



### SEMESTER – III

| PAPER CODE     | SUBJECT NAME                                 | THEORY HOURS | PRACTICAL HOURS | THEORY MARKS | PRACTICAL MARKS |
|----------------|----------------------------------------------|--------------|-----------------|--------------|-----------------|
| <b>DOTT301</b> | <b>PHARMACOLOGY</b>                          | 45 Min       | 1 Hrs.          | 50           | 50              |
| <b>DOTT302</b> | <b>STERILIZATION TECHNIQUES</b>              | 45 Min       | 1 Hrs.          | 50           | 50              |
| <b>DOT303</b>  | <b>BIOMEDICAL WASTE MANAGEMENT</b>           | 45 Min       | 1 Hrs.          | 50           | 50              |
| <b>DOTT304</b> | <b>PRE &amp; POST OPERATIVE PATIENT CARE</b> | 45 Min       | 1 Hrs.          | 50           | 50              |

## PHARMACOLOGY

### Theory

#### 1. Introduction to Pharmacology

- Definition and scope of pharmacology
- Classification of drugs
- Sources of drugs: natural, synthetic, semi-synthetic, biological
- Dosage forms: tablets, injections, syrups, ointments, etc.
- Routes of drug administration: oral, IV, IM, SC, topical, rectal

#### 2. Principles of Drug Action

- Pharmacokinetics:
  - Absorption
  - Distribution
  - Metabolism
  - Excretion
- Pharmacodynamics:
  - Drug-receptor interaction
  - Dose-response relationship
- Therapeutic index and half-life of drugs

#### 3. Factors Modifying Drug Action

- Age, sex, weight
- Route and time of administration
- Genetic and pathological conditions
- Drug interactions (synergism, antagonism)



#### **4. Adverse Drug Reactions (ADR)**

- Types of adverse effects
- Drug allergies and anaphylaxis
- Toxic effects and overdose
- Drug dependence and tolerance
- Reporting of ADRs (pharmacovigilance basics)

#### **5. Classification and Uses of Important Drug Groups**

- **Analgesics & Antipyretics**
  - Paracetamol, NSAIDs, opioids
- **Anesthetics**
  - Local: lignocaine, bupivacaine
  - General: propofol, halothane, sevoflurane
- **Antibiotics & Antiseptics**
  - Penicillin, cephalosporins, metronidazole, ciprofloxacin
  - Povidone iodine, spirit, chlorhexidine
- **Cardiovascular Drugs**
  - Antihypertensives, vasopressors, antiarrhythmics
- **Respiratory Drugs**
  - Bronchodilators, antihistamines, mucolytics
- **Gastrointestinal Drugs**
  - Antacids, antiemetics, laxatives, antidiarrheals
- **Endocrine Drugs**
  - Insulin, oral hypoglycemics, corticosteroids
- **Anticoagulants and Hemostatics**
  - Heparin, warfarin, tranexamic acid
- **Emergency Drugs in OT**
  - Adrenaline, atropine, dopamine, sodium bicarbonate

#### **6. Drug Storage and Handling**

- Drug storage guidelines (temperature, light, humidity)
- Labeling and expiry date monitoring
- Narcotic drug handling and register maintenance
- Stock management and drug inventory in OT

#### **7. Calculation of Dosages**

- Metric system and units
- Dosage calculations (adult and pediatric)
- IV flow rate calculation
- Dilution techniques



## 8. Injection Techniques and Safety

- Aseptic precautions during injections
- IM, IV, SC injection techniques
- Safe disposal of needles and sharps
- Injection-related complications

## 9. Drug Regulations and Legal Aspects

- Schedule H and Schedule X drugs
- Narcotic Drugs and Psychotropic Substances (NDPS) Act (basics)
- Drug prescription and record-keeping ethics

## Practical

### ➤ Drug Identification and Classification

- Identification of commonly used **OT drugs** (injectables, tablets, solutions)
- Reading and interpreting drug **labels, brand/generic names**
- Sorting drugs based on their **class (antibiotic, analgesic, anesthetic, etc.)**
- Understanding **schedules** of drugs (Schedule H, X, etc.)

### ➤ Drug Storage and Handling

- Demonstration of correct **drug storage** techniques:
  - Temperature-controlled storage
  - Light-sensitive drugs
- Handling **emergency and narcotic drugs**
- Checking **expiry dates**, batch numbers, and drug logs
- Drug inventory management in **Operation Theatre pharmacy**

### ➤ Routes of Drug Administration (Simulated)

- Practice on dummies/mannequins:
  - **Oral** administration techniques
  - **Intramuscular (IM)** injection technique
  - **Intravenous (IV)** cannulation and drug administration
  - **Subcutaneous (SC)** injection
  - **Topical, inhalational, rectal** drug use demonstration

### ➤ Dosage Calculation Practice

- Adult and pediatric **dosage calculation**
- **Dilution of injectable drugs** (e.g., antibiotics, adrenaline)
- **Infusion and IV flow rate** calculation using drip sets
- Preparation of **IV fluids** with additives (e.g., dextrose with potassium chloride)



➤ **Preparation and Labeling of Drugs**

- Drawing up medication in syringes with aseptic precautions
- Reconstitution of **powdered drugs** (e.g., ceftriaxone, streptomycin)
- Labeling of **drug vials and syringes** correctly
- Preparing and labeling **multi-dose vials** and **infusion bottles**

➤ **Operation Theatre Drug Trolley Setup**

- Arranging pre-operative, intra-operative, and post-operative drugs
- Maintaining **emergency/crash cart** drugs checklist
- Weekly check of **expiry dates and stock levels**
- Mock setup of **drug trolley for major and minor surgeries**

➤ **Emergency Drugs Familiarization**

- Identification and use of:
  - **Adrenaline, Atropine, Dopamine, Sodium bicarbonate**
  - **Lignocaine, Hydrocortisone, Diazepam**
  - **Oxygen and inhalational agents**
- Practice of **loading syringes and labeling** emergency drugs

➤ **Adverse Drug Reaction & First-Aid Response (Simulated)**

- Recognizing and reporting **adverse drug reactions (ADR)**
- Simulated management of:
  - **Anaphylactic shock**
  - **Drug overdose scenarios**
- First aid measures with **OT emergency kits**

➤ **Safe Disposal of Drugs and Sharps**

- Demonstration of:
  - Proper disposal of **expired drugs**
  - **Needle and syringe disposal** using safety boxes
  - Segregation of **pharmaceutical biomedical waste**

➤ **Record-Keeping and Documentation**

- Maintaining:
  - **Drug administration charts**
  - **Controlled drug registers**
  - **Daily usage logs for OT drugs**
  - **Incident report forms** for ADRs



## **STERILIZATION TECHNIQUES**

### **Theory**

#### **1. Introduction to Sterilization**

- Definition and importance of sterilization
- Difference between **sterilization**, **disinfection**, and **antisepsis**
- Role of sterilization in **infection control** in OT
- Types of microbial contamination

#### **2. Principles of Sterilization**

- Basic microbiological principles
- Physical and chemical agents of sterilization
- Factors affecting sterilization (time, temperature, humidity, load)
- Sterilization indicators (chemical & biological)

#### **3. Methods of Sterilization**

##### **A. Physical Methods**

- **Moist Heat Sterilization**
  - Autoclaving: principle, procedure, uses, and precautions
  - Pasteurization (low-temperature sterilization)
- **Dry Heat Sterilization**
  - Hot air oven: uses, limitations
- **Radiation Sterilization**
  - Ultraviolet (UV) rays
  - Gamma radiation (for industrial use)
- **Filtration**
  - Membrane and HEPA filters: principle and application

##### **B. Chemical Methods**

- Common chemical sterilants (formaldehyde, glutaraldehyde, ethylene oxide gas)
- Disinfectants used in OT (phenols, chlorine compounds, hydrogen peroxide)
- Surface and instrument disinfection procedures

#### **4. Sterilization Equipment**

- **Autoclave**: parts, function, cycle, temperature & pressure settings
- **Hot air oven**: parts, temperature control, loading process
- **ETO Sterilizer**: working principle, handling precautions
- **Plasma sterilizers** and **chemical foggers**
- Routine OT sterilization schedule



## **5. Sterilization of Surgical Instruments**

- Classification of instruments (critical, semi-critical, non-critical)
- Cleaning, decontamination, drying, packing
- Wrapping materials and tray preparation
- Indicators (chemical strips, biological spores)

## **6. Sterilization of OT Linen, Drapes & Gowns**

- Linen handling before and after use
- Pre-wash, drying, folding, and packing
- Sterilization cycle and storage guidelines

## **7. OT Room and Equipment Disinfection**

- OT fumigation and fogging protocols
- Floor, wall, and surface cleaning standards
- Disinfection of anesthesia machines and suction units

## **8. Monitoring and Quality Control**

- Sterilization logs and documentation
- Autoclave validation (Bowie-Dick test, spore test)
- Troubleshooting sterilization failures
- Biomedical waste segregation and disposal

## **9. Infection Control Guidelines**

- WHO and NABH guidelines for sterilization
- Role of OT technician in infection control
- Hand hygiene and personal protective equipment (PPE)
- Maintaining sterility chain

## **Practical**

### **➤ Identification of Sterilization Equipment**

- Identify and demonstrate:
  - **Autoclave machine**
  - **Hot air oven**
  - **ETO (Ethylene Oxide) sterilizer**
  - **Plasma sterilizer**
  - **UV cabinet**
  - **Fumigation machine**
  - **Chemical indicator strips and biological spore vials**



➤ **Autoclave Operation (Moist Heat Sterilization)**

- Demonstrate:
  - **Loading and unloading** of instruments in autoclave
  - **Wrapping and packing** of items using sterile indicators
  - Setting correct **temperature (121°C), pressure (15 psi)** and time (15–30 min)
  - Reading **chemical indicators** and interpreting results
  - Daily autoclave testing: **Bowie-Dick test**, spore test
  - Recording sterilization logbook entries

➤ **Dry Heat Sterilization (Hot Air Oven)**

- Operation of hot air oven
- Temperature setting (160–180°C) and time (1–2 hours)
- Loading of glassware, syringes, metal instruments
- Reading sterilization indicator tapes
- Post-sterilization cooling and storage

➤ **Chemical Sterilization Techniques**

- Preparation and handling of:
  - **Glutaraldehyde (Cidex) 2% solution**
  - **Formalin, phenol, hydrogen peroxide**
- Submerging instruments and devices for required durations
- PPE use during chemical sterilization
- Disposal of used chemical solutions
- Documentation of chemical sterilization logs

➤ **ETO (Ethylene Oxide) Sterilization (Observation/Demonstration-based)**

- Cycle phases: pre-conditioning, sterilization, aeration
- Safety precautions
- Reading ETO indicators
- Proper ventilation and monitoring post-process
- Recording in ETO logs

➤ **Disinfection of Operation Theatre Area**

- Cleaning and disinfection of:
  - OT tables, lights, trolleys, suction machines
  - Floors, walls, doors, air vents
- Fumigation process:
  - Chemicals used (formalin + KMnO<sub>4</sub> or fogging solutions)
  - Duration and sealing of OT
  - Clearance after exposure period
- Preparation of disinfectant solutions (sodium hypochlorite, Bacillocid, etc.)



➤ **Sterilization of Linen, Drapes, and Gowns**

- Washing, drying, folding techniques
- Packaging and labeling before sterilization
- Use of **linen wraps, drums, and indicators**
- Storage and shelf-life after sterilization

➤ **Surgical Instrument Processing**

- Pre-cleaning: rinsing, brushing, ultrasonic cleaning
- Disinfection or sterilization based on criticality
- Use of enzymatic detergents
- Instrument inspection before packing
- Tray assembly and labeling

➤ **Sterility Testing & Quality Assurance**

- Using **chemical indicators** (Class I, II, IV)
- **Biological indicators:** spore testing (*Bacillus stearothermophilus*)
- Interpreting test results
- Record maintenance: sterility logs, equipment checklists

➤ **Biomedical Waste Management (Linked to Sterilization)**

- Segregation of contaminated vs. sterilized items
- Safe disposal of sterilization wraps, indicator strips, expired disinfectants
- Handling of biohazardous waste after cleaning or sterilization

## **BIOMEDICAL WASTE MANAGEMENT**

### **Theory**

#### **1. Introduction to Biomedical Waste**

- Definition and meaning of biomedical waste (BMW)
- Classification and sources of biomedical waste
- Categories of BMW generated in:
  - Operation theatre
  - Laboratories
  - Wards and ICUs
  - OPDs and diagnostic centres
- Need and importance of proper waste disposal



## 2. Types of Biomedical Waste

- Human anatomical waste
- Animal waste
- Microbiology & biotechnology waste
- Sharps (needles, blades, scalpels)
- Discarded medicines and cytotoxic drugs
- Soiled waste (dressings, cotton, bandages)
- Liquid waste (blood, body fluids, chemicals)
- Incineration ash, chemical waste

## 3. Segregation of Waste

- Color-coded segregation system (as per BMW Rules)
  - **Yellow bag** – human waste, soiled waste
  - **Red bag** – contaminated plastic waste
  - **White container** – sharps
  - **Blue container** – broken glass, metallic implants
- Proper labeling and container use
- Time and place of segregation

## 4. Collection and Storage

- Guidelines for BMW collection
- Safe handling and transportation
- Use of trolleys, bins, covers, PPE
- Temporary storage rules – time limits
- Use of barcoding system in waste tracking

## 5. Treatment and Disposal Methods

- Autoclaving
- Microwaving
- Incineration
- Deep burial
- Shredding and chemical disinfection
- Liquid waste neutralization

## 6. Transportation and Disposal

- On-site vs. off-site treatment
- Role of **Common Biomedical Waste Treatment Facility (CBWTF)**
- Guidelines for vehicle transport (covered, leak-proof, labeled)
- Record keeping and daily logs



## 7. Personal Protective Measures

- Use of gloves, mask, apron, boots
- Hand hygiene practices
- Needle-stick injury management
- Post-exposure prophylaxis (PEP)

## 8. Regulatory and Legal Aspects

- **Biomedical Waste Management Rules (2016, amended 2018 & 2019)**
- CPCB (Central Pollution Control Board) guidelines
- Role of hospital infection control committee
- Penalties for non-compliance

## 9. Role of OT Technician in Waste Management

- Identifying waste types in OT
- Segregating and disposing waste immediately after surgery
- Sterilizing reusable instruments
- Coordinating with housekeeping and waste handlers
- Reporting any mishandling or exposure

## 10. Environmental and Health Hazards

- Health risks to patients, staff, public
- Air, water, soil pollution due to improper disposal
- Occupational exposure: infections (HIV, Hepatitis B & C, TB)
- Need for public health awareness and training

## Practical

### ➤ Identification and Categorization of Biomedical Waste

- Hands-on identification of different biomedical waste types:
  - Soiled waste, sharps, pharmaceutical waste, plastics, etc.
- Differentiating **infectious** vs **non-infectious** waste
- Demonstrating understanding of waste generated in:
  - Operation theatre
  - Dressing room
  - Minor OT
  - ICU and ward settings

### ➤ Waste Segregation and Color Coding

- Practical demonstration of **waste segregation** at source
- Use of **color-coded bins/containers**:



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- **Yellow** – Human anatomical & soiled waste
- **Red** – Contaminated recyclable waste (IV sets, catheters)
- **White (translucent)** – Sharps container (needles, blades)
- **Blue** – Broken glassware and metallic implants
- Use of **labels and biohazard symbols**
- Daily waste segregation checklist preparation

### ➤ **Handling and Disposal of Sharps**

- Safe collection and disposal of:
  - Needles, scalpels, glass syringes
- Use of **needle destroyer and hub cutter**
- Use of **puncture-proof white containers**
- Immediate disposal after use

### ➤ **Collection, Storage & Transportation of BMW**

- Internal transport of waste using:
  - Closed leak-proof trolleys
  - Bins with lids
- Observation/demonstration of:
  - Temporary storage procedures (max 48 hrs)
  - Labelling and weighing of waste
- Use of **barcoding and tracking** where applicable

### ➤ **Treatment of Biomedical Waste (Observation-based)**

- **Autoclave process** demonstration for waste disinfection
- **Chemical disinfection** using hypochlorite solution
- **Microwave or incineration process** (field visit or video demo)
- Shredding of plastics post-treatment

### ➤ **Personal Protective Measures**

- Wearing and removing PPE correctly:
  - Gloves, mask, apron, face shield, boots
- Hand washing technique after waste handling
- Disinfection of gloves and boots
- Reporting and first aid for accidental exposure

### ➤ **Preparation of Disinfectant Solutions**

- Preparation of:
  - **1% sodium hypochlorite**
  - **0.5% chlorine solution**
- Correct dilution, handling, and application on surfaces



- Labeling of chemical disinfectants

#### ➤ **Waste Handling in Operation Theatre**

- Post-surgical waste handling (e.g., blood-soaked gauze, tubing)
- Separating reusable instruments for sterilization
- Coordinating with waste collection personnel
- End-of-day waste audit/checklist preparation

#### ➤ **Documentation & Reporting**

- Maintaining **waste tracking logs**
- **Incident reporting** for needle-stick injuries or waste spillage
- Sample format filling:
  - Daily waste generation sheet
  - Treatment and disposal records

#### ➤ **Awareness & Communication**

- Educating staff and attendants on proper segregation
- Displaying **color coding charts** and signage in OT
- Participating in **mock drills** or **infection control training**
- Demonstrating safe behavior during collection and transportation

## **PRE & POST OPERATIVE PATIENT CARE**

### **Theory**

#### **1. Introduction to Perioperative Care**

- Definition and scope of:
  - Preoperative care
  - Intraoperative care
  - Postoperative care
- Role and responsibilities of the OT technician
- Communication with surgical team and patient

#### **2. Preoperative Patient Preparation**

- General and specific patient preparation
- Informed consent – meaning and importance
- Pre-anesthetic assessment and checklist
- Skin preparation (shaving, cleaning, antisepsis)
- Bowel preparation



- Fasting (NPO) protocols and duration
- Removal of jewelry, dentures, contact lenses
- Preoperative medications – types and timings
- Psychological support and patient counseling

### **3. Transportation of Patient to Operation Theatre**

- Method of shifting patients safely
- Use of wheelchairs, stretchers, trolleys
- Positioning of patient on OT table
- Preventing pressure sores and falls
- Vital sign monitoring during transport

### **4. Patient Positioning for Surgery**

- Principles of patient positioning
- Different surgical positions:
  - Supine, Prone, Lithotomy, Trendelenburg, Lateral
- Positioning aids (pillows, straps, rolls)
- Precautions for patients with fractures, obesity, or disabilities

### **5. Intraoperative Patient Monitoring (Overview)**

- Role of technician in assisting anesthetist
- Monitoring vital signs (BP, pulse, SPO<sub>2</sub>, temperature)
- Recognizing signs of patient distress
- Handling patient under general, local or spinal anesthesia

### **6. Immediate Postoperative Care (PACU)**

- Receiving patient in **Post Anesthesia Care Unit (PACU)**
- Airway management (oxygen, suction)
- Vital sign monitoring
- Positioning for recovery
- Pain management and sedation monitoring
- Checking surgical dressings, drains, IV lines

### **7. Observation for Complications**

- Early signs of:
  - Hemorrhage
  - Shock
  - Infection
  - Respiratory distress
  - Nausea and vomiting
- Reporting to nurse/doctor immediately



- Role of OT technician in emergency support

## **8. Discharge from PACU**

- Criteria for shifting to ward/ICU
- Documentation of patient condition
- Handover process to ward nurse
- Post-op instructions (diet, medication, movement)

## **9. Psychological Support**

- Dealing with anxious or confused patients
- Communicating calmly and effectively
- Addressing fear, stress, and doubts pre/post surgery

## **10. Infection Prevention Measures**

- Aseptic techniques before and after surgery
- Disinfection of patient's skin, equipment
- Use of PPE and hand hygiene
- Waste disposal related to patient care

## **11. Ethical and Legal Aspects**

- Patient privacy and dignity
- Maintaining confidentiality
- Legal documentation of consent and care

## **Practical**

### **➤ Preoperative Patient Preparation**

- Demonstration of:
  - Obtaining and verifying informed consent
  - Removal of jewelry, prosthetics, dentures, nail polish
  - Assisting in **shaving** and **skin antisepsis**
  - Checking fasting (NPO) status
  - Administration of preoperative medications
  - Recording baseline vital signs (BP, pulse, temp, SPO<sub>2</sub>)
  - Preparing patient physically and emotionally for surgery

### **➤ Patient Identification and Documentation**

- Verifying patient identity using ID bands and case sheets
- Completing pre-op checklist
- Labeling and documentation for surgery



- Maintaining patient file accuracy

#### ➤ **Transportation of Patient to OT**

- Practice safe transfer using:
  - Stretcher
  - Wheelchair
  - Trolley
- Demonstrating side rail usage, patient safety protocols
- Giving handover to OT team or anesthetist

#### ➤ **Patient Positioning on OT Table**

- Assisting in positioning patient for various surgeries:
  - Supine, Prone, Lithotomy, Trendelenburg, Lateral
- Using support tools (pillows, foam pads, straps)
- Ensuring:
  - No pressure points
  - Proper alignment
  - Privacy and safety

#### ➤ **Intraoperative Monitoring (Basic Observation Role)**

- Observing and assisting in:
  - Monitoring vital signs under anesthesia
  - Supporting anesthetist with suction, oxygen, and monitoring
- Understanding basic equipment: ECG, pulse oximeter, BP monitor

#### ➤ **Immediate Postoperative Care (PACU)**

- Receiving patient post-surgery
- Monitoring:
  - Consciousness level
  - Respiratory effort
  - Pulse, BP, temperature, and oxygen saturation
- Assisting in:
  - Airway maintenance
  - Oxygen therapy setup
  - Checking and supporting surgical site, dressings, drains
  - Maintaining patient in recovery position

#### ➤ **Observation and Reporting of Postoperative Complications**

- Identifying and reporting:
  - Bleeding
  - Vomiting



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- Signs of shock
  - Pain
  - Breathing difficulty
- Supporting emergency management under supervision

### ➤ Patient Comfort Measures

- Adjusting bed and patient position post-surgery
- Providing blanket, backrest, or pillows
- Assisting with oral hygiene or sponge bath if needed
- Ensuring a calm and quiet environment

### ➤ Infection Control and Hygiene Practices

- Performing hand hygiene before and after care
- Use of gloves, masks, gowns while handling surgical patients
- Cleaning and disinfecting patient area and reusable aids
- Handling of linens and biomedical waste

### ➤ Communication and Psychological Support

- Demonstrating communication with:
  - Conscious and semi-conscious patients
  - Anxious or confused individuals
- Explaining post-op instructions in simple language
- Using calm tone and non-verbal support