly, calmly, and Efficiently.	

S. no.	Learning outcomes	Knowledge/comprehension	Applications / synthesis /evaluation	Hours
13	Monitor and assure quality	Monitor treatment process/outcomes process/outcomes	Evaluate potential faults in treatment procedures.	200
		Identify problems in treatment	Identify breaches in health, safety and security procedures.	
		Solve treatment process/outcome problems	Follow the organization's emergency procedures promptly, calmly and efficiently.	
	Total			2270


NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
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स्वास्थ्यम् सर्वार्थसाधनम्
NCAHP
Since-2021

4.3 Master's in Anaesthesia & Operation Theatre Technology (M. A&OTT)

MASTER'S IN ANAESTHESIA & OPERATION THEATRE TECHNOLOGY (M.AOTT)

ABOUT THIS PROGRAM

An Anaesthesia and Operation Theatre (A&OT) Technologist forms an intrinsic part of any hospital. To become a trained professional one must undertake Anaesthesia and Operation Theatre Technology (A&OTT) program. This program aims at providing advanced knowledge in the field of Anaesthesia & Operation Theatre Technology. It aims to provide graduates who are well versed in planning, setting up, maintaining and managing the anaesthesia and surgical procedures. This program provides training on working and handling of anaesthesia and surgical equipment in and outside the Operating Room(OR). This program will bring out post graduates who are qualified and eligible to work as clinical supervisors in the Operation Theatre (OT), teach and train the students in the same specialty.

SCOPE OF PRACTICE

k. The Anaesthesia & Operation Theatre Technologists mainly assists the Anaesthesiologist and Surgeons in preparing and managing the patient for surgery during pre-operative, intra-operative and post-operative periods
l. Responsible for maintaining anaesthesia records
m. Understand the anxiety of patient in preoperative state and appropriately assist to shift, induce anaesthesia and position patient for surgical procedure
n. Assist anesthesiologists and surgeons with Non-Operating Room Anaesthesia(NORA) and surgery, like in CT and MRI suits, dental clinic, Labor theatre, IVF centres, burn centres, endoscopy room, and Cardiac catheterization laboratory, pain relief procedures etc.
o. Assist anesthesiologists during management of patient in the emergency departments and intensive care units
p. Assist consultant in transportation of the patients
q. Responsible for managing an OR as clinical supervisor
r. Postgraduates are qualified to teach at the university level and responsible for developing curriculum and delivering the course content, grading assignments, assessing the students and providing feedback and support the students
s. Postgraduates can also be involved in research related to their field of study, in addition to teaching and other academic responsibilities
t. There is a scope to get a fellowship or Ph. D after post-graduation
u. Assist disaster team in disaster situations and national emergencies on field and safe transport in ambulance.

JOB RESPONSIBILITIES FOR MASTER'S IN ANAESTHESIA & OPERATION THEATRE TECHNOLOGY:

- **As a Clinical Supervisor/ OT Manager:**

a. Providing supervision to clinical staff in the OT
b. Monitoring progress and ensuring that clinical staff adhering to ethical and legal standards
c. Maintaining the records, inventory and human resource in the OT

➢ **As an Anaesthesia/Surgical assistant:**

a. Assisting Anaesthesiologist and surgeons during surgeries and anaesthetic procedures for general surgeries and super specialties like Cardio Thoracic surgeries, Neuro surgeries, Pediatric surgeries, Renal surgeries, Plastic and reconstructive surgeries, Onco-surgeries, Ophthalmic surgeries, Otorhinolaryngology (ENT) surgeries, Orthopedic surgeries and OBG procedures
b. Preparation and maintenance of advanced anesthetic equipment including fiberoptic bronchoscopes, ultrasound used in anaesthesia, advanced airway gadgets, invasive monitoring devices and infusion pumps
c. Maintaining the stock and records of anaesthetic drugs including narcotics
d. Preparation and maintenance of advanced surgical equipment including laparoscopes, endoscopes, microscopes, electrosurgical units, laser and robotic surgical instruments

➢ **As Teaching faculty**

a. Designing course curriculum, developing and implementing new teaching strategies and methods
b. Student assessment
c. Mentoring the students
d. Organizing and participating in departmental meetings, workshops, conferences, faculty development programmes and other academic activities
e. Conducting research related to their field of study
f. Collaborating with researchers and industry experts
g. Serving on academic committees and participating in other service activities

Entry requirements

A candidate seeking admission to Master's in Anaesthesia & Operation Theatre Technology program must have passed Bachelor's degree of minimum of 3 years duration in Anaesthesia & Operation Theatre Technology/Anaesthesia Technology/ Operation Theatre Technology from a recognized university, with minimum 50% aggregate marks at HSC for open category and minimum 45% aggregate marks for reserve category.

Course Duration

The duration of Master's in Anaesthesia & Operation Theatre Technology shall be two academic years (4 semesters)

Medium of instruction:

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

Teaching Faculty and Infrastructure

The importance of providing an adequate learning environment for the students cannot be over emphasized. Both the physical infrastructure and the teaching staff must be adequate.

Teaching areas should facilitate different teaching methods. Large lecture theatres may be appropriate, but smaller teaching areas should also be provided for tutorial and problem/case-based learning approaches. In all venues where students are placed the health and safety standards must be adhered to.

The recommended teachers to student ratio in the PG level should be - 1:20.

Attendance:

A candidate has to secure minimum-

3. 75% attendance in theory
4. 80% in Skills training (practical) for qualifying to appear for the final university examination.

Assessment:

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training program. To achieve this, all assessment forms and feedback should be included and evaluated.

Examination:

There shall be a University examination at the end of each semester. Evaluation is based on formative evaluation (Internal Assessment) and summative evaluation (University examination).

Internal assessment (IA):

The internal assessment for theory and practical's shall be 20 marks each.
Internal assessment for theory shall be calculated as average of two sessional examinations, seminars, assignments etc. The internal assessment for practicals shall be calculated on the basis of the records of the practicals maintained and examinations.
A Candidate must secure at least 40% of total marks fixed for internal assessment in a particular course in order to be eligible to appear in the university examination of that course. If candidate is having inadequate internal assessment marks shall appear for internal assessment in the next semester.

University examination:

A candidate who satisfies the requirements of attendance, progress and conduct shall be eligible to appear for the university examinations. There shall be a university examination at the end of each semester.
To be eligible to appear for University examination a candidate should fulfil all the following conditions:

- 80% attendance separately in theory and practical/Clinical postings, in each course.
- Secure at least 40% of total marks fixed for internal assessment in a particular course in theory and practical separately.
- Submit dissertation in the prescribed format, as per the stipulated schedule in IV semester.

Dissertation:

A candidate is required to carry out research study in a select area of his subject, under the supervision of a faculty guide. The results of such a study shall be submitted to the University in the form a dissertation as per the prescribed format and within the date stipulated by the University.

Guide:

A guide shall be MD/DNB/PG Diploma/M. Sc. or equivalent qualification as recognized by the University in relevant subject with two years' experience in respective Allied Health Science Course. In case of postgraduate diploma, he/she should have two publications in indexed journals. However, a Co-guide can be opted wherever required with prior permission of the Institute and University. The Co-guide shall also be a postgraduate teacher recognized by the University as a guide.

Candidate shall submit synopsis to the University through the Guide and Head of the Institute, on or before the completion of one month of second semester, or within the date notified by the University, whichever is earlier.

Once the synopsis is approved and registered by the University, no change in the topic or Guide shall be made without the prior approval of the University.

In the event of registered Guide leaving the Institute or in the event of the death of the guide, a change of Guide shall be permitted by the University, on the specific recommendation of the Institute.

Ethical clearance

Ethical clearance should be obtained for a study involving any procedure on human subjects. The candidate should apply for the certificate to the Ethics Committee of the respective Institute/University, through the Guide and present the study before the Committee for clearance. A copy of the certificate should be attached along with the synopsis forwarded at the time of submission of synopsis. All such clearance should be sought within one month of commencement of II semester.

Submission of synopsis

Synopsis should be verified by guide, HOD and departmental curriculum development cell and approved by the institutional ethics committee before submission to the university. The synopsis should be submitted as per the format, on or before one month of second semester, or within the date notified by the University, whichever is earlier. Once the synopsis is approved and registered by the university no change in the topic or Guide shall be made without the prior approval of the University.

Final submission of the dissertation

The dissertation complete in all respects and duly certified by the Guide/Co-guide, Course Co-ordinator/ HOD/ Director should be submitted it to the Controller of Examinations as per the date specified by the respective University, generally three months before commencement of University examination.

Semester & credit system regulations

Definitions of Key Words:

Credit: A unit by which the course work is interpreted. It functions the number of hours of instructions required per week.

Credit Distribution

Each semester would get a complete 15 weeks for academics, excluding sessional exams, study leave, university exams, semester break, declared holidays and non-academic events.

Lectures (L)/Theory (T)	: 1 hour /week = 1 credit
Practical (P)/ Demonstration (D)	: 2 hours/week = 1 credit
Clinical Posting (CLP)	: 3 hours/week = 1 credit

Credit distribution table format:

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

Semester Grade Point Average (SGPA): The overall performance of a student in each semester

Grade Point: It is a numerical marking allotted to each letter grade on a 10-point scale.

Grade Point Average (GPA):

The total performance of a candidate will be indicated by GPA.

Grade points will be awarded for each course after the assessment of Semester End Examination (SEE) as per the letter grading system

Grade point and letter grade received for respective mark range is tabulated below:

Marks Range(%)	Grade Point	Letter Grade	Descriptor	Classification	CGPA
90 & above	10	O	Outstanding	First Class with distinction	7.00 and Above
80 -89	9	S	Excellent		
70-79	8	A+	Very Good		
60-69	7	A	Good	First Class	6.00-6.99
55-59	6	B+	Above Average	Second Class	5.50-5.99
50-54	5	B	Average		5.00-5.49
40-49	4	C	Pass	Pass Class	4.0-4.99
Below 40	0	F	Fails	Fail	Less than 4.0
Absent	0	I	Absent		

Semester Grade Point Average (SGPA): The overall performance of a student in each semester

Semester Grade Point Average (SGPA) is computed as follows:

$$SGPA = \frac{\sum [(\text{course credit}) \times (\text{Grade point})] \text{ for all courses in that semester; with Letter grades, including F}}{\sum[(\text{course credits})] \text{ for all courses in the semester with Letter grades, including F}}$$

Cumulative Grade Point Average (CGPA):

It is a measure of the overall performance of the student for the entire program

Cumulative Grade Point Average (CGPA) is computed as follows:

$$CGPA = \frac{\sum [(\text{course credit}) \times (\text{Grade point})] \text{ for all courses for all semesters with, Letter grades excluding F}}{\sum [(\text{course credits})] \text{ for all courses for all semesters with Letter grades, excluding F}}$$

Conversion of Grades into Percentage:

Formula for conversion of GPA into percentage: **CGPA earned X10 = Percentage of marks scored**

Illustration: (CGPA Earned 8.18 X 10) = 81.80 %

Award of Class:

The candidate, who has passed all the courses prescribed, shall be declared to have passed the program. Class will be awarded only to those who pass the entire examination in the first attempt and on the basis of the aggregate of marks scored in individual semester.

A candidate shall be considered to have completed a course successfully and earned the credits assigned, if he secures an acceptable letter grade in the range O-C. Letter grade 'F' in any course implies failure in that course and no credit is earned.

A candidate having satisfactory attendance at classes and meeting the passing standard at CIE in a course, but remained absent from SEE shall be awarded 'I' grade in that course.

- A candidate who secures GPA ≥ 7.00 and above in first attempt shall be declared to have passed in 'First Class with Distinction'.
- A candidate who secures GPA ≥ 6.00 or more but less than 7.00 in the first attempt shall be declared to have passed in 'First Class'.
- A candidate who secures GPA ≥ 5.00 or more but less than 6.00 in the first attempt shall be declared to have passed in 'Second Class'.
- A candidate who secures GPA ≥ 4.00 or more but less than 5.00 in the first attempt shall be declared to have passed in 'Pass Class'.
- Candidates who pass the examinations in more than one attempt shall be declared as passed in 'Pass' class irrespective of the percentage of marks secured.
- An attempt means the appearance of a candidate for one or more courses either in part or full in a particular examination. If a candidate submits application for appearing for the examination but does not appear for any of the courses either in full or part in the university examination, he can appear for supplementary examination provided other conditions such as attendance requirement, internal assessment marks, etc are fulfilled and his appearing in the supplementary examination shall be considered as the first attempt.
- Candidates who pass the subjects in the supplementary examinations are not eligible for the award of Gold Medal or Merit Certificate

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 I semester is allowed to move to II semester. The candidates with back log subjects shall take both I semester backlog papers as well as II semester papers. Candidate with a backlog of not more than 2 papers in I & II semester put together is allowed to go to the III semester.
- Candidates who have failed in not more than 2 subjects of II semester and III semester (put together) and not having backlog of I semester papers are only permitted to go to IV semester.

- The candidate is permitted to appear for the IV semester examination along with the backlog subjects of II and III semesters and should pass all the subjects, including the backlog subjects to be declared as having completed the course.
- However, a candidate should pass all the lower semester papers before the announcement of final semester results.

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.

MODEL CURRICULUM

MASTER'S IN ANAESTHESIA AND OPERATION THEATRE TECHNOLOGY

PROGRAM OUTCOMES

At the completion of this program, 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 train and develop an individual to independently handle the latest technology and high end biomedical equipment in Operation Theatre
- Able to assist anesthesiologists in developing patient care plans, including pre-operative, surgical theater, recovery room, and post-operative intensive care procedures.
- Able to do- patient data collection, catheter insertion, airway management, assisting the administration and monitoring of regional and peripheral nerve blockades, support therapy, adjusting anesthetic levels during surgery, inter-operative monitoring, postoperative procedures, pain clinics and patient education, and administrative tasks.
- Able to assist surgeons during perioperative period
- Able to manage medical gases and pipeline system
- Able to assist in Intensive care unit
- Able to manage Central sterile supply department
- Able to apply principles of management in health care setting
- Able to apply statistical methods for research and analysis

Model Curriculum Outline

FIRST SEMESTER													
Course Code	Course Title	Credit(s) distribution				Marks Distribution							
		L/T	P/D	CLP	CR	Theory			Practical			Total
						IA	SEE	Total	IA	SEE	Total	
MAOT1.1	Review of Applied sciences	3	--	--	3	20	80	100	---	--	--	100
MAOT1.2	Anaesthetic equipment and procedures	3	1	2	6	20	80	100	20	80	100	200
MAOT1.3	Anaesthetics and emergency drugs	3	1	2	6	20	80	100	20	80	100	200
MAOT1.4	Applied surgical technology	3	--	2	5	20	80	100	--	--	--	100
GRAND TOTAL					**20**							**600**
L - Lectures, T - Theory, P/D –Practicals/Demonstration, CLP – Clinical Posting, CR - Credits. IA - Internal Assessment, SEE – Semester End Examination													

SECOND SEMESTER												
Course Code	Course Title	Credit(s) distribution				Marks Distribution						
		L/T	P/D	CLP	CR	Theory			Practical			Total
						IA	SEE	Total	IA	SEE	Total	
MAOT 2.1	Advanced anaesthesia techniques	3	1	2	6	20	80	100	20	80	100	200
MAOT 2.2	Speciality Anaesthesia-I	3	1	1	5	20	80	100	20	80	100	200
MAOT 2.3	Clinical surgery-I	3	1	2	6	20	80	100	20	80	100	200
MAOT 2.4	Research methodology & biostatistics (should include one unit related to teaching methodology)	4	--	--	4	20	80	100	---	---	--	100
GRAND TOTAL					**21**							**700**
L - Lectures, T - Theory, P/D –Practicals/Demonstration, CLP – Clinical Posting, CR - Credits. IA - Internal Assessment, SEE – Semester End Examination												

THIRD SEMESTER												
Course Code	**Course Title**	**Credit(s) distribution**				**Marks Distribution**						
		L/T	**P/D**	**CLP**	**CR**	**Theory**			**Practical**			**Total**
						IA	**SEE**	**Total**	**IA**	**SEE**	**Total**	
MAOT 3.1	Speciality Anaesthesia-II	3	1	4	8	20	80	100	20	80	100	200
MAOT 3.2	Clinical surgery-II	3	1	3	7	20	80	100	20	80	100	200
MAOT 3.3	Health care management (includes principles of management)	3	--	--	3	20	80	100	---	---	--	100
GRAND TOTAL					**18**							**500**
L - Lectures, T - Theory, P/D –Practicals/Demonstration, CLP – Clinical Posting, CR - Credits. IA - Internal Assessment, SEE – Semester End Examination												

FOURTH SEMESTER												
Course Code	Course Title	Credit(s) distribution				Marks Distribution						
		L/T	P/D	CLP	CR	Theory			Practical			Total
						IA	SEE	Total	IA	SEE	Total	
MAOT4.1	Clinical Medicine & critical care management	5	1	1	7	20	80	100	20	80	100	200
MAOT4.2	Dissertation evaluation	--	--	8	8	--	---	--	-	100	100	100
GRAND TOTAL					15							300
L - Lectures, T - Theory, P/D –Practicals/Demonstration, CLP – Clinical Posting, CR - Credits. IA - Internal Assessment, SEE – Semester End Examination												

COURSES OF STUDY & TEACHING HOUR DISTRIBUTION

FIRST SEMESTER					
Course code	**Course Title**	**Total hours of instruction**			
		Theory	**Practical**		**Total**
			Demonstration	**Clinical Posting**	
MAOT1.1	Review of applied sciences	45	--	--	**45**
MAOT1.2	Anaesthetic equipment and procedures	45	30	90	**165**
MAOT1.3	Anaesthetics and emergency drugs	45	30	90	**165**
MAOT1.4	Applied surgical technology	45	--	90	**135**
TOTAL		**180**	**60**	**270**	**510**

SECOND SEMESTER					
Course code	**Course Title**	**Total hours of instruction**			
		Theory	**Practical**		**Total**
			Demonstration	**Clinical Posting**	
MAOT2.1	Advanced anaesthesia techniques	45	30	90	**165**
MAOT2.2	Speciality Anaesthesia-I	45	30	45	**120**
MAOT2.3	Clinical surgery-I	45	30	90	**165**
MAOT2.4	Research methodology & biostatistics (should include one unit related to teaching methodology)	60	--	--	**60**
TOTAL		**195**	**90**	**225**	**510**

THIRD SEMESTER					
Course code	**Course Title**	**Total hours of instruction**			
		Theory	**Practical**		**Total**
			Demonstration	**Clinical Posting**	
MAOT3.1	Speciality Anaesthesia-II	45	30	180	**255**
MAOT3.2	Clinical surgery-II	45	30	135	**210**
MAOT3.3	Health care management(includes principles of management)	45	--	--	**45**
TOTAL		**135**	**60**	**315**	**510**

FOURTH SEMESTER					
Course code	**Course Title**	**Total hours of instruction**			
		Theory	**Practical**		**Total**
			Demonstration	**Clinical Posting**	
MAOT4.1	Clinical Medicine & critical care management	75	30	45	**150**
MAOT4.2	Dissertation- Project work	--	--	360	**360**

FIRST SEMESTER

REVIEW OF APPLIED SCIENCES

Theory: 45 hours

OBJECTIVES:

At the end of this semester students should be able to

1. Describe the parts of brain
2. Mention the coverings of spinal cord & CSF
3. Illustrate the anatomical structure of the bronchi and their subdivisions.

4. Explain how the blood transports oxygen and carbon dioxide.
5. Describe gas exchange in the pulmonary and systemic circuits.
6. Understand the clinical physiology of ANS and α and β receptors
    a. Uses and side effects of major drugs in each category.
    b. Clinical circumstances where these agents may be beneficial.
7. Ability to identify, address and treat the associated risk factors according to evidence based guidelines.
8. Understand the pharmacology of diuretics, antihypertensives, antiarrhythmics, corticosteroids, drugs used for coagulation disorders and other hormonal preparations
9. Understand hypersensitivity and antibiotic sensitivity
10. Understand and manage nosocomial infections

COURSE OUTCOMES:

At the end of the course, students will be able to...

CO1: Discuss the anatomy of Brain & spinal cord

CO2: Discuss the anatomical & physiological aspects of respiratory and cardiovascular system.

CO3: Record and interpret the lung function tests.

CO4: Explain the homeostasis and hemostasis

CO5: Describe the pharmacology of Adrenergic and Cholinergic drugs and their blockers.

CO6: Explain the pharmacology of Diuretics, antiarrhythmics, antihypertensives and corticosteroids.

CO7: Describe the pharmacology of drugs used in coagulation disorders and other drugs

CO8: Understand immunology & nosocomial infections.

Unit-I: Applied Anatomy **12 hours**

A. Brain & Spinal Cord
    - Parts of brain
        - Covering of spinal cord
        - Tracts of spinal cord
        - CSF
B. Broncho pulmonary segments and alveoli
C. Systemic and pulmonary circulation
D. Coronary circulation

E. Hepatobiliary system
    - Liver
    - Biliary apparatus
F. Urinary system

Unit-II: Applied Physiology **13 hours**

A. Respiratory physiology
    - Spirometry
    - Lung function tests
    - Oxygen transport & CO2 transport
B. Conducting system of the heart
C. Neuro muscular junction
D. Coagulation and its disorders
E. Acid base physiology
F. Hepatobiliary physiology

Unit-III: Applied Pharmacology **13 hours**

A. Adverse drug reactions & Drug interactions
B. Drugs acting on autonomic nervous system
    - Adrenergic drugs & blockers
    - Cholinergic drugs & blockers
C. Diuretics
D. Antiarrhythmics
E. Antihypertensive drugs
F. Corticosteroids
G. Drugs used in disorders of coagulation
H. Others
    - Insulin
    - Oxytocin
    - Methylergometrine
    - Prostodine
    - Antacids

Unit-IV: Microbiology **07 hours**

A. Immunology
    - Immunity
    - Antigen
    - Antibody
    - Hypersentivity
    - Antibiotic resistance

B. Nosocomial infection – Introduction, prophylactic immunization & management
   - Meningitis
   - Hepatitis
   - HIV infection & AIDS
   - UTI
   - Pneumonia
   - MRSA infection

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Review of applied sciences** shall be as given under.

Type of questions	**No. of questions**	**Marks**	**Total**
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20 marks

There shall be no practical examination

Reference books:

1. Essentials of medical pharmacology (Latest edition) – KD Tripathi
2. Textbook of Pharmacology for Dental and Allied Health Sciences (Latest edition)- Padmaja Udaykumar
3. Text book of Medical Physiology – Indu Khurana
4. Manipal manual of Anatomy for Allied Health Sciences Courses- Sampath Madhyastha
5. BD Chaurasia's Human Anatomy – volume1
6. Text book of microbiology- C P Baveja

FIRST SEMESTER

ANAESTHETIC EQUIPMENT AND PROCEDURES

Theory: 45 hours

Practical/Demonstration: 30 hours

OBJECTIVES:

At the end of the first semester students should be able to

1. Check adequacy of gas supplies, indent for required supplies, and ensure safe storage and commissioning of gas supplies.
2. Perform routine and periodic checks of
    a. Anaesthesia workstation
    b. Gases supply system
    c. Scavenging system
3. Trouble shoot problems in gas supply, anaesthesia workstation and scavenging system.
4. Ensure availability of standard monitors and their proper functioning.
5. Able to trouble shoot minor complications. Periodic check and suitability of monitoring. Competency in basic interpretation of monitored values.
6. Understand simulation in anaesthesia

COURSE OUTCOMES

At the end of the course, students will be able to...
CO1: Understand & demonstrate anaesthesia workstation, its components & safety
CO2: Practice safety check of anaesthesia workstation.
CO3: Discuss and operate monitoring devices
CO4: Understand and operate airway devices
CO5: Prepare difficult airway cart.
CO6: Set up for hemodynamic monitoring.
CO7: Understand types of simulators and simulation in anaesthesia

Unit-1 **07 hours**

A. Medical Gases and Distribution System
    - Medical gas supply, storage and safety

B. The modern integrated Anaesthesia workstation
    - Anaesthesia machine & its components
    - Fail safe system
    - Safety check of anaesthesia machine
    - Scavenger system

Unit-2 **16 hours**

C. Monitoring Equipment

- Respiratory gas monitoring and minimum alveolar concentration
- Equipments to measure depth of anaesthesia
  - Bi-spectral index
  - Entropy
- Neuromuscular block monitoring equipment
- Cardiac output monitors
- Equipment for central neuraxial and regional blocks
  - Needles
  - Catheters
  - Nerve locators
  - Ultrasound device
- Anesthesia equipment for magnetic resonance imaging
- Equipment for anaesthesia in remote locations

Unit-3 **12 hours**

D. Airway gadgets and their accessories

- Surgical airway equipments
- Percutaneous airway equipments
- Optical laryngoscopes
- Fiberoptic bronchoscopes
- Airway introducers
- Alternative to intubation
- Gadgets for difficult airway

Unit-4 **10 hours**

E. Hemodynamic monitoring
- Pressure transducers: resonance
- Damping
- Invasive & non-invasive blood pressure measurement
- Oscillometer

F. Defibrillator

G. Updates in anaesthesia devices
- Advanced Supraglottic Airway Devices
- Ventrain device
- Optical Stylets
- Smart pumps

H. Simulation in anaesthesia

Practical/Demonstration: **30 hours**

- Perform routine and periodic checks and troubleshooting of anaesthesia workstation, Gas Supply and Scavenging system 04 hours
- Analyze the proper working of monitoring systems 03 hours
- Assembly of gadgets for difficult airway management 02 hours
- Preparation of invasive blood pressure monitoring systems 02 hours
- Arrangement of trolley for surgical airway 02 hours
- Simulation in anaesthesia – Mask ventilation, laryngoscopy and endotracheal intubation 03 hours
- Training of use of anaesthesia equipment in MRI field 02 hours
- Pre-use check of anaesthesia equipment 02 hours
- Sterilization and maintenance of anaesthesia equipment 02 hours
- Anaesthesia in remote locations- Exposure to patients in
  - Emergency department 02 hours
  - Endoscopy room, 02 hours
  - IVF center, 02 hours
  - Labour theatre 02 hours

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Anaesthetic Equipment & Procedures** shall be as given under.

Type of questions	**No. of questions**	**Marks**	**Total**
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory internal assessment-20marks

Practical examination-100marks

Marks pattern for practical examination:-

Practical exercises		**Viva- Voce**	**Internal assessment**
Skill	**Response**		
30	30	20	20
Grand Total- 100			

Reference books:

1. A practical approach to anaesthesia equipment- Jerry A Dorsch & Susan E Dorsch
2. Anaesthesia equipment simplified- Gregory Rose & J Thomas Mclarney
3. Understanding anaesthetic equipments and procedures A practical approach- Dwarakadas K Baheti & Vandana V Laheri

FIRST SEMESTER

ANAESTHETICS AND EMERGENCY DRUGS

Theory: 45 hours

Practical/Demonstration: 30 hours

OBJECTIVES:

At the end of the semester students should be aware

1. Preparation, strength, dose, dilution and storage of commonly used drugs during anaesthesia and resuscitation.
2. Common indications and main pharmacological effects of drugs, fluid and blood used in anaesthesia.
3. Common side effects of the drugs.
4. Identification and immediate treatment of common side effects.

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Describe the pharmacology of emergency drugs

CO2: Group and demonstrate preparation of emergency drugs.

CO3: Discuss and use antiemetic drugs

CO4: Demonstrate and dilute electrolytes

CO5: Demonstrate fluid infusion including blood

CO6: Discuss transfusion hazards

Unit-1 **11 hours**

- Core drugs in anaesthetic practice
  - General anaesthetic agents
    - IV inducing agents
    - Opioid analgesics & antagonists
    - Volatile anaesthetic agents
    - Sedative hypnotics
  - Local anaesthetics
  - Muscle relaxants and anticholinesterases
  - NSAIDS

Unit-2 **12 hours**

- Emergency drugs
  - Oxygen
  - Inotropes
    - Adrenaline
    - Noradrenaline
    - Dopamine
    - Dobutamine
    - Isoprenaline
    - Vasopressine
    - Digoxin
  - Sympathomimetics
    - Mephentermine
    - Phenylephrine
    - Ephedrine
  - Vasodilators
    - Sodium Nitroprusside
    - Nitroglycerin
    - Nifedipine
  - Anticholinergics
    - Atropine
    - Glycopyrrolate
  - Bronchodilators
    - Deriphylline
    - Aminophylline
    - Salbutamol

Unit-3 **10 hours**

- Other important drugs
  - Antiemetics and related drugs
  - Antimicrobials
  - Antihistamines
  - Electrolytes
    a. Sodium Bicarbonate
    b. Calcium Gluconate
    c. Calcium Chloride
    d. Magnesium Sulphate
    e. Potassium Chloride

Unit-4 **12 hours**

- Fluid therapy and transfusion
  - Distribution of body fluids
  - Crystalloids
  - Colloids
  - Fluid infusion and effect on body fluid compartments
  - Blood components
  - Blood transfusion
  - Transfusion hazards

Practical/Demonstration: **30hours**

- Preparation, strength, dosage, dilution and labelling of
  - General anaesthetic agents
    - IV inducing agents
    - Opioid analgesics & antagonists
    - Volatile anaesthetic agents
    - Sedative hypnotics
  - Local anaesthetics
  - Muscle relaxants and anticholinesterases
  - NSAIDS
  - Oxygen
  - Inotropes
  - Sympathomimetics
  - Vasodilators
  - Anticholinergics
  - Bronchodilators
  - Antiemetics
  - Electrolytes
- I. V fluid infusion for adults and paediatric patients
- Blood transfusion demonstration
- Identification and immediate treatment of common side effects of drugs

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Anaesthetics and Emergency drugs** shall be as given under.

Type of questions	**No. of questions**	**Marks**	**Total**
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20 marks

Practical examination- 100marks
Marks pattern for practical examination: -

Practical exercises		Viva- Voce	Internal assessment
Skill	**Response**		
30	30	20	20
Grand Total- 100			

Reference books:

1. Comparative Pharmacology for Anaesthetist: Armeen Ahmed, Vipin Dhama, Nitin Garg
2. A Primer of Anesthesia- Rajeshwari Subramaniam
3. Drugs in anaesthesia & intensive care- Edward Scarth & Susan Smith

FIRST SEMESTER

APPLIED SURGICAL TECHNOLOGY

Theory: 45 hours

OBJECTIVES:

At the end of the second semester student is expected to understand

1. Common procedures performed in anaesthesia, intensive care unit, and emergency department.
2. Physics and technology involved in the functioning of special equipment used to aid the procedures.
3. Safely transportation of the patient

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Understand developing a surgical diagnosis

CO2: Demonstrate and apply aseptic technique.

CO3: Understand and demonstrate suturing techniques

CO4: Classify and identify surgical instruments

CO5: Maintenance and troubleshoot specialized surgical devices

Unit-1 **08 hours**

- Developing a surgical diagnosis
  - Complete and thorough history
  - Physical examination
    - Radiographic findings
    - Laboratory investigations
    - Record keeping
    - Differential diagnosis

Unit-2 **12 hours**

- Basic necessities for surgery
- Aseptic technique
  - Medical asepsis
  - Surgical asepsis
- Pre surgical preparation of the patient
- Surgical Infection
  - Factors for wound infection
  - Management of abscess
  - Antibiotic prophylaxis
- Infection prevention and universal precautions
- Surgical Incisions
- Hemostasis
  - Means of promoting wound Hemostasis
  - Dead space management

Unit-3 **11 hours**

- Decontamination and debridement
- Edema control
- Patient general health and nutrition
- Wound management
  - Prevention of wound infections
- Suture techniques
- Anastomoses
- Abdominal drainage
- Basic surgical and perioperative considerations
  - Antibiotic prophylaxis
  - Prevention of infection in postoperative period

Unit-4 **14 hours**

- Patient Safety
    - Admission Procedure
    - Procedure for Safely Transferring the Patient to the Operating Table
    - Positioning
- Surgical Instrumentation
    - Functioning
    - Uses
    - Maintenance
    - Risks and precautions
    - Electrocautery
    - Harmonica
    - Lasers
    - Surgical bio-microscopes
    - X-ray
    - Endoscopes

Scheme of Theory Examination:

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

Type of questions	**No. of questions**	**Marks**	**Total**
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks

There shall be no Practical examination

Reference books:

1. Basic surgical skills and techniques- Sudhir Kumar Jain, David L Stoker & Raman Tanwar
2. Berry & Kohn's Operating Room Technique (Latest edition)
1. Pocket guide to the Operating Room- Jaypee Latest edition

SECOND SEMESTER

ADVANCED ANAESTHESIA TECHNIQUES

Theory: 45 hours

Practical/Demonstration: 30 hours

OBJECTIVES:

At the end of the second semester student is expected to understand

1. Common procedures performed in anaesthesia, intensive care unit, and emergency department.
2. Physics and technology involved in the functioning of special equipment used to aid the procedures.
3. Understand and manage anaesthetic emergencies in the intraoperative period

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Understand and practice peripheral venous cannulation
CO2: Demonstrate and prepare vascular cannulation
CO3: Explain and demonstrate the applications of ultrasound in ICU
CO4: Understand modern technology in anaesthesia
CO5: Understand and apply emergency anaesthesia guidelines

Unit- I **11 hours**

- Vascular cannulation
- Central neuraxial blockade
  - Potential benefits of central neuraxial block
  - Mechanism of action, spread, uptake & elimination
  - Ultrasound for central neuraxial blockade
- Peripheral nerve blocks
- Post anaesthesia care
- Ultrasound in ICU
  - FAST
  - Volume assessment
  - Thoracic ultrasound

Unit- II **10 hours**

- Review of modern technology in anaesthesia
  - Ultrasound
  - Fiberoptic
  - X-ray
- Smart Pumps and Computer-Controlled Drug Infusion Delivery
- Anaesthesia information management systems
- Clinical information systems in critical care
- Decision support system

Unit- III **12 hours**

- General anaesthesia
  - Types and techniques
  - Awareness during anaesthesia
  - Complications
  - The long term effects of general anaesthesia
  - Management of general anaesthesia
  - Anesthesia and children

Unit- IV **12 hours**

- Emergency anaesthesia guidelines
  - Incidence and risk factor
- Anaesthetic emergencies
  - Airway emergencies
  - Anaphylaxis
  - Local anaesthetic toxicity
  - Malignant hyperthermia
- The principles and conduct of anaesthesia for emergency surgery
  - Choice of anaesthetic technique
  - Management and protection of the airway including pulmonary aspiration
  - The rapid sequence induction: evolution over time
  - Management of ventilation
  - Maintenance of anaesthesia

Practical/Demonstration **30 hours**

- Assembly of cart for and knowledge of technique of
  - Vascular cannulation 02 hours
  - Central neuraxial blockade 04 hours
  - General Anaesthesia 04 hours
- Assembly of cart for Peripheral nerve blocks 02 hours

- Use of special equipment and trouble shoot
  - Ultrasound used in anaesthesia 03 hours
  - Fiberoptic 03 hours
  - Smart pumps and computer controlled drug infusions 03 hours
- Identification and management of airway emergencies 03 hours
- Preparation of anaesthesia cart for emergency surgeries 03 hours
- Intraoperative maintenance of patient in terms of monitoring and ventilation. 03 hours

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Advanced Anaesthesia Techniques** shall be as given under.

Type of questions	No. of questions	Marks	Total
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks
Practical examination-100marks

Marks pattern for practical examination:-

Practical Exercises	Viva- Voce	Internal assessment
60	20	20
Grand Total- 100		

Reference books:

1. Step by step practical aspects of emergency anesthesia- Arun Kumar Paul
2. Anesthesiology updates for postgraduates- Sampa Dutta Gupta
3. Morgan and Mikhail's Clinical Anesthesiology

SECOND SEMESTER

SPECIALITY ANAESTHESIA-I

Theory: 45 hours

Practical/Demonstration: 30 hours

OBJECTIVES:

Upon completion of this semester, students will achieve knowledge and level of expertise & proficiency in:

1. Anaesthetic and surgical requirement for different subspeciality procedures in terms of equipment and monitoring.
2. Functioning and procedures of pain clinic.

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Understand, prepare and demonstrate the anaesthesia for Laparoscopic and Robotic surgeries

CO2: Understand, prepare and demonstrate the anaesthesia for Obstetrics and Gynecological procedures

CO3: Understand, prepare and demonstrate the anesthesia for Orthopedic surgeries.

CO4: Understand, prepare and demonstrate the anesthesia for Ophthalmic surgeries.

CO5: Understand, prepare and demonstrate the anesthesia for Otorhinolaryngoscopic surgeries

CO6: Understand, prepare and demonstrate the anesthesia for Onco surgeries

Unit- I **15hours**

- Anaesthesia for Laparoscopic and Robotic Surgeries
    - Patient preparation
    - Anaesthetic Management
    - Special Considerations
    - Post- operative care
- Anaesthesia for Obstetrics & Gynecological procedures
    - Patient preparation
    - Anaesthetic Management
    - Special Considerations
    - Post-operative care

Unit- II **15 hours**

- Anaesthesia for Orthopedic surgeries
  - Patient preparation, Anaesthetic Management, Positioning, Post-operative care for
    - Upper limb procedures
    - Hip and knee
    - Foot & ankle
    - Pediatric orthopedics
    - orthopedic emergency/trauma

- Anaesthesia for Ophthalmic surgeries
  - Patient preparation
  - Anaesthetic Management
  - Special Considerations
  - Post-operative care

Unit- III **15hours**

- Anesthesia for Otorhinolaryngologic Surgeries
  - Preoperative considerations
  - Intraoperative Management
  - Special Considerations
  - Post-operative care

- Anesthesia for Onco surgeries
  - Preoperative considerations
  - Intraoperative Management
  - Special Considerations
  - Post-operative care

Practical/Demonstration: **30 hours**

- Setting up of monitor, equipment and preparation of the patient for
  - Anaesthesia for Laparoscopic Surgery
  - Anaesthesia for Robotic Surgery
  - Anaesthesia for obstetrics and gynaecological procedures
  - Anaesthesia for ophthalmic procedures
  - Anaesthesia for orthopaedic surgeries
  - Anesthesia for Otorhinolaryngologic Surgeries
  - Anesthesia for Onco surgeries

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Specialty Anesthesia-I** shall be as given under.

Type of questions	No. of questions	Marks	Total
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks

Practical examination-100marks

Marks pattern for practical examination:-

Practical Exercises	Viva- Voce	Internal assessment
60	20	20
Grand Total- 100		

Reference books:

1. Anaesthesiology updates for postgraduates- Sampa Dutta Gupta
2. Textbook of Anaesthesia- Alan R Aitkenhead, David J Rowbotham, Graham Smith
3. A basic textbook is essential - Fundamentals of Anaesthesia- Tim Smith, Colin Pinnock, Ted Lin, and Robert Jones
4. Morgan and Mikhail's Clinical Anesthesiology

SECOND SEMESTER

CLINICAL SURGERY-I

Theory: 45 hours

Practical/Demonstration: 30 hours

OBJECTIVES:

At the end of this semester students should understand

1. Various sub speciality surgical procedures
2. Different requirement for each of these procedures
3. Preparation of patient, equipment, operation theatre for these surgical procedures

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Understand & prepare for Laparoscopic & Robotic surgeries

CO2: Understand spinal cord injuries and management of spinal trauma

CO3: Describe types of fractures and its management

CO4: Understand & prepare for ophthalmic surgeries

CO5: Understand & prepare for ENT surgeries

CO6: Understand & prepare for Obstetrics & gynecological procedures

Unit- I **11 hours**

- **Laparoscopic Surgery**
  - Principles of laparoscopic surgery
  - Advantages and disadvantages
  - Safety issues and indications
  - Postoperative care
  - Laparoscopic Cholecystectomy
  - Laparoscopic Appendicectomy
  - Advanced Laparoscopic Surgeries
  - Diagnostic Laparoscopy
- **Robotic surgery**
  - Principles of robotic surgery
  - Advantages and disadvantages
  - Safety issues and indications
  - Postoperative care

Unit- II **17 hours**

- **Neck and spine**
  - The accurate assessment of spinal cord injuries
  - The basic management of spinal trauma and major pitfalls
- **Trauma to the face and mouth**
  - Classification of facial fractures
  - Diagnosis and management of fractures
- **Elective orthopedics**

  Pathology, assessment and management of
  - Upper limb
  - Hip and knee
  - Foot and ankle
  - Pediatric orthopedics

Unit- III **17 hours**

- **Ophthalmic surgeries**
  - Cataract extraction
  - Corneal transplant/ keratoplasty
  - Correction of strabismus
- **ENT surgeries**
  - Tympanoplasty
  - Mastoidectomy
  - FESS
  - Rhinoplasty
  - Tonsillectomy & Adenoidectomy
  - Tracheostomy
  - Laryngectomy
  - Radical Neck Dissection
- **Obstetrics & Gynaecological Procedures**
  - D&C
  - Hysterectomy
  - Salphingooophorectomy
  - Tubal Sterilization
  - LSCS
  - Ectopic pregnancy

Practical/Demonstration: **30 hours**

- Setting up of Equipments and preparation of patient for
  - Laparoscopic surgery
  - Robotic surgery
  - Neck and spine surgery
  - Trauma to the face and mouth
  - Elective orthopedic surgery
  - Ophthalmic surgery
  - ENT surgeries
  - Obstetrics and gynaecological procedures

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Clinical Surgery-I** shall be as given under.

Type of questions	No. of questions	Marks	Total
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks

Practical examination-100marks
Marks pattern for practical examination:-

Practical Exercises	Viva- Voce	Internal assessment
60	20	20
Grand Total- 100		

Reference books:

1. Bailey & Loves Short Textbook of Surgery
2. Text book of surgery – S. Das
3. Manipal manual of surgery-K. Rajgopal Shenoy & Anitha Shenoy
4. Short text book of surgery – Himasu Roy

SECOND SEMESTER

RESEARCH METHODOLOGY & BIOSTATISTICS

Theory: 60 hours

At the end of the semester students should be able to

1. Understand and apply statistical methods for the design of biomedical research and analysis of biomedical research data;
2. Learn to participate in a research team in study design, data coordination and management, and statistical analysis and reporting of study results

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Understand & apply scales of measurements, incidence, prevalence and central tendency
CO2: Understand sampling methods
CO3: Describe skewness and kurtosis
CO4: Explain tests of significance
CO5: Understand correlation & regression
CO6: Understand & estimate sample size determination
CO7: Describe study designs & scientific documentation

Unit 1: **08 hours**

Introduction

Introduction to biostatistics &research methodology, types of variables & scales of measurements, measure of central tendency & dispersion, rate, ratio, proportion, incidence & prevalence

Unit 2: **06 hours**

Sampling

Random and non-random sampling, Different sampling techniques – simple random, stratified, systematic, cluster& multi-stage. Sampling and non-sampling errors and methods of minimizing these errors

Unit 3:

08 hours

Sampling distribution. Statistics and parameter. Standard error. Basic probability distributions-Normal, Poisson and Binomial distributions with their application in biological sciences. Skewness & Kurtosis.

Unit 4:

10 hours

Tests of significance

Basics of testing of hypothesis – Null & Alternative hypothesis, type 1 and type II errors, level of significance & power of the tests, p value. Different Parametric Tests – T test (paired & unpaired), & Test for proportion, One-way analysis of variance. Repeated measures analysis of variance. Non-Parametric Tests of significance Chi square test– Mann – Whitney U Test, Wilcoxon Test, Kruskal – Wallis Analysis of variance by ranks, Friedman's test.

Unit 5:

08 hours

Correlation and regression

Linear correlation by Karl Pearson and Rank order correlation due to Spearman. Testing the significance of correlation. Linear and Multiple regression.

Unit 6: **02hours**

Sample size determination

General concept. Sample size for estimating means and proportion, testing of difference in means and proportions of two groups.

Unit 7: **06 hours**

Study designs

Descriptive epidemiological methods – case series analysis and prevalence studies. Analytical epidemiological methods – case control and cohort studies. Clinical trials / intervention studies, odds ratio and relative risk, stratified analysis

Unit 8: **04 hours**

Multivariate analysis

Concept of multivariate analysis, introduction to logistic regression and survival analysis

Unit 9: **02 hours**

Reliability and validity of diagnostic tests

Unit 10: **06 hours**

Scientific documentations

Structure of research protocols, structure of thesis/research report, formats of reporting in scientific journals. Systematic review and meta-analysis.

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Research methodology and Biostatistics** shall be as given under.

Type of questions	No. of questions	Marks	Total
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks

There shall be no practical examination

Reference books:

1. ABC of research methodology and applied biostatistics by MN Parick & Nithya Gogtay.
2. Introduction to biostatistics and research methods by P.S.S. Sundar Rao & J. Richard
3. Research methodology & Biostatistics- A comprehensive guide for health care professionals-Suresh K. Sharma
4. Guide to research methodology and Biostatistics-KMK Masthan

THIRD SEMESTER

SPECIALITY ANAESTHESIA- II

Theory: 45 hours

Practical/Demonstration: 30 hours

OBJECTIVES:

Upon completion of this semester, students will achieve knowledge and level of expertise & proficiency in:

1. Anaesthetic and surgical requirement for different sub speciality procedures in terms of equipment and monitoring.
2. Functioning and procedures of pain clinic.
3. Basic legal ethical issues in organ transplant

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Understand, prepare and demonstrate the anaesthesia for Neurosurgeries
CO2: Understand, prepare and demonstrate the anaesthesia for Pediatric surgeries
CO3: Understand, prepare, and demonstrate the anesthesia for Cardiovascular surgeries.
CO4: Understand, prepare, and demonstrate the anesthesia for Genitourinary surgeries.
CO5: Understand, prepare, and demonstrate the anaesthesia for Plastic & reconstructive surgeries.
CO6: Understand, prepare and demonstrate the anaesthesia for organ transplantation

Unit- I **15 hours**

- Anaesthesia for Neurosurgeries
  - ICP & ICT
  - Patient preparation
  - Anaesthetic Management
  - Special Considerations
  - Post- operative care

- Anaesthesia for Paediatric surgeries
  - Patient preparation
  - Anaesthetic Management
  - Special Considerations
  - Post-operative care

Unit- II **15 hours**

- Anaesthesia for Cardiovascular surgeries
    - Patient preparation
    - Anaesthetic Management
    - Positioning
    - Post-operative care
    - Cardiopulmonary bypass

- Anaesthesia for genitourinary surgeries
    - Patient preparation
    - Anaesthetic Management
    - Special Considerations
    - Post-operative care

Unit- III **15hours**

- Anaesthesia for plastic & reconstructive Surgeries
    - Preoperative considerations
    - Intraoperative Management
    - Special Considerations
    - Post-operative care

- Anaesthesia for organ transplantation
    - What is organ transplantation
    - The transplant process
    - Cadaveric organ donation
    - Living organ donation
    - Anaesthetic management

Practical/Demonstration: **30 hours**

- Setting up of monitor, equipment and preparation of the patient for
    - Anaesthesia for Neurosurgeries
    - Anaesthesia for Paediatric surgeries
    - Anaesthesia for Cardiovascular surgeries
    - Anaesthesia for genitourinary surgeries
    - Anaesthesia for plastic & reconstructive Surgeries
    - Anaesthesia for organ transplantation

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Specialty Anesthesia- II** shall be as given under.

Type of questions	No. of questions	Marks	Total
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks

Practical examination-100marks

Marks pattern for practical exams:-

Practical Exercises	Viva- Voce	Internal assessment
60	20	20
Grand Total- 100		

Reference books:

1. Anaesthesiology updates for postgraduates- Sampa Dutta Gupta
2. Textbook of Anaesthesia- Alan R Aitkenhead, David J Rowbotham, Graham Smith
3. A basic textbook is essential - Fundamentals of Anaesthesia- Tim Smith, Colin Pinnock,Ted Lin, and Robert Jones
4. Morgan and Mikhail's Clinical Anesthesiology

THIRD SEMESTER

CLINICAL SURGERY-II

Theory: 45 hours

Practical/Demonstration: 30 hours

OBJECTIVES:

At the end of this semester students should understand

- Various sub speciality surgical procedures
- Different requirement for each of these procedures
- Preparation of patient, equipment, operation theatre for these surgical procedures

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Understand & prepare for Cardiac, thorax and vascular surgeries
CO2: Understand organ transplantation procedures
CO3: Describe Elective neurosurgeries
CO4: Understand & prepare for plastic & reconstructive surgeries

Unit- I **15 hours**

- Elective neurosurgery
  - Head injury
  - Investigation and treatment for intracranial infection
  - Treatment for hydrocephalus
  - Management of intracranial hemorrhage
  - Management of epilepsy
  - Understanding the principles involved in brain death
- Plastic and reconstructive surgery
  - The spectrum of plastic surgical techniques
  - The various skin grafts
  - The principles and use of flaps
  - Plastic surgery to manage difficult and complex tissue loss

Unit- II **20 hours**

- The thorax
  - Investigation of chest pathology
  - Surgical oncology as applied to chest surgery
- Vascular surgery
  - Investigation for vascular surgery
  - Management technique of vascular surgery
    - Direct repair by stunting
    - Endarterectomy
    - Bypass
- Cardiac surgery
  - The role of investigation in planning of surgery
  - The management of coronary heart disease
  - The role of surgery in valvular heart disease
  - Special role of surgery in congenital heart disease
  - The management of aortic vascular and pericardial disease'

Unit- III **10 hours**

- Organ Transplantation
    - What is organ transplantation
    - The transplant process
    - Timeline of medical and legal advances in organ transplantation
    - Cadaveric organ donation
    - Living organ donation
    - Alternative organs
    - The impact of transplantation

Practical/Demonstration: **30 hours**

- Setting up of Equipments and preparation of patient for
    - Elective neurosurgery
    - Plastic and reconstructive surgery
    - The thoracic surgery
    - Vascular surgery
    - Cardiac surgery
    - Organ Transplantation

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Clinical Surgery-II** shall be as given under.

Type of questions	**No. of questions**	**Marks**	**Total**
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks

Practical examination-100 marks

Marks pattern for practical examination: -

Practical Exercises	**Viva- Voce**	**Internal assessment**
60	20	20
Grand Total- 100		

Reference books:

1. Bailey & Loves Short Textbook of Surgery
2. Text book of surgery – S. Das
3. Manipal manual of surgery-K. Rajgopal Shenoy & Anitha Shenoy
4. Short text book of surgery – Himasu Roy

THIRD SEMESTER

HEALTH CARE MANAGEMENT

Theory: 45 hours

OBJECTIVES:

At the end of the third semester students should be able to

1. Discuss the role of the manager in healthcare and how organizations and people work within the healthcare system.
2. Effectively manage people, finances and organizational resources.
3. Complete an organizational development project, reflect on the learning gained and evaluate the project from a leadership and healthcare management perspective.

COURSE OUTCOMES

At the end of the course, students will be able to...

CO1: Understand & apply management concepts & theories
CO2: Mention management functions & process
CO3: Describe basics of HRM & sourcing
CO4: Understand staff training & development
CO5: Understand materials management
CO6: Describe Inventory control, value analysis & biomedical waste management

Unit-I **13 hours**

- **Management concepts and theories**
  - Management and organizations
  - Management role
  - Levels of managers and management skills
  - Classical school
  - Behavior school
  - Management science school

- **Management functions and process**
  - Planning
  - Organizing
  - Staffing
  - Directing
  - Controlling

Unit- II **10 hours**

- **Basics of HRM and sourcing**
  - Introduction and relationship between HRM and HRD
  - Objectives of HRM
  - HR planning: short term and long term
  - Productivity analysis in healthcare
  - HR policy and procedure
  - Recruitment
  - Selection
  - Placement
  - Induction / Orientation
- **Training and development**
  - Staff training and development
  - Career growth and development
  - Management development

Unit- III **12 hours**

- **Materials management**
  - Introduction
  - Definition and function
  - Goals and objectives of materials management
  - Problems and issues in hospitals
- **Equipment purchase and maintenance**
  - Planning and selection of equipment
  - Import of equipment
  - Equipment utilization and operation
  - Equipment repair and maintenance
  - Equipment audit

Unit- IV **10 hours**

- **Scientific inventory management**
  - Codification and standardization
  - Value analysis
  - Inventory control
  - Lead time, safety stock and reorder level
  - Economic order quantity (EOQ)
  - Selective controls
  - Case studies on inventory control
  - The biomedical waste (management and handling) rules

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Health care management** shall be as given under.

Type of questions	No. of questions	Marks	Total
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks

There shall be no practical examination

Reference books:

1. Introduction to health care management by Sharoon B & Nancy H
2. Foundations of health care management – Bernard J Healy & Marc C Marchese
3. Dunn & Haimann's Health Care Management

FOURTH SEMESTER

CLINICAL MEDICINE & CRITICAL CARE MANAGEMENT

Theory: 75 hours

Practical/Demonstration: 30 hours

OBJECTIVES:

- At the end of the fourth semester students should be able to
- Overall idea of ICU care, emergency care, and transport of patients.
- Knowledge of techniques, procedures and monitoring of ICU patients.
- General care, nutrition and respiratory care of ICU patients.
- Basic Life Support and some knowledge of ACLS.
- Understand the emergency/ disaster management cycle
- Develop a basic knowledge of prevention, mitigation, preparedness, response and recovery in disaster
- Have a basic understanding emergency management.
- Resuscitation and triage skills

COURSE OUTCOMES

At the end of the course students should be able to…

CO1: Understand universal precautions
CO2: Report patient vital signs with different monitoring systems
CO3: Know the techniques, procedures and treatment of intensive care unit patients
CO4: Understand general care, nutrition and respiratory care of intensive care unit patients
CO5: Learn to manage the hospital acquired infections
CO6: Participate in disaster and triage management and trauma management
CO7: Perform basic life support (BLS) and advanced cardiac life support (ACLS)
CO8: Learn to monitor the patient during inter hospital and intra hospital transport

Unit-I **20 hours**

- First aid for unconsciousness
  - Aims, principles & rules of first aid
  - First aid box
- Advance Trauma Life Support
- Cardio pulmonary resuscitation
- Basic life support
  - Algorithm
  - Mouth to mouth ventilation
  - External cardiac compression
- ACLS
  - Defibrillation
  - Vascular access
  - Definitive airway
  - Foreign body obstruction
  - Drugs
- CPR in infants and children
- Complications of BLS

Unit- II **20 hours**

- Monitoring techniques in ICU practice
  - Invasive blood pressure (BP) monitoring
  - Transoesophageal Doppler (TED)
  - Measurement of central venous pressure (CVP)
  - Pulmonary artery catheterization
  - Arterial blood gas (ABG) analysis

- Ventilator Life Support in ICU
    - Working principles of ventilator in ICU
    - Types of ventilators
    - Mechanical ventilation modes and settings
    - Ventilator management
    - Ventilation induced lung injury
    - Ventilation monitoring
    - Non-conventional ventilation
    - Weaning from the ventilator
    - Spontaneous Awakening Trial (SAT) & Spontaneous Breathing Trial (SBT)

Unit- III **12 hours**

- Intubation and tracheostomy
- Spirometry - Data analysis
- Fluid control and therapy
- Supportive care
    - Control of infection
    - Transport of critically ill
    - Investigations
- Patient Safety Bundle
    - Ventilator Care Bundle
    - Central-line Bundle
    - Severe Sepsis Bundle

Unit- IV **10 hours**

- Hospital disaster preparedness and response
    - Coordination and management
    - Planning, training
    - Information, communication and documentation
    - Medico legal concerns
    - Safety and security
    - Human resources
    - Triage
    - Post disaster recovery
    - Patient handling

Unit- V **13 hours**

- Neurologic evaluation or monitoring
    - Sedation score
    - Glasgow coma scale

- Shock and Multisystem failure
  - Sepsis
  - Septic shock
  - Hemorrhagic shock
  - Neurogenic shock
  - Anaphylactic shock
  - Acute Lung Injury (ALI) and Acute Respiratory Distress syndrome (ARDS)
  - Multi-organ dysfunction syndrome

Practical/Demonstration: **30 hours**

- Principles and setting up of
  - Invasive blood pressure monitoring 02 hours
  - Transesophageal Doppler 01 hours
  - Measurement of Central Venous pressure 02 hours
  - Pulmonary artery catheterization 01 hours
  - Arterial blood gas analysis 01 hours
  - Intracranial pressure measurement 01 hours
  - Intra-abdominal pressure measurement 01 hours
- Working principle and setting up of ventilator 03 hours
- Hand washing and universal precautions 02 hours
- Transport of critically ill patient 02 hours
- Training on- First aid, BLS, ACLS, ATLS and defibrillation 10 hours
- Mock drill on disaster preparation 04 hours

Scheme of Theory Examination:

There shall be one theory paper of **three** hours duration carrying **80** marks. Distribution of type of questions and marks for **Clinical Medicine & Critical care management** shall be as given under.

Type of questions	No. of questions	Marks	Total
Long Essay(LE)	02	15	30
Short Essay(SE)	10	05	50
Grand Total			**80**

Theory Internal Assessment-20marks

Practical examination-100marks

Marks pattern for practical examination: -

Practical Exercises	Viva- Voce	Internal assessment
60	20	20
Grand Total- 100		

Reference books:

1. Civetta, Taylor & Kirbey's Critical care
2. Critical care- Paul Marino
3. The ICU book-Schumacher

FOURTH SEMESTER

DISSERTATION /PROJECT WORK

COURSE OUTCOMES:

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

CO1: Develop the ability to apply the methods while working on a research project work
CO2: Describe the appropriate statistical methods required for a particular research design
CO3: Choose the appropriate research design and develop appropriate research hypothesis for a research project
CO4: Develop an appropriate framework for research studies

The dissertation work is aimed at training a postgraduate candidate in research methodology and techniques. It includes identification of the problem, formulation of a hypothesis, review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, and comparison of results and drawing conclusions.

Preparation of dissertation

The written text of dissertation shall be prepared as per the respective university guidelines.

Scheme of evaluation

Dissertation shall be evaluated at the time of university examination of 4thsemester by the panel of examiners (internal & external) appointed by the university. He should obtain a score of 50% aggregate to be declared pass in IV semester examination.

Evaluation format for dissertation

Sl. No	University Evaluation	Marks			
		Max Marks	Internal Examiner	External Examiner	Marks obtained
1.	Objectives, Research Question, Literature Review	25			
2.	Results and Discussion	25			
3.	Dissertation Defence	25			
4.	Viva voce by Internal and External Examiner	25			
	Total	**100**			

LOG BOOK PROFORMA FOR MAOTT PROGRAM:

Institute Name & Logo
Logbook for MAOTT Program.

Student Name .....
Year & Month .....
Regd. No. .....

BIODATA OF THE STUDENT

Name	
D.O. B	
Parents Name	
Regd. No	
Year of Passing BAOTT Program	
Date of Joining the MAOTT Program	
Permanent Address	
Postal Address	
Mobile No. of Student	
Mobile No. of Parents	
Email	
Other Achievements	

Guidelines for Logbook Entry Outcome:

Outcome - Morbidly / Mortality / Any major complication should be indicated with measures taken for timely management.

1. The candidate should make the entries in the log book daily, countersigned by the Assistant Professor / Associate Professor / Professor / Head of the Department.
2. The Associate Professor / Professor must review & sign the log book every week for short-duration postings & every month for long-duration postings
3. In emergency OT posting the log book will be countersigned by Senior Resident on duty.
4. Any classes taken for BAOTT students or time spent on a thesis should be explicitly noted along with the nature of work in the log book.
5. The logbook is to be submitted through the Professor / Associate Professor at the time of the final examination.
6. Please use clear handwriting to fill the Logbook.

Logbook Proforma: MAOTT

Area of Posting…… Period……to……

Date						
Patient ID						
Age/Sex						
Diagnosis						
Operative Procedure						
Anesthetic Technique						
Special Procedure						
In time						
Out time						

Observation/Work done/Newly learned things						
Any Classes Taken for BAOTT students						
Time, Nature of work regarding thesis work.						
Signature of Faculty/Senior Resident						

Course Coordinator Signature: …….

Competencies Statement

Master in Anaesthesia & Operation Theatre Technology

Learning Objectives:

At the completion of this course, the student should be able to –

1. Provide advanced nursing care to manage the complex clinical needs of patients in an intensive care unit and operating room
2. Managing patient care procedures during anaesthesia
3. Various anaesthesia techniques- theory and skills, anaesthetic drugs, specialty anaesthesia with complications and management under supervision of the Anaesthesiologist.
4. Understanding monitoring needs, preventing, detecting complications using technologically advanced monitors & instruments and treating the condition respecting the limitation of his own competence
5. Capable to order and interpret full spectrum of diagnostic tests and special procedures related to care of critically ill, under the supervision of a critical care specialist and evaluate the outcomes of intervention.
6. The application of relevant theories, research, and evidence-based guidelines, and meet psychological needs of patients in critical care situation
7. Managerial skills, effective communication with patients 'relatives, medical staff in high stress conditions, working within norms and regulation as well as ethics and following deontological principles.

Expectation from the future post graduates in the providing patient care

1. Student will be able to demonstrate comprehensive knowledge covering the main areas of Anaesthetic management of the all critical care medicine.
2. Student will be able to apply clinical reasoning and integrate knowledge with practice in a wide, and often unpredictable, variety of clinical conditions.
3. You will be able to demonstrate criticality and problem-solving in the areas of academic and clinical critical care.
4. Student will be able to manage patient care procedures during anaesthesia and critical care
5. Student will have ability to work independently and take responsibility for his own work, collaborating in activities of clinical research and training.

Performance Criteria	Indicators		
	Knowledge	**Skill**	**Behavior**
• **Quality care and patient safety**	• Should have in depth knowledge about various general health conditions while examination • Should have essential knowledge about providing care to each individual who visits to your hospital • Should be aware of different types of disabilities and information on patients with additional need. • Should have essential knowledge about rights and dignity of the patients.	• Proficiency in assisting surgeons/anaesthetist with equipment's, machines instruments, and suturing. • Competence in aiding anesthetists with anesthesia induction, airway management, and vital sign monitoring.	• Proactive attitude in preparing for procedures and anticipating the needs of the surgical team/Anesthesia team. • Attention to detail, ensuring proper organization of instruments and supplies. • Effective time management and collaboration with the surgical team. • Adaptability to handle unexpected situations and adjustments during surgery. • Professionalism, including confidentiality, ethical conduct, and respect for boundaries.
• **Quality care and patient safety**	• Thorough understanding of the principles of aseptic technique and sterile field maintenance.	• Proficiency in performing hand hygiene using appropriate handwashing or hand sanitization methods.	• Maintaining appropriate hand hygiene procedures both inside and outside the operating room.

	• Knowledge of infection control guidelines, including hand hygiene, proper gowning and gloving techniques, and disinfection protocols. • Familiarity with different types of sterilization methods, such as steam sterilization, ethylene oxide sterilization, and sterile packaging	• Competence in donning sterile gowns and gloves without contaminating them and in maintaining sterility while working within the sterile field. • Skill in handling sterile instruments, supplies, and drapes to prevent contamination and maintain a sterile environment. • Ability to assist surgeons and anesthetists in maintaining sterility during procedures, such as passing instruments or opening sterile packages.	• Diligently adhering to the recommended gowning and gloving procedures to protect oneself and the patient. • Pay close attention to protecting the sterile field's integrity by limiting air circulation, preventing needless movements, and contaminating it with non-sterile things. • Strict adherence to sterile procedure during instrument handling, making sure that instruments stay in the sterile field and maintaining the proper sterile instrument passes. • Addressing any breaches of sterile technique or potential contamination as soon as possible, taking corrective action, and, as necessary, informing the surgical team. • Maintaining sterility during the procedure with constant attention and awareness while aggressively looking out for any potential breaks or compromises.

• **System based practice**	• Understanding of surgical instruments and their uses. • Familiarity with medical equipment, such as anesthesia machines and monitors and Troubleshooting • Knowledge of equipment setup and placement.	• Proficiency in handling surgical instruments and ensuring their sterility. • Ability to set up and place medical equipment accurately. • Skill in operating equipment and adjusting settings. • Troubleshooting abilities for equipment malfunctions.	• Continuously update knowledge of instruments and equipment. • Ensure instruments are clean and organized. • Double-check equipment setup for patient safety. • Communicate effectively with surgeons and anesthetists. • Promptly address equipment issues during procedures. • Collaborate with appropriate personnel for complex troubleshooting.
• System based practice	• Understanding of surgical procedures, including laparoscopic, arthroscopic, and robotic techniques. • Knowledge of different surgical instruments, sutures, and their uses. • Familiarity with sterile techniques and maintaining a sterile field.	• Proficiency in directly supporting the surgeon during procedures. • Ability to anticipate the surgeon's needs and provide timely assistance. • Skill in passing sutures, instruments, and other necessary items accurately.	• Adhere to the surgeon's directions promptly and accurately. • Anticipate the surgeon's demands and prepare instruments or sutures in advance. • Maintain clear and open communication with the surgeon throughout the procedure.

		• Competence in scrubbing for more technical procedures like laparoscopic, arthroscopic, and robotic surgeries.	• Collaborate with the surgical team to ensure effective teamwork. • Demonstrate attentiveness and responsiveness during the surgery. • Continuously enhance knowledge of surgical procedures and instruments. • Adhere to sterile techniques and maintain a sterile environment.
• System based practice (Anesthesia Support)	• Understanding of anesthesia administration and management. • Familiarity with the different stages of anesthesia induction and maintenance. • Awareness of monitoring vital signs, oxygen saturation, and end-tidal carbon dioxide levels taking ABG sample, BIS, NMT, Arterial line/CVP line insertion.	• Proficiency in assisting with the administration and supervision of anaesthesia. • Ability to assist in securing and positioning patients during anesthesia induction. • Ability to monitor and assess vital signs, oxygen saturation, and end-tidal carbon dioxide levels.	• Collaborate closely with the anaesthetist, following their instructions and assisting with anaesthesia administration. • Help secure and position patients during anaesthesia induction and throughout the procedure. • Pay close attention to any changes or irregularities in patient conditions. • Promptly communicate any significant changes to the anaesthetist and surgical team.

• Communication and Teamwork.	• Understanding of emergency procedures and protocols. • Knowledge of the locations and functions of emergency equipment/crash carts. • Familiarity with potential postoperative complications and their management.	• Proficiency in identifying and accessing emergency equipment quickly. • Ability to remain calm and composed in high-stress situations. • Competence in following established emergency protocols. • Skill in assisting the surgical team during crises or postoperative difficulties.	• Proactively learn about emergency procedures and equipment locations. • Follow established protocols and guidelines for emergency situations. • Assist the surgical team promptly and effectively during crises. • Continuously update knowledge of emergency procedures and best practices.
• Informatics and technology	• Should have adequate knowledge of data protection and how this will impact security, access and confidentiality of the patient's records • Should have essential knowledge to ensure the patient environment will remain safe and user-friendly, in terms of access and facilities	• Conversant in using various digital devices, access cloud storage platforms and saves electronic medical records on system-based software programs and keeps them safe • Demonstrates how to store and retrieve manual medical records	• Seeks consent of the patient before providing information to external stake holders • Restricts self from discussing patient information and condition in any open forum/external communication

• Professionalism and Leadership	• Should have essential knowledge of how to maintain practice in accordance with other professional health care standards	• Explains the condition that are treatable/correctable beyond your practice standards	• Honesty and understanding of own limitations
• Professionalism and Leadership	• Should have in depth knowledge of ethical practice and standard operating procedures followed in the clinical examination	• Explains the uses of various diagnostic instruments and their importance in the process of examination	Can demonstrate and teach of bachelor courses students
• Evidence Based practice	• Should have vital knowledge of the law, codes and guidelines set by the regulatory body of profession and is fully aware of the consequences if not followed.	• Follows the code of conduct set down by the council/ appropriate authorities	Can demonstrate and teach of bachelor courses students


NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
राष्ट्रीय सहबद्ध और स्वास्थ्य देखभाल पेशा आयोग
स्वास्थ्यम् सर्वार्थसाधनम्
NCAHP
Since-2021

4.4 Doctor of Philosophy (Ph.D.) - Anaesthesia & Operation Theatre Technology.

PH. D. GUIDELINES:

Eligibility:

Candidates with Master's Degree in Anaesthesia and Operation Theatre Technology with a minimum of 55% marks in the qualifying examination are eligible for enrolment/registration for the Ph.D. program under the Faculty of Allied Health Sciences.

Procedure for Admission:

All Universities shall admit Ph.D. Scholars through a National Eligibility Test (NET) or National Entrance Test or an Entrance test conducted at the level of individual universities. Universities and Colleges under them which are allowed to conduct Ph.D. programmes shall: decide on an annual basis through their academic bodies a pre-determined and manageable number of Ph.D. scholars to be admitted depending on the number of available Research Supervisors and other academic, research, and physical facilities available

Notify well in advance on the institutional website and through advertisement in at least two (2) national newspapers, of which at least one (1) shall be in the regional language, the number of seats for admission, subject/discipline-wise distribution of available seats, criteria for admission, the procedure for admission, examination centre(s) where entrance test(s) shall be conducted and all other relevant information for the benefit of the prospective candidates.

The admission shall be based on the criteria notified by the Institution.

The syllabus of the Entrance Test shall consist of questions that test research/ analytical/ comprehension/quantitative aptitude. The Entrance Test shall be conducted at the Centre(s) notified in advance (changes of Centres, if any, also to be notified well in advance) by the organization conducting the examination. Qualifying marks in the entrance test will be 50%.

An interview/viva-voce has to be organized by the University/College concerned wherein the candidates are required to discuss their research interest/area through a presentation before a duly constituted Departmental Research Committee. The selection of qualified candidates should be based on interview/viva-voce, the selection shall be evaluated in the ratio 70 (written test), 30 (interview).

Modes of Study and Duration:

Full-time and Part-time

1. Full-time Ph.D.

For full-time candidates, the minimum duration for completing the course requirement including Pre-Ph.D. examination is three (3) years. The maximum duration of the Ph.D. program for a full-time student will be six (6) years, counted from the date of provisional registration to the date of submission of the thesis.

All candidates registered for the Ph.D. program shall be available in the Department throughout the program and the Head of the Department / Head of Institution shall maintain their attendance.

Full-time Ph.D. Scholars are eligible to avail of 15 days of casual leave during a calendar year. In addition, Ph.D. Scholars can avail 15 days of OOD for data collection visits, visits to collaborating labs, attending conferences, workshops, training programs and other such official research-related activities outside the university/institution.

2. Part-time Ph.D.

Internal Part-time Ph.D. candidates - Teachers who are in regular service and are working in the

Constituent Colleges are eligible to register for part-time Ph.D.

RESEARCH GUIDES:

Eligibility for Recognition as a Ph.D. Guide:

Only full-time permanent faculty members of the University meeting at least one of the following criteria are eligible to be recognized as Ph.D. guides:

1) Professors / Associate Professors holding a Ph.D. / MD / MS/ MDS with a minimum of 5 peer-reviewed publications* in indexed journals (Scopus / Web of Science) as First /Second / corresponding author.

2) Assistant Professors with a Ph.D. qualification, a minimum of two years of post-Ph.D. teaching experience, and a minimum of 3 peer-reviewed publications* in indexed journals (Scopus / Web of Science) as First / Second / corresponding author.

3) Assistant Professors with MD / MS / MDS qualification, a minimum of eight years of post-PG teaching experience, and a minimum of three peer-reviewed publications* in indexed journals (Scopus / Web of Science) as First / Second / corresponding author.

The allocation of Research Supervisor for a selected research scholar shall be decided by the Department concerned depending on the number of scholars per Research Supervisor, the available specialization among the Supervisors, and research interests of the scholars as indicated by them at the time of interview/viva voce.

In the case of topics which are inter-disciplinary and where the Department concerned feels that the expertise in the Department has to be supplemented from outside, the Department may appoint a Research Supervisor from the Department itself, who shall be known as the Research Supervisor, and a Co-Supervisor from outside the Department/Faculty/College/University on such terms and conditions as may be specified and agreed upon by the consenting Institutions.

A Research Supervisor/Co-Supervisor who is a Professor cannot guide more than eight (8) Ph.D. scholars at any given point of time. An Associate Professor as Research Supervisor can guide up to a maximum of six (6) Ph.D. scholars (including co-supervision) and an Assistant Professor as Research Supervisor can guide up to a maximum of four (4) Ph.D. scholars. One additional research scholar can be allotted to each supervisor over and above the allotted number provided the Research Supervisor is implementing a major sponsored research project. Further, each Research Supervisor/Co-Supervisor can guide two international students on a supernumerary basis. At any point of time the total number of candidates under a research

supervisor shall not exceed the number as prescribed above including the candidates under co-supervision.

Note: The Research Supervisor should declare the number of Ph.D. scholars registered with him/her periodically to the University/College. He/she cannot increase the number by using recognition from multiple universities/colleges.

Course Work: Credit Requirements:

All candidates admitted to the Ph.D. programmes shall be required to complete the course work prescribed by the Department during the initial one or two semesters

The coursework shall be treated as a prerequisite for Ph.D. preparation. A minimum of four credits shall be assigned to one or more courses on Research Methodology which could cover areas such as quantitative methods, qualitative methods, computer applications, research ethics, and review of published research in the relevant field, fieldwork, etc.

Minimum number of the credit requirement for the Ph.D. programme should be at least 12 credits and a maximum of 16 credits.

Research Advisory Committee and Its Functions:

There shall be a Research Advisory Committee, or an equivalent body for a similar purpose as defined in the Statutes/Ordinances of the Institution concerned, for each Ph.D. scholar.

The Research Supervisor of the scholar shall be the Convener of this Committee. This Committee shall have the following responsibilities:

- To review the research proposal and finalize the topic of research;
- To guide the research scholar to develop the study design and methodology of
- Research and identify the course(s) that he/she may have to do.
- To periodically review and assist in the progress of the research work of the research scholar.

A research scholar shall appear before the Research Advisory Committee once in six months to make a presentation of the progress of his/her work for evaluation and further guidance. The six-monthly progress reports shall be submitted by the Research Advisory Committee to the Institution with a copy to the research scholar.

In case the progress of the research scholar is unsatisfactory, the Research Advisory Committee shall record the reasons for the same and suggest corrective measures. If the research scholar fails to implement these corrective measures, the Research Advisory Committee may recommend the cancellation of registration from the programme

Evaluation and Assessment Methods:

Upon satisfactory completion of course work, the Ph.D. scholar shall be required to undertake research work and produce a draft dissertation/thesis within a reasonable time, as stipulated by the Institution concerned based on these Regulations.

Before the submission of the thesis, the scholar shall make a presentation in the Department before the Research Advisory Committee of the Institution concerned which shall also be open to all faculty members and other research scholars. The feedback and comments obtained from them may be suitably incorporated into the draft thesis in consultation with the Research Advisory Committee.

It is desirable that the research work of Ph.D. scholars is published in peer reviewed or refereed journals and presented in conferences/seminars. The quality assessment of Ph.D. degrees should be the responsibility of the Institutions. The institutions are free to evolve guidelines in this regard, if needed.

The thesis shall be submitted together with an originality report produced by an antiplagiarism software application. The supervisor (and co-supervisor, if there is any) shall receive an originality report on the whole text of the thesis and shall take this report into account in the evaluation on the submission.

The Ph.D. thesis submitted by a research scholar shall be evaluated by his/her Research Supervisor and at least two external examiners, who are experts in the field and not in employment of the Institution. Examiner(s) should be academics with a good record of scholarly publications in the field. Out of the two external examiners, one must be from out of the state in which the institution is located. Where possible, one of the external examiners may preferably be chosen as a distinguished academician, not below the rank of Professor or equivalent, from outside India. The viva-voce examination based, among other things, on the critiques given in the evaluation report, shall be conducted by the Research Supervisor and at least one of the two external examiners and shall be open to be attended by Members of the Research Advisory Committee, all faculty members of the Department, other research scholars and other interested experts/researchers.

The viva-voce of the research scholar to defend the thesis shall be conducted only if the evaluation report(s) of the examiner(s) on the thesis recommends acceptance. If one of the evaluation reports of the examiner in case of a Ph.D. thesis recommends rejection, the Institution shall send the thesis to an alternate examiner out of the approved panel of examiners and the viva-voce examination shall be held only if the report of the alternate examiner is satisfactory. If the report of the alternate examiner is also unsatisfactory, the thesis shall be rejected, and the research scholar shall be declared ineligible for the award of the degree.


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Chapter 5
Job Descriptions

Chapter 5: Job Description for all levels

Duties and Responsibilities of Anaesthesia and OT Technologist:

Definition: Anaesthesia & Operation theatre Technologist is a member of a multidisciplinary team in operation theatres who prepare and maintain an operating theatre. Assists Anaesthesiologist and surgical team during peri-operative period and provides support to patients in the recovery room**.**

1. Junior Anaesthesia & Operation Theatre Technologist:

1. JOB TITLE : **Junior Anaesthesia & Operation Theatre Technologist**
2. JOB PURPOSE:
   - Assisting team in pre-operative arrangements.
   - Assisting during intra-operative with surgeons & Anaesthesiologist.
   - Assisting team post-operative.
   - Maintenance of machines.
3. ACCOUNTABLE TO: HOD- Anaesthesia Department / Senior AOT Technologist.
4. QUALIFICATION: Diploma in Anaesthesia & Operation Theatre Technology (2.5 years)

RESPONSIBILITIES:

- Responsible for the transportation of patients to and from the theatre and PACU
- Assist staff with the mobilization of the patient within the Operation Theatre
- Assist with patient procedures as required
- Maintain procedure room/operating theatre equipment so as to ensure a clean, safe and efficient environment for patients and staff
- Assist in the preparation of patient prior to surgery, e.g. pre-operative, patient positioning.
- Ensure that the patient is positioned securely and safely on the operating table prior to surgery and on the patient trolley at the completion of surgery
- Provide assistance to Anaesthesiologist
- Promote patient safety at all the times
- Assist in other areas within the theatre complex as workload permits
- Maintain good communications with other staff in the theatre complex
- Maintain patient integrity at all the times
- Be familiar with the correct operation of all equipment
- Collect and return all necessary equipment for the procedure and patient safety
- Report malfunctioning equipment to person as per protocol
- Follow the hospital's Health and Safety policies and procedures
- Be aware of the OH&S guidelines for the safe transport of beds and patients throughout the hospital

2. Anaesthesia & Operation Theatre Technologist:

JOB TITLE : Anesthesia & Operation Theatre Technologist

JOB PURPOSE: Assisting team in pre-operative arrangements.

- Assisting during intra-operative with surgeons & anesthesiologist.
- Assisting team post-operative.
- Maintenance of machines

ACCOUNTABLE TO : Head- Anaesthesia/ Senior AOT Technologist.

QUALIFICATION : Baccalaureate in Anaesthesia & Operation Theatre Technology (4 Years degree program)

RESPONSIBILITIES:

Supporting the multidisciplinary team in providing a safe, high quality environment for the carrying out of surgical procedures by:

- Anticipating the needs of the Anesthesia/surgical team and responding effectively
- Implementing of Surgical safety checklist and handover form/checklist
- Implementing OT functionality and equipment checklist
- Implementing crash cart checklist
- Maintaining effectiveness of sterilizing process in the OT
- Managing anesthesia drugs in the OT
- Be well versed with Narcotic policy and appropriately maintain records
- Maintaining biomedical equipment and troubleshooting as and when required
- Handling blood products, coordination with blood bank and alignment with related blood policy
- Assisting Anesthesiologist in peripheral procedures – endoscopy, MRI, CT scan etc.
- Assisting in patient positioning and transfer
- Assisting in skin preparation and draping of the surgical field.
- Supporting and observing the patient throughout the operation.
- Assisting in the measurement and recording of fluid input/output.
- Working as part of the multidisciplinary team for the benefit of the patient, appreciating each member of the team's needs and role.
- Safely handling and recording anesthesia and surgical instruments in line with policy.
- Disposing of clinical and biomedical waste including drugs safely and appropriately in line with policy.
- Capturing and maintaining patient data/documentation and any information required for auditing/quality issues. Documentation will be countersigned by the Registered Practitioner.
- Utilizing communication skills, preparing the environment and equipment and acting as a link between the surgical team and other parts of the theatre and hospital.

- Assisting the Registered Practitioner in the handover of the patient to the recovery staff, providing appropriate information and documentation.
- Responds and notifies appropriate physicians when immediate clinical response is necessary based on emergency in Operation Theater.
- Involvement in research and development.

Brief description of work which a professional will perform after successful completion of Baccalaureate in Anaesthesia & Operation Theatre Technology (B. A&OTT) are as follows:-

1. Carry out administration of oxygen and nebulization in OT as instructed by Anesthesiologist.
2. Ensure sterilization, day to day maintenance and proper storage as required of Anesthesia work stations with all their attachments, OT Tables, Electro-cautery, OT Lights, sterilizers, Harmonic Cautery, ENT and Ophthalmic Microscopes, Suction Machines, Monitors, defibrillators, ventilators, airways, tubes, circuits, lines, anesthetic instruments, all components and accessories of endoscopes and laparoscopes, Infusion Pumps, Ultrasound Machines, Phaco Machines, DVT pumps, tourniquets, multi Para monitors etc.
3. Fixing and removing BIPAP/CPAP masks as required, and operation of machines.
4. Assisting surgeons in all kind of endoscopic and laparoscopic procedures up to technological aspects permits.
5. Assisting Anesthetist in Laryngoscopy, intubation, I-gel/LMA insertion, Fiber optic intubation, CVP line insertion, Arterial Line Insertion, percutaneous tracheostomy, general anesthesia, USG guided regional anesthesia blocks (e.g. Spinal Anaesthesia, Epidural Anaesthesia, Brachial block, Axillary Block etc.)
6. Assisting Anesthetists in pain clinics during all kind of procedures except operating the C-Arm machine..
7. Assisting Surgeons in all type of surgeries (e.g. Obstetrics & Gynecology, Orthopedics, General Surgery, Plastic-cosmetics and maxillofacial surgeries, ENT, Ophthalmic Surgeries, Neurosurgery, Cardiac Surgery, Onco Surgeries, Urology, and Pediatric Surgeries etc.) by providing technical support during the surgeries.
8. Assisting Surgeons in Robotic surgeries up to required technological aspects.
9. IV Cannulation and securing them.
10. Help Anesthesiologist in ABG sampling and send it for testing with proper ice packing and labeling.
11. Taking Vitals (e.g. Pulse, Blood Pressure, temperature, SPO2 etc.) and document it wherever required.
12. Working in Central Sterile Supply Department (CSSD), Operate Autoclave Machines, ETO Sterilizers and Plasma Sterilizers, flash sterilizers and do its record keeping.
13. Work in all type of intensive care units (ICU's) to manage its equipments (e.g. Multi Para Monitors, Ventilators, Defibrillators, Nebulizers, DVT Pumps, ABG Machines, Syringe Pumps etc.)

14. Looking after the AMC/CMC of all the equipment of OTs and ICUs.
15. Maintain a sterile field during surgical procedures.
16. Reprocessing and maintenance of fragile equipments used by Technologists.
17. Assist to Anesthesiologist in obtaining an accurate pre-anaesthetic health history, perform a thorough physical examination, and maintain organized records.
18. Establish and monitor non-invasive and invasive monitoring modalities, as delegated by the supervising Anesthesiologist.
19. Administer induction agents, adjust Anaesthesia levels, provide adjunctive treatment, and ensure continuity of anaesthetic care through the postoperative recovery period under the supervision of Anesthesiologist.
20. Apply and interpret advanced monitoring techniques, including pulmonary artery catheterization, electroencephalographic spectral analysis, echocardiography, and evoked potentials.
21. Utilize advanced life-support techniques such as high-frequency ventilation and intra-arterial cardiovascular assist devices under the supervision of Anaesthesiologist.
22. Conduct post-anaesthesia patient rounds, record progress notes, compile case summaries, and transcribe orders under supervision of Anaesthesiologist.

3. Senior Anaesthesia & Operation Theatre Technologist:

1. JOB TITLE: **Senior Anaesthesia & Operation Theatre Technologist**
2. JOB PURPOSE:
    - Supervision of working of Junior and AOT Technologist.
    - Indenting, stock management and documentation of drugs and other consumables.
    - Looking after the AMC/CMC of all the machines in OTs and ICUs and maintenance of all the machines.
    - Helping Technical Officers in maintenance of duty roster of all the technologists working under his/her control.
3. ACCOUNTABLE TO: Head Anaesthesia Department / Technical Officer (AOTT)

RESPONSIBILITIES:

Supporting the multidisciplinary team in providing a safe, high quality environment for the carrying out of surgical procedures by supervision of Junior Anaesthesia & Operation Theatre Technologists and Anaesthesia & Operation Theatre Technologists in carrying their duties efficiently by:

- Indenting, storage and managing all drugs including narcotics, anesthetic agents, inhalational agents, anesthesia and surgical consumables etc.
- Looking after the AMC/CMC of all the equipment of OTs and ICUs.
- Anticipating the needs of the Anesthesia/surgical team and responding effectively.
- Implementing of Surgical safety checklist and handover form/checklist
- Implementing OT functionality and equipment checklist with the help of Junior Technologists and Technologists.

- Implementing crash cart checklist.
- Maintaining effectiveness of sterilizing process in the OT and continuous supervision of application of sterilization methods.
- Be well versed with Narcotic policy and appropriately maintain records.
- Maintaining biomedical equipment and troubleshooting as and when required and helping Junior Technologists and Technologists working under him/her.
- Handling blood products, coordination with blood bank and alignment with related blood policy.
- Supporting and observing the patient throughout the operation.
- Assisting in the measurement and recording of fluid input/output.
- Working as part of the multidisciplinary team for the benefit of the patient, appreciating each member of the team's needs and role.
- Safely handling and recording anesthesia and surgical instruments in line with policy.
- Capturing and maintaining patient data/documentation and any information required for auditing/quality issues. Documentation will be countersigned by the Registered Practitioner.
- Utilizing communication skills, preparing the environment and equipment and acting as a link between the surgical team and other parts of the theatre and hospital.
- Assisting the Registered Practitioner in the handover of the patient to the recovery staff, providing appropriate information and documentation.
- Responds and notifies appropriate physicians when immediate clinical response is necessary based on emergency in Operation Theater.
- Involvement in research and development of human and healthcare resources.

4. Technical officer (Anaesthesia & Operation Theatre Technology)

1. JOB TITLE: **Technical officer (A &OTT)**
2. JOB PURPOSE:
    - Should have a thorough understanding of all hospital procedures and policies
    - He/she serves as a liaison between administration, faculty/doctors, and all technical employees in developing and implementing standard operating procedures, communicating with doctors/faculty on various operational and administrative issues, budgeting, and stock maintenance.
    - He/she anticipates the department's future requirements. He employs his/her organizational and leadership skills to supervise staff and assure adherence to policies and regulations, resulting in the most efficient use of labor and other resources.
    - He/she will be in charge of ensuring that hospital's technical operations work smoothly.
3. ACCOUNTABLE TO: Head Anaesthesia Department/Senior Technical Office (AOTT)

RESPONSIBILITIES:

- Roster planning of all Anaesthesia & Operation Theatre Technologists.
- Material and store management of consumable and non-consumable items and their proper record keeping. Calls for special equipment service, evaluates service contracts and maintains equipment inventories.
- Installation and demonstrations of equipment and machinery being used in their respective departments.
- Maintains equipment by completing preventive maintenance schedules, conducting tests and troubleshooting and repairing malfunctions.
- Maintains supplies inventory by checking stock, anticipating needs, placing and expediting orders, and verifying receipts.
- Control inventory levels and ensure availability of material during emergencies.
- Keep detailed records on procurement activity, materials quantity, specifications etc.
- Assist in forecasting to plan future orders.
- Maintains a safe and healthy working environment by conducting safety tests, recommending and complying with procedures, training and guiding medical and healthcare personnel and complying with hospital policies and protocols.
- Ensures that standard operating procedures are followed in his respective departments which he ensures by conducting classes, training the technical staff and taking rounds prior to and during the various ongoing procedures in the department.
- Reporting to the Senior/ Chief Technical Officer- In charge for any procurement-related issues like approvals of new machines/ consumables/accessories.
- Reporting of issues related to manpower management if any shortage arises.

5. Senior Technical officer (Anaesthesia & Operation Theatre Technology):

1. JOB TITLE : **Senior Technical officer (A & OTT)**
2. JOB PURPOSE
   - He/she should have a thorough understanding of all hospital procedures and policies.
   - He/she serves as a liaison between administration, faculty/doctors/Chief Technical Officer and all technical employees in developing and implementing standard operating procedures, communicating with doctors/faculty on various operational and administrative issues, budgeting, and stock maintenance.
   - He anticipates the department's future requirements. He/she employs his/her organizational and leadership skills to supervise staff and assure adherence to policies and regulations, resulting in the most efficient use of human and other healthcare resources.
   - He/she will be in charge of ensuring that hospital's technical operations work smoothly.

3. ACCOUNTABLE TO: Head Anaesthesia Department/Chief Technical Officer (AOTT)

RESPONSIBILITIES:

- Supervise and monitor daily operations in concerned departments and the involvement of the technical staff under him/her.
- Act as a spokesperson/ representative for all the technical staff.
- Arranges/attends all the monthly/weekly meetings with faculty/Head of the Department/Administration held for technical staff and their involvement with concerned authorities.
- Signing and forwarding authority for sanctioning various leaves and other official letters to underlying technical staff.
- Monitor expenses and suggest cost-effective alternatives.
- Develop and implement effective policies for all operational procedures.
- Prepare/amend work schedules/standard operating procedures. (Creates and adheres to standard operating procedures) under the guidance of his/her respective HOD/Authority.
- Maintain Leave records of all technical staff in the department.
- Monitoring technical staff's performance also has a significant role in the Annual Performance Appraisal Report (APAR) of all the technical staff of the concerned department and he/she is Reporting Authority for technical staff up to the level of Technical Officers.
- Ensure the training of all technical staff by allocating proper arrangements.
- Ensure prompt ordering and stocking of medical and hospital supplies.
- Involve in training of BSc/MSc Anesthesia/ AOT technology courses.
- Maintain attendance/ roster of all BSc/MSc Anesthesia/ OT technology courses students.
- Help in organize Demo class, academic classes, practical classes of B. AOTT/M.AOTT/ OT technology course students with respective course coordinator.
- Provide technical support in PG practical exams in department with guidance of HOD/ faculty.
- Provide technical support in conference/CME/Workshop organized by Dept. with the coordination of HOD/Faculty
- Any other supervisory official work assigned by HOD.

6. Chief Technical officer (Anaesthesia & Operation Theatre Technology):

1. JOB TITLE: **Chief Technical officer (A & OTT)**
2. JOB PURPOSE
    - He/she should have a thorough understanding of all hospital procedures and policies.
    - He/she serves as a liaison between Administration/Head of Department and all technical employees through Senior Technical Officers in developing and implementing standard operating procedures, communicating with doctors/faculty on various operational and administrative issues, budgeting, and stock maintenance.
    - He anticipates the department's future requirements. He/she employs his/her organizational and leadership skills to supervise staff and assure adherence to policies and regulations, resulting in the most efficient use of human and other healthcare resources.
    - He/she will be in charge of ensuring that hospital's technical operations work smoothly.
3. ACCOUNTABLE TO: Head Anaesthesia Department or Higher authorities of the Hospital/Institution.

RESPONSIBILITIES:

- Act as a spokesperson/ representative for all the technical staff with Hospital Administration/ Head of Department.
- Arranges/attends all the monthly/weekly meetings with faculty/Head of the Department/Administration held for technical staff and their involvement with concerned authorities.
- Signing and forwarding authority for sanctioning various leaves and other official letters to underlying technical staff.
- Monitor expenses and suggest cost-effective alternatives.
- Roster management and deployment of all Senior Technical Officers and Technical Officers in his/her concerned department.
- Develop and implement effective policies for all operational procedures.
- Prepare/amend work schedules/standard operating procedures. (Creates and adheres to standard operating procedures) under the guidance of his/her respective HOD/Authority.
- Maintain Leave records of all technical staff in the department.
- Monitoring technical staff's performance also has a significant role in the Annual Performance Appraisal Report (APAR) of all the technical staff of the concerned department and he/she is Reporting Authority for Senior Technical Officers and Reviewing Authority for technical staff up to the level of Technical Officers (AOTT).
- Ensure the training of all technical staff by allocating proper resources.

- Ensure prompt ordering and stocking of medical and hospital supplies.
- Involve in training of BSc/MSc Anesthesia/ AOT technology courses.
- Organizing Demo class, academic classes, and practical classes of B. AOTT/M.AOTT/ OT technology course students with respective course coordinator.
- Provide technical support in conference/CME/Workshop organized by Dept. with the coordination of HOD/Faculty.
- Any other supervisory official work assigned by HOD.


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Annex- 1

Allied and Healthcare Professions

Allied and healthcare professionals includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions. They work in multidisciplinary health teams in varied healthcare settings including doctors (physicians and specialist), nurses and public health officials to promote, protect, treat and/or manage a person('s) physical, mental, social, emotional, environmental health and holistic well-being.

The wide variation in the understanding of the concept of allied and healthcare professional, better known as 'paramedic', the nomenclature, and functions has led to the poor image of allied and healthcare sciences in India. The use of the word paramedic itself limits the activities of AHPs in the system. Hence, it is imperative to adequately compensate these professionals based on their qualifications and specialties. Despite a huge demand for services from this sector, allied and healthcare sciences is highly fragmented. As per the report 'From Paramedics to Allied Health Sciences', in total 138 courses of varied levels were identified during the process. Although it is estimated that there may be many more courses which are yet to be identified.

Considering the lack of regulatory mechanism following 15 core professional groups (accounting for around 44 professions) has been enlisted below (The list is illustrative of the allied and healthcare professions. In future there may be addition or removal of certain professions based on the state of their regulation and standardization). It also needs a mention that most of these professions are not restricted to the professional groups under which they have been categorized, their role may extend to other professional services too. Similarly, the categorization is an indicative categorization, however this may evolve over time based on deeper understanding of the roles and responsibilities of each professional group:

1. **Healthcare Professions**
    1. Optometry
    2. Physiotherapy
    3. Occupational Therapy
    4. Nutrition Sciences
    5. Physician Associate and Assistants

2. **Allied Health Professions**
    6. Cardiology, Vascular and Pulmonary Technology
    7. Medical Laboratory Sciences
    8. Medical Radiology and Imaging Technology
    9. Neurosciences Technology
    10. Non- direct and Administrative services
    11. Primary Care and Community services
    12. Radiation Therapy
    13. Renal Technology
    14. Surgical and Anesthesia related Technology
    15. Trauma Care Services

The above mentioned groups account for over 44 job profiles in the allied and healthcare space, which are as follows-

A. Healthcare Professions

1. Optometry
    a. Optometrist
2. Physiotherapy
    a. Physiotherapist
3. Occupational Therapy
    a. Occupational Therapist
4. Nutrition Sciences
    a. Nutritionist
    b. Dietitian
5. Physician Associate and Assistants
    a. Physician Associates and Assistants

B. Allied Health Professions

6. Surgical and anesthesia related technology
    a. Anesthesia Assistants and Technologist
    b. OT Technologist
    c. Endoscopy Technologist
7. Medical Laboratory Sciences
    a. Cyto-Technologist
    b. Dermatology/STD /Leprosy Lab Technologist
    c. Forensic Technologist
    d. Haemato-Technologist
    e. Histopathology-Technologist
    f. Phlebotomist
    g. Medical and Clinical Lab Technologist
8. Medical Radiology and Imaging Technology
    a. Radiographer
    b. Radiologic /Imaging Technologist
    c. Diagnostic Medical Sonographer
9. Renal Technology
    a. Urology Technologist
    b. Dialysis Therapy Technologist
10. Radiation Therapy
    a. Radiotherapy Technologist
    b. Medical Dosimetrist
    c. Nuclear Medicine Technologist
11. Trauma Care Services
    a. Emergency Medical Technologist (paramedic)
    b. Critical Care/ICU Technologist

12. Neurosciences Technology
    a. EEG/END Technologist
    b. EMG Technologist
    c. Neuro Lab Technologist
    d. Sleep Lab Technologist
13. Cardiology, Vascular and Pulmonary Technology
    a. Cardiovascular Technologist
    b. ECG Technologist
    c. ECHO Technologist
    d. Perfusionist
    e. Pulmonary Function (PFT) Technologist
    f. Respiratory Therapist
14. Non- direct and Administrative Services
    a. Biomedical Engineers and Technologist
    b. Medical Assistant
    c. Medical Secretaries
    d. Medical Transcriptionist
    e. Health Information Management Technologist
15. Primary Care and community services
    a. Blood Bank Technologist
    b. Counselor- Integrated Behavioral Health Counselors, Palliative counselors etc.
    c. Sanitary Health Inspectors


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