Curriculum and Credit Framework For

Bachelor of Operation Theater Technology (BOTT)

(To be effective from the Academic Session 2025-26)

Faculty of Life Sciences
Gurugram University ,Gurugram

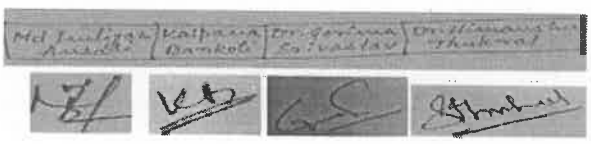
(AStateGovt.UniversityEstablishedUnderHaryanaAct17Of2017)

First Semester–Foundation Course

Sl. No.	Course Titles	Hours		
		Theory	Practical	Total
BOTT-001	Introduction to Healthcare Delivery System in India	60	0	60
BOTT-002	Basic computers and information Science	10	40	50
BOTT-003	Communication and soft skills	20	10	30
BOTT-004	Medical Terminology and Record keeping(including Anatomical terms)	40	0	40
BOTT-005	Medical Law and Ethics	40	0	40
BOTT-006	Introduction to Quality and Patient safety (including Basic emergency care and life support skills, Infection prevention and control, Biomedical waste management, Disaster Management and Antibiotic resistance)	40	60	100
BOTT-007	Professionalism and values	20	0	20
BOTT-008	Research Methodology and Biostatistics	40	20	60
BOTT-009	Principals of Management	40	0	40
BOTT-010	Community orientation and clinical visit(including related Practical to course 001)*	0	100	100
TOTAL		310	230	540

Second Semester

Sl. No.	Course Titles	Hours		
		Theory	Practical	Total
BOTT-011	Basic Anatomy and Physiology	80	120	200
BOTT-012	Biochemistry	40	60	100
BOTT-013	Principles of Management	30	50	80
	OTT Directed Clinical Education–part I (studentship)	-	160	160
	TOTAL	150	390	540

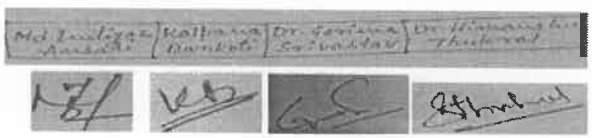


Third Semester

Sl. No.	Course Titles	Hours		
		Theory	Practical	Total
BOTT-014	Pathology	40	80	120
BOTT-015	Medicine	40	80	120
BOTT-016	Principles of Anesthesia	40	100	140
	OTT Directed Clinical Education–part II(studentship)	-	160	160
	TOTAL	120	420	540

Fourth Semester

Sl. No.	Course Titles	Hours		
		Theory	Practical	Total
BOTT-017	Clinical Pharmacology	40	60	100
BOTT-018	Clinical Microbiology	40	60	100
BOTT-019	Basic techniques of Anesthesia	40	120	160
	OTT Directed Clinical Education–part III(studentship)		180	180
	TOTAL	120	420	540



Fifth Semester

Sl. No.	Course Titles	Hours		
		Theory	Practical	Total
BOTT-020	Basics of Surgical procedures	30	50	80
BOTT-021	CSSD Procedures.	30	70	100
BOTT-022	Advance anesthetic techniques	50	70	120
BOTT-023	Basic Intensive care	30	100	130
	OTT Directed Clinical Education–part IV(studentship)		110	110
	TOTAL	140	400	540

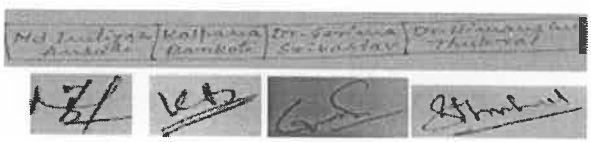
Sixth Semester

Sl .No.	Course Titles	Hours		
		Theory	Practical	Total
BOTT-024	Specialized surgery and anesthesia	80	200	280
BOTT-025	Electronics and technology in surgery and anesthesia	50	100	150
	OTT Directed Clinical Education–part V(studentship)		110	110
	TOTAL	130	410	540

Seventh and Eighth Semester

Sl. No.	Course Titles	Hours		
		Theory	Practical	Total
	OTT Internship	-	1440	1440

***Internship –minimum 1440 hours (calculated based on 8hours per day, if 180 working days in a year). This is the minimum requirement, however depending on the working days/ hours, the total duration of engagement in internship may be more than 1440 hours.**



Bachelor of Operation Theater Technology (BOTT)

Introduction

Objectives/aim of the course:
1. Proficiently perform a full range of clinical laboratory tests
2. Develop and evaluate test systems and interpretive algorithms
3. Manage information to enable effective, timely, accurate, and cost-effective reporting of laboratory-generated information

Expectation from the future graduatein providing patient care:

At the end of the course the student should be able to:
1. Perform routine clinical laboratory testing.
2. Make specimen-oriented decisions on predetermined criteria including working knowledge of critical values.
3. Communicate with other members of healthcare team, customers and patients in an effective manner.
4. Process information and ensure quality control as appropriate to routine laboratory procedures.
5. Train students in routine laboratory procedure.
6. Upgrade knowledge and skills in a changing healthcare scenario.
7. Should know the logical interpretation of clinical lab investigations.
8. Should be able to extrapolate data acquired
9. Should be able to working on automated machine

Eligibility for admission

Selection procedure
1. Candidate should have passed 10 + 2 with Biology or vocational course in MLS/MLT.
2. Minimum percentage of marks: 50% aggregate.
3. Separate entrance exam should be incorporated for these students who want to purse allied health course.

Provision of Lateral Entry:

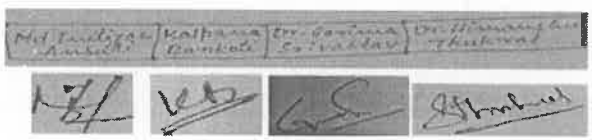
Students who have successfully completed DMLS and would like to pursue BMLS can directly enter into the second year or 3rd Semester, subject to availability of vacancy on merit of entrance test.

Duration of the course

Duration of the course: Total 4 Years(8 semesters or 4528 hours) with 3.5 Years didactic and practical (3808 hours) + 6 months (720 hours) internship after successful completion of all the 7 semesters of BMLS.

Medium of instruction

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



Provision of internship & project

Six months of internship should be mandatory in a Government recognized Hospital/Institution as partial fulfillment for the award of Bachelor in MLS Degree to candidates, as per government norms.
Minimum 720 hours of internship should be completed by the candidate to be awarded the degree.

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.

Assessment:

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical &clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated. Students must attain a cumulative score of at least 50% marks in both theory and practical for each individual subject and internal assessment separately.

First Semester- Foundation course

BOTT-001 Introduction to National Healthcare 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
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.
3. Introduction to AYUSH system of medicine
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
5. Demography & Vital Statistics
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
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.

BOTT-002 Basic computers and information science

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:

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. 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).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. 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.).
6. 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.
7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
8. 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.

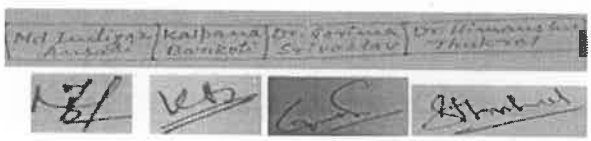
10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
11. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
12. Application of Computers in clinical settings.

Practical on fundamentals of computers -

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

BOTT-003Communication and soft skills

Major topics to be covered under Communication course29–
Basic Language Skills: Grammar and Usage.
2. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
3. 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. Basic concepts & principles of good communication
5. Special characteristics of health communication
6. Types & process of communication
7. Barriers of communication & how to overcome



BOTT-004Medical terminologies and record keeping

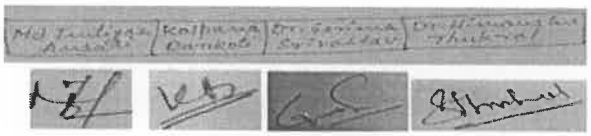
This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests.27 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.

BOTT-005 Medical law and ethics

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.[28]
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, analyzing, and attempting to resolve the ethical problems that arise in practice".[28]
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:

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. 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.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events
11. Obtaining an informed consent.



BOTT-006Introduction to Quality and patient safety

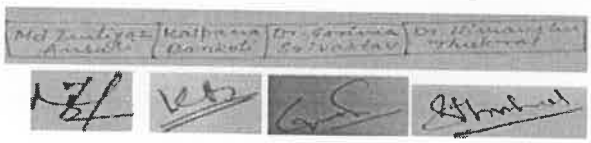
1. Quality assurance and management - The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system.
a. Concepts of Quality of Care
b. Quality Improvement Approaches
c. Standards and Norms
d. Quality Improvement Tools
e. Introduction to NABH guidelines

2. Basics of emergency care and life support skills - 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.
3. Bio medical waste management and environment safety- 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:
a. Definition of Biomedical Waste
b. Waste minimization

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)
4. Infection prevention and control - 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,

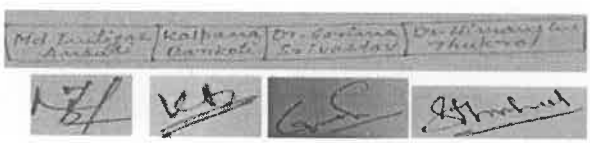


disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
b. Prevention & control of common healthcare associated infections,
c. Components of an effective infection control program, and
d. Guidelines (NABH and JCI) for Hospital Infection Control
5. Antibiotic Resistance
a. History of Antibiotics
b. How Resistance Happens and Spreads
c. Types of resistance- Intrinsic, Acquired, Passive
d. Trends in Drug Resistance
e. Actions to Fight Resistance
f. Bacterial persistence
g. Antibiotic sensitivity
h. Consequences of antibiotic resistance
i. Antimicrobial Stewardship- Barriers and opportunities, Tools and models in hospitals
6. Disaster preparedness and management- The objective of this section will be to provide knowledge on the principles of on-site disaster management. Concepts to be taught should include
a. Fundamentals of emergency management,
b. Psychological impact management,
c. Resource management,
d. Preparedness and risk reduction,
e. Key response functions (including public health, logistics and governance, recovery, rehabilitation and reconstruction), information management, incident command and institutional mechanisms.

BOTT-007Professionalism and Values

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.

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
6. Cultural issues in the healthcare environment



BOTT-008Research 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.

1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design
5. Basic Concepts of Biostatistics
6. Types of Data
7. Research tools and Data collection methods
8. Sampling methods
9. Developing a research proposal

BOTT-009Principals of Management

The course is intended to provide knowledge about the basic principles of Management.

1. Introduction to management
2. Strategic Management
3. Foundations of Planning
4. Planning Tools and Techniques
5. Decision Making, conflict and stress management
6. Managing Change and Innovation
7. Understanding Groups and Teams
8. Leadership
9. Time Management
10. Cost and efficiency

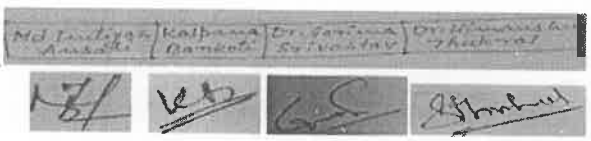
BOTT-010Community orientation and clinical visit

The objective of this particular section of the foundation course is to sensitize potential learners with essential knowledge; this will lay a sound foundation for their learning across the under graduate program and across their career. Innovative teaching methods should be used to ensure the attention of a student and make them more receptive such as group activities, interactive fora, role plays, and clinical bed-side demonstrations.

1. The community orientation and clinical visit will include visit to the entire chain of healthcare delivery system -Sub centre, PHC, CHC, SDH, DH and Medical college, private hospitals, dispensaries and clinics.

2. The student will also be briefed regarding governance at village level including interaction and group discussion with village panchayat and front line health workers.

3. Clinical visit to their respective professional department within the hospital.



Second Semester

BOTT-011Anatomy and Physiology of human body

Anatomy is a key component of all education programmes for OTTs and should have a strong focus on organ position, orientation and relationships. The topics provide the student with an understanding of the structure and relationships of the systems and organs of the body which is essential in patient positioning and accurate delivery of intervention.

Similarly Physiology provides the students with knowledge of the function of systems and organs and their relationships and underpins the understanding of how surgical intervention can modify the function and structure of outcomes. Physiology is important to all programmes with increased depth of content required where OTTs are being required to take a more active role in side effect recognition and management. This may be in departments where OTTs are increasingly taking some responsibility in this area or in resource constrained environments where nursing or medical staff are limited.

1. Structure and function of cell; cell division; tissue: definition and classification (Gross outline)
2. General Anatomical terms and topography of the body-planes regions, positions, movements.
3. Skeleton & joints- Long bones, vertebrae, pelvic and shoulder girdles, hands and feet, skull , face and teeth; parts of classical long bone; outline of different joints and type of movements.
4. Muscles; Classification, structure and function (Gross outline)
5. Brain & spinal cord with its coverings and cavities including cerebrospinal fluids and pituitary gland (Macroscopic anatomy and surface anatomy only)
6. Head & Neck; Oral cavity & lips, Pharynx, Larynx, Nasal Cavity and Para Nasal sinuses, Salivary Glands, Ear; Orbit & its content; Thyroid Gland and Nodal Areas (Macroscopic Anatomy only)
7. Thorax: Structure of Thoracic cage, Oesophagus, Trachea, Lungs & Pleura, The Mediastinum including Thymus, Heart and Great Vessels and Diaphragm (Macroscopic and Surface Anatomy)
8. Abdomen: Structure of Abdomen & Peritoneum, Retro Peritoneal structures (including Kidney), Stomach, Small Intestine, Colon, Liver, Pancreas, Spleen (Macroscopic and Surface Anatomy)
9. Pelvic and Perineum: Structure of Pelvis, Rectum & Anus, Bladder, Prostate, Female Genital Tract, Male Genital Tract and Inguinal Femoral Region (Macroscopic and surface Anatomy)
10. Lymphatic system and Reticulo-endothelial system (Gross outline only)- Position and function of Lymph Nodal regions (Including Neck, Axilla, Mediastinum, para-aortic, Inguinal) Extra nodal Lymphatic Tissues(Waldeyer's Ring, Spleen and Liver, Malt, Bone Marrow, Thymus) and Re System; Lymphatic Drainage.
11. Digestive System- Organs of digestion, histology of the digestive organs (stomach, small intestine, liver, pancreas), process of digestion, absorption and assimilation of food, Vitamins and minerals
12. Respiratory System- Organs of respiration and their histology (lungs and trachea), Respiration (Definition and Mechanism), gas exchange in the lungs, regulation of respiration, basal metabolic rate
13. The skin (Structure and functions)
14. The excretory system- Organs of excretion (kidneys, ureter, bladder), histology of kidney and its functions, formation of urine and its composition, structure of nephron
15. Circulatory System- Composition and functions of blood, the heart anatomy and physiology, the chambers of heart, various vessels and valves present in heart, Circulation of blood, the cardiac cycle and heart sounds, blood pressure, arteries and veins.
16. Nervous System- Central nervous system (Brain and Spinal cord), Peripheral nervous system (cranial and spinal nerves), The reflex action and reflex arc, The transmission of nerve impulse, sense organs (eye, ear, tongue and nose); structure and functions
17. Endocrine System- short description of various endocrine glands and their functions
18. Reproductive System- Male and female reproductive system, Histology of Gonads, ovarian cycle and ovulation, Fertilization, Fertility control

BOTT-012 Biochemistry:

1. Carbohydrates - Glucose and Glycogen Metabolism
2. Proteins-Classification of proteins and functions
3. Lipids- Classification of lipids and functions
4. Enzymes- Definition, Nomenclature, Classification, Factors affecting enzyme activity, Active site. Coenzyme, Enzyme Inhibition, Units of enzymes, Isoenzymes and Enzyme pattern in diseases
5. 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), Specific Dynamic Action (SDA), balanced diet, Marasmus and Kwashiorkor
6. Acids and bases-Definition, pH, Henderson – Hassel Balch equation, Buffers, Indicators, Normality, Molarity, Molality
7. Hormones
8. Applied Chemistry:

a. Nomenclature of compounds containing Halogen. Alcohols and Phenols. Ethane, Propane, Ether, Aldehydes, Ketones, Carboxylic acid, Cyanides, Isocyanides, Nitrogen compounds and amines.

b. Catalysis.

c. Hemoglobin, Blood and respiration.

Syllabus for practical

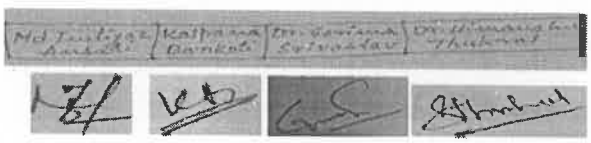
1. Benedict's test
2. Heat coagulation tests

BOTT-013Principles of management

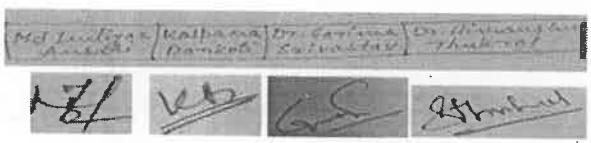
1. Principles of management:
a. Development of Management: Definitions of Management – Contributions of F.W. Taylor, Henry Fayol and others.
b. Functions of Management: Planning – Organizing – Directing – Controlling Planning: Types of planning – Short–term and long plans – Corporate or Strategic Planning – 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.

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 counselling – 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.



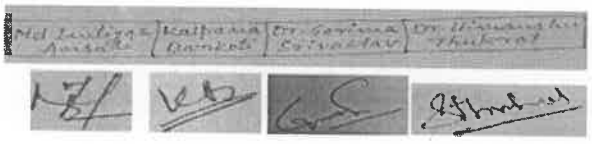
OTT Directed Clinical Education – part I (studentship)
Students will observe the basic operations of the operation theatre while interacting with the multidisciplinary team members involved in providing optimal care to the patients. The student will be introduced to terminologies, equipment, and techniques used for preparation and management of the OT.



Third Semester

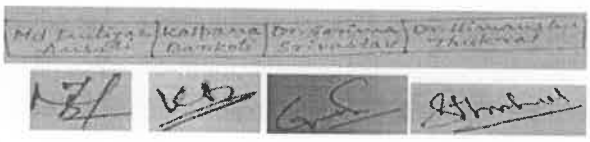
BOTT-014Pathology:

1. Cellular adaptation and cell death
2. Inflammation and repair, infection, circulatory disorders, immune defense
3. Genetics of disease
4. Neoplasia
5. Cell injury and adaptation
6. Atrophy, hypertrophy, metaphase, hyperplasia
7. Classification of tumors, premalignant lesion
8. Types of inflammation & system manifestations of inflammation
9. Disorders of vascular flow & shock (brief introduction)
10. Oedema, hyperemia or congestion, thrombosis, embolism, infarction shock, ischemia, over hydration, dehydration
11. The response to infection
12. Categories of infectious agents, host barriers to infection
13. How disease is caused
14. Inflammatory response to infectious agents
15. Hematopoietic and lymphoid System
16. Hemorrhage, various types of anemia, leucopenia, leukocytosis, bleeding disorders coagulation mechanism.



BOTT-015 Medicine:

1. Common symptoms of diseases –
a. Pain: pathophysiology, clinical types, assessment and management
b. Fever: clinical assessment and management
c. Cough, chest pain, dyspnoea, hemoptysis
d. Edema, anasarca, ascites
e. Pallor, jaundice
f. Bleeding
g. Anorexia, nausea and vomiting
h. Constipation and diarrhea
i. Hematemesis, malena and hematochezia
j. Common urinary symptoms- dysuria, pyuria, anuria, oliguria, polyuria, nocturia, enuresis
k. Body pains and joint pains
l. Headache, seizures, fainting, syncope, dizziness, vertigo
m. Disturbances of consciousness and coma
n. Weight loss and weight gain
2. Immune Response and Infections
a. Approach to infectious diseases – diagnostic and therapeutic principles
b. Immune defense mechanisms
c. Laboratory diagnosis of infections
d. Principles of immunization and vaccine use
e. Immunodeficiency disorders - acquired
f. Immunodeficiency disorders – congenital
3. Systems
a. Cardiovascular system- Clinical examination of the cardiovascular system, major manifestations of cardiovascular disease
b. Respiratory system - Clinical examination of the respiratory system, major manifestations of respiratory disease
c. Renal and genito-urinary system- Major manifestations of renal and urinary tract disease
d. Liver and biliary tract disease - Viral hepatitis, alcoholism.
e. Endocrinology and metabolism - Diabetes mellitus, Hyper - and hypothyroidism.
f. Disorders of the Immune System, Connective Tissue and Joints
g. Disorder of haemopoesis - Anemia - iron deficiencies anemia.



BOTT-016 Principles of Anesthesia

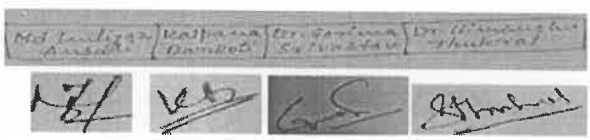
1. Medical gas supply
a. Compressed gas cylinders
b. Color coding
c. Cylinder valves; pin index.
d. Gas piping system
e. Recommendations for piping system
f. Alarms & safety devices.
g. Scavenging of waste anesthetic gases
2. Anesthesia machine
a. Hanger and yoke system
b. Cylinder pressure gauge
c. 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. Anesthesia ventilator and working principles.
6. 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

Practical

1. Supply of compressed gases:
a. Types of gases and their chemical and physical properties.
b. Types of containers.
c. Their checking and maintenance.
d. Types of compressors.
e. Structure and mechanism of various type of gauges, liquid oxygen storage and supply system.
2. Structure of reducing valves-
a. Mechanism of pressure reducing valves.
b. Their maintenance and safety checks
3. Structure and mechanism of flow meters, maintenance and safety checks
4. Volatile anaesthetic agents.
a. Selection of material to be used for containers of the volatile anaesthetic agents.
b. Structure of different types of vaporizers.
c. Principles of various vaporizers, their maintenance and safety precautions.
5. Types of circuits:
a. Open, Semi closed and closed circuits.
b. Non-rebreathing valves.
c. T-piece circuit and its modifications.
d. To and fro system and circle absorber.
6. Types of valves used in the different circuits. Structure and working of Heidbrink's valve, Rubin valve numan valve etc.

OTT Directed Clinical Education – part II (studentship)

Students will gain additional skills in clinical preparation, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior technical officer.



Fourth Semester

BOTT-017 Clinical pharmacology

1. Antisialagogues: Atropine, Glycopyrrolate.
2. Sedatives I Anxiolytics: Diazepam, Midazolam, Phenergan, Lorazepam, Chlorpromazine, and Triclofos.
3. Narcotics: Morphine, Pethidine, Fentanyl, Pentazozine, tramadol.
4. Antiemetic's: Metoclopramide, Ondanseteron, Dexamethasone
5. Induction Agent: Thiopentone, Diazepam, Midazolam, Ketamine, Propofol, Etomidate.
6. Muscle Relaxants: Depolarizing - Suxamethonium, Non depolarizing - Vecuronium, Atracurium, rocuranium
7. Inhalational Gases: Gases-02, N20, Air, Agents-Ether ,Halothane, Isofllurane, Saevoflurane, Desflurane
8. Reversal Agents: Neostigmine, Glycopyrrolate, Atropine, Naloxone, Flumazenil (Diazepam).
9. Local Anesthetics: Xylocaine, Bupivacaine - Topical, Prilocaine-jelly, Emla - Ointment, Etidocaine. Ropivacaine.
10. Emergency Drugs : Mode or administration, dilution, dosage and effects

a. Adrenaline, Atropine

b. Ephedrine, Mephentramine

c. Bicarbonate, calcium, potassium.

d. Inotropes: dopamine, dobutamine, amidarone

e. Aminophylline, hydrocortisone, antihistaminic,

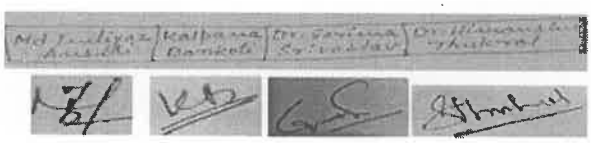
f. Antihypertensive –Beta-blockers, Ca-channel blockers.

g. Antiarrhythmic- xylocard

h. Vasodilators- nitroglycerin & sodium nitroprusside

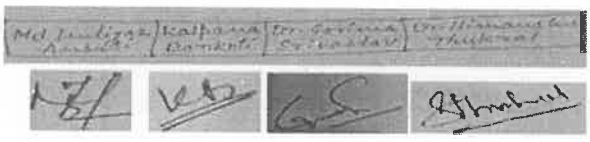
i. Respiratory system- Bronchodilators

j. Renal system- Diuretics, frusemide, mannitol



BOTT-018 Clinical Microbiology

1. Morphology
a. Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.
2. Growth and nutrition
a. Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.
3. Culture media
a. Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test.
4. Sterilization and Disinfection
a. Principles and use of equipment of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, antiseptic and disinfectants.
5. Immunology
a. Immunity, vaccines, types of vaccine and immunization schedule, principles and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA.
b. Rapid tests for HIV and HBsAg (excluding technical details).
6. Systematic Bacteriology
a. Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (excluding classification, antigenic structure and pathogenicity),
b. Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, E. coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes.
7. Parasitology
a. Morphology, life cycle, laboratory diagnosis of following parasites: E. histolytica, Plasmodium, tape worms, Intestinal nematodes.
8. Mycology
a. Morphology, diseases caused and lab diagnosis of following fungi. Candida, Cryptococcus, Dermatophytes, opportunistic fungi
9. Virology
a. General properties of viruses, diseases caused lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.



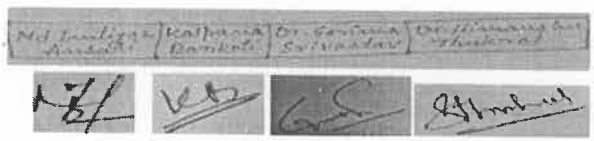
BOTT-019 Basic techniques of anesthesia

1. Resuscitation techniques:
a. Basic life support (Airway, breathing, circulation) and the equipment used for it.
b. Drugs used in CPR.
c. AED and Defibrillators.
2. Anesthesia drugs and techniques:
a. Principles of anesthesia.
b. Basics of general anesthesia depth, mechanism and intubation.
c. Techniques of general anesthesia.
d. Various intravenous and inhalational agents.
e. Regional anesthesia, spinal and epidural, posture and drugs.
f. Local Anaesthetic agents.
g. Neuro muscular blocking agents.
h. Principles of oxygen administration along with the apparatus.
i. Care of patient in the recovery room.
j. Post-operative pain: evaluation and management.
k. Types of fluid and therapy.
l. Blood and blood components transfusion.
m. Preparation of anesthesia machine, intubation kit, suction machine, anesthesia drugs.
n. Patient identification, marking, shifting to OT before surgery and out of OT to recovery room after surgery, complete takeover and handover of the patient with vital signs recording before and after surgical procedure to the nursing staff.

Practical

1. Anesthesia work station
2. Boyle's anesthesia apparatus and other Advanced Anesthesia machines.
3. Apparatus and technique of the intravenous injections:
a. Selection of the material used for intravenous injection.
b. Different types of intravenous needles and cannulas.
c. Theoretical study for testing of the toxicity of the materials.
4. Resuscitation equipment and Resuscitation techniques:
a. Endotracheal tubes :
- Selection of the material used for the endotracheal tube
- Study of the structure of various types of the endotracheal tubes. Cleaning and sterilization of ETT.

b. Connectors: Various connectors, size and material used.
c. Mask: Material, structure and importance of dead space of face mask.
d. Supraglottic airways.
e. Spinal and epidural blocks: equipment, types of spinal and epidural needles, their structure. Instruments used for spinal and epidural blocks.
f. Laryngeal sprays: Types, structure and material used, mechanism, uses and their maintenance.



OTT Directed Clinical Education – part III (studentship)

Students will improve their skills in clinical procedures. Progressive interaction with patients and professional personnel are monitored as students practice in a supervised setting. Additional areas include problem solving, identifying machine components and basic side effect management. Students will demonstrate competence in beginning, intermediate, and advanced procedures.

Fifth Semester

BOTT-020 Basics of surgical procedures

1. Blood Transfusion
a. History of discovery of blood groups and genetics of blood groups.
b. Types of blood groups and Rh factor.
c. Coombs test.
d. Collection of blood, its preservation and standardization.
e. Various types of blood and blood products(Packed cells, PRP, FFP)
f. Pre-transfusion checks.
g. Transfusion reactions.
h. Fluids and electrolytes
i. Body fluid compartments and the effect of fluid administration on them.
j. Types of fluids (crystalloids and colloids) and their chemical composition.
k. Indications of specific fluids and their complications.
2. General surgical procedure and para-surgical equipment
a. Operating tables: structure, material used, maintenance, control, Hydraulic system and Electrical system.
b. Different types of diathermy machine. Monopole, Bipolar, Ligasure, Harmonic Scalpel, CUSA- Principle, hazards, prevention, functioning and maintenance.
c. Types of operation lights and light sources: Features, Care, cleaning, sterilization and maintenance.
d. Operation Theatre sterilization- Different recent advances.
e. LAR/APR--Positioning of patient, care-Prevention of hazards.
f. Total thyroidectomy—with emphasis on proper positioning.
g. Transthoracic esophagectomy—Different approaches.
h. Venesection and Tracheostomy.
i. Laproscopic Cholecystectomy – Pneumoperitonium - Creation and removing, principles.
j. Nephrectomy.
k. Breast surgery.
l. Positioning of patient for different operations: Problems and hazards.
m. Hypothermia and hyperthermia.

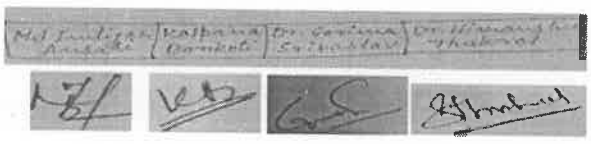
BOTT-021 CSSD procedures

1. Principles of sterilization and disinfection.
2. Methods of sterilization
3. Dry Sterilization.
4. Wet sterilization.
5. Gaseous sterilization.
6. Chemical sterilization.
7. Sterilization by radiation (Gamma rays, ultraviolet rays)
8. Techniques of sterilization of rubber articles. (LMA, FOB, ETT, Laryngoscopes, Anesthesia machines and circuits.)
9. Technique of sterilization of carbonized articles.
10. Methods of disinfection.
11. Boiling.
12. Chemical disinfection.
13. Hazards of sterilization.
14. Prevention of hazards of sterilization.
15. Precautions to be taken during sterilization.
16. Recent advances in the methods of sterilization.

BOTT-022 Advance anesthesia techniques

1. Heart as a pump.
2. Cardiac cycle.
3. Cardiac contractility and stroke volume.
4. Cardiac output and its measurement.
5. Various ECG Leads, their placement and Normal ECG.
6. Cardiac Arrhythmias (atrial fibrillation, ventricular tachycardia, extra systoles)
7. Circulatory shock and its physiology.
8. Cardiac failure.
9. Physics of blood flow and pressure.
10. Measurement of blood flow.
11. Electromagnetic flow meter, ultrasonic flow meter, plethysmography.
12. Regulation of arterial pressure and hypertension (Drugs used for treatment of hypertension)
13. Arterial circulation including cardiopulmonary bypass.
14. Artificial ventilation and related equipment:

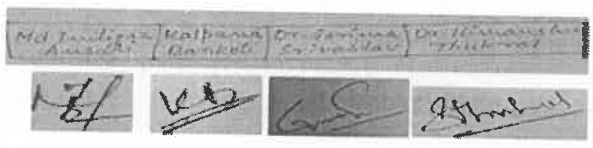
a. Physiology of IPPV (Intermittent positive pressure ventilation)
b. Principles of mechanical ventilation.
c. Various modes of IPPV.
d. Automatic pressure and time cycled ventilators.
e. Operating room ventilators.
f. Other types of ventilators (HFJV, NIV)
g. Complications in patients on ventilators.
h. General care of a patient on ventilator.
i. Disinfection and sterilization of ventilators.
j. Humidification
k. Principles of oxygen administration and methods used to deliver oxygen.
l. Acid base balance.
m. Electrolyte imbalance and its relevance to anesthesia.



Basic Intensive care

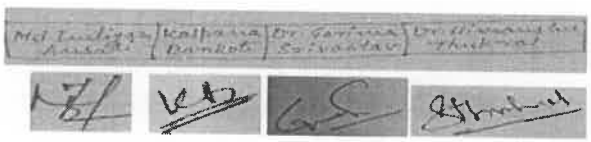
1. Care and maintenance of ventilators, suction machine, monitoring devices.
2. Sterilization and disinfection of ventilators.
3. Care, maintenance and operational capabilities of beds, lights and other apparatus.
4. Air conditioning and control of pollution in ICU.
5. Attachment and intraoperative utility of ventilators and monitoring devices.
6. Care of unconscious adult and pediatric patients.
7. Physiotherapy techniques, feeding, Ryle's tube insertion and hyper alimentation.
8. Suctioning and posturing of semiconscious and unconscious patients.
9. Oxygen therapy, maintenance of clear Airway.
10. Ventilation of patient in crisis:
11. Mouth to mouth.
12. Mouth to ET Tube.
13. Resuscitator/ bag valve mask assembly
14. Different types of Airways.
15. Short term ventilation/ Transport ventilators.
16. ICU Laboratory; Detection of blood gases of the patient, Principles of ABG machines.
17. Management of asepsis.
18. Management of tetanus patient.
19. Psychological aspects of the patient, relative and staff.
20. Hemofiltration and hemodialysis.
21. Ventilators: Principles of working of different ventilators:

a. Volume cycled/Time cycled/Pressure cycled ventilators.
b. High frequency ventilators and other types.
c. Methods of measuring the expired gases from the patient; Types of spirometers, Principles of working of spirometers. Clinical application of above apparatus.
d. 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.
e. Laryngeal sprays; Types, material, principle and mechanism.
f. Monitoring techniques and equipment; Cardiac monitors, Respiratory monitors, Spirometers, Temperature monitors.



OTT Directed Clinical Education – part IV (studentship)

The course provides 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.



Sixth Semester

BOTT-024 Specialized anesthesia and surgery

1. Cardiovascular and Respiratory System- Techniques, equipment, procedures and instruments
a. Diseases of cardiovascular and respiratory systems.
b. Types of perfusion machines.
c. Techniques of Perfusion and operational capabilities.
d. Intra-aortic Balloon pump.
e. Cell saver techniques.
f. Care, maintenance and working of Heart lung Machine.
g. Patient's record keeping preoperatively, during anesthesia and post-operatively.
h. Principles and techniques of temperature monitoring.
i. Positioning during cardiothoracic surgical procedures.
j. Positioning and techniques for:
- Radial artery cannulation.
- Central venous cannulation/pulmonary artery catheter.
- Femoral artery/venous cannulation.

2. Monitoring Techniques and Equipment:
a. Cardiac monitors, blood pressure and ECG monitoring.
b. Respiratory monitors, respiratory rate, Spirometers, SpO2, and EtCO2.
c. Temperature monitors.
d. TEE and echocardiography machine
e. Non- invasive cardiac output machine
3. Positioning-
a. During various neurosurgical procedures including sitting, prone, lateral and position for trans-sphenoidal hypo-physectomy.
b. Fixation of head during various neurosurgical procedures.
c. Prone and Knee chest position for spine surgery.
4. Requirements during intubation in a case of cervical spine fracture including fiber- optic laryngoscopy, awake intubation, LMA family especially ILMA.
5. Anaesthetic and surgical requirements during aneurysm surgery.
6. Surgical and Anaesthetic requirements during micro neurosurgery including types of microscopes, principle, structural features, microscopic photography and cameras used.
7. Anaesthetic and surgical requirements during thyroid surgery, adrenal surgery.
8. Anaesthetic and surgical requirements during abdominal surgery including Laproscopic surgery, genitourinary surgery including percutaneous nephrolithotomy, Endoscopic surgery, TURP, TURBT, Lithotripsy, ESWL (Extracorporeal shock wave therapy)
9. Anaesthetic and surgical requirement during renal transplant donor and recipient surgery including care and precautions during operative procedures of hepatitis B & hepatitis C positive patients.
10. Anaesthetic and surgical requirement during pediatric and Neonatal surgical procedures including emergency procedures like tracheo-esophageal fistula. Sub diaphragmatic hernia, major abdominal and thoracic procedures. Foreign body bronchus and esophagus.
11. Apparatus and techniques for measuring blood pressure and temperature.
12. Principle and working of direct/Indirect blood pressure monitoring apparatus.
13. Intraoperative and postoperative problems and complications of general surgery.
14. Management of emergency caesarean section.

15. Management of massive obstetrical hemorrhage.
16. Surgical management in major burns and craniofacial surgery.
17. Surgical management of joint replacement and arthroscopy.
18. Surgical management of endoscopies, laryngectomy with RND and cochlear implant.
19. Management of PPV and perforating eye injury.
20. Care and maintenance of Para-surgical equipment (Cautery, OT Lights, OT Table etc.)

BOTT-025 Electronics and technology in surgery and anesthesia

1. Electronics and electro mechanical techniques-
a. Electrical safety precautions in operation theatre. OT tables, OT lights, suction machines, electrodes, pressure transducers, electrical safety, application, handling operation.
b. Basic electronics, basic principle, care and maintenance and uses of surgical diathermy machine, defibrillator, Boyle's apparatus, anesthesia machine, monitors, pace-makers and stimulators etc.
c. Engineering aspects of operation theatre equipment, power supplies, CVT, servo-stabilizers, and ups etc.
2. Book keeping and Stock maintenance.
a. Moral aspects and duties of OT technologist.
b. Indenting, Book keeping and storage procedures of different articles.
c. Co-ordination with all working personal in operation Theatre.
d. Psychological aspects of patient, staff and relatives of the patient.
e. Management of operation theatre in routine and emergency.
3. Computer data processing, software information and Data management
a. Logging on and off, Security concepts, Sending and receiving Emails.
b. Hospital information system.

OTT Directed Clinical Education – part V (studentship)

This course is the final in a series of five directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction.

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.

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