



## **DIPLOMA IN OT TECHNICIAN**

Course Name: Diploma in OT Technician

Duration: 1 Year

Eligibility: 10+2 with Science Stream

### **DETAILED SYLLABUS**

<b>Semester I</b>	<b>Semester II</b>
Human Anatomy	Biochemistry
Human Physiology	Basic Anaesthesia Technology
Pathology	Advanced Anaesthesia Technology
Microbiology	Medicines relevant to OT

## SEMESTER I

### **PAPER 1: HUMAN ANATOMY**

#### **CONTENT:**

- Unit 1:** Introduction: human body -Definition of anatomy and its divisions, Terms of location, positions and planes, Cell and its organelles, Epithelium, Glands, Basic tissues
- Unit 2:** Locomotion and Support-Cartilage, Bone, Joints, Muscular system, Names of muscles of the body.
- Unit 3:** Cardiovascular system -Heart-size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Lymphatic system, cisterna chyli & thoracic duct, Histology of lymphatic tissues.
- Unit 4:** Gastro-intestinal system - Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring), Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, Radiographs of abdomen
- Unit 5:** Respiratory system - Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses
- Unit 6:** Urinary system - Kidney, ureter, urinary bladder, male and female urethra, Histology of kidney, ureter and urinary bladder.
- Unit 7:** Reproductive system - Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology), Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology), Mammary gland, gross
- Unit 8:** Endocrine glands - Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal glad.
- Unit 9:** Nervous system - Neuron, Classification of NS, Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (Gross Anatomy), Histology of Cerebrum, cerebellum and spinal cord, Meninges, Ventricles & cerebrospinal fluid, Blood supply of brain (In Brief), Cranial nerves (Only Names)
- Unit 10:** Sensory organs – Skin, skin histology, Appendages of skin, Eye, Parts of eye & lacrimal apparatus, Extra-ocular muscles & nerve supply, Ear, parts of ear, external, middle and inner ear and contents.

**Unit 11:** Embryology- Spermatogenesis & oogenesis, Ovulation, fertilization, Fetal circulation, Placenta

**PRACTICAL:**

1. Histology of types of epithelium
2. Histology of serous, mucous & mixed salivary gland
3. Histology of the 3 types of cartilage
4. Demo of all bones showing parts, radiographs of normal bones & joints
5. Histology of compact bone (TS & LS)
6. Demonstration of muscles of the body (as functional groups)
7. Histology of skeletal (TS & LS), smooth & cardiac muscle
8. Demonstration of heart and vessels in the body
9. Histology of large artery, medium sized artery & vein, large vein
10. Microscopic appearance of large artery, medium sized artery & vein, large vein
11. pericardium
12. Histology of lymph node, spleen, tonsil & thymus
13. Normal chest radiograph showing heart shadows
14. Normal angiograms
15. Demonstration of parts of respiratory system.
16. Normal radiographs of chest
17. Histology of lung and trachea
18. Demonstration of parts of urinary system
19. Histology of kidney, ureter, urinary bladder
20. Radiographs of abdomen-IVP, retrograde cystogram
21. Demonstration of section of male and female pelvis with organs in situ
22. Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary
23. Radiographs of pelvis – hysterosalpingogram
24. Demonstration of the glands
25. Histology of pituitary, thyroid, parathyroid, suprarenal glands
26. Histology of peripheral nerve & optic nerve
27. Demonstration of all plexuses and nerves in the body
28. Demonstration of all part of brain
29. Histology of cerebrum, cerebellum, spinal cord
30. Histology of thin and thick skin
31. Demonstration and histology of eyeball
32. Histology of cornea & retina

**Suggested Readings**

1. 1 William Davis (P) understanding Human Anatomy and Physiology MC Graw Hill
2. Human Anatomy for Nursing & Allied Sciences - 1st edition Dr. M.K. Anand, Dr. Meena Verma, The Arora Medical Publishers Pvt.Ltd
3. Fattana, Human anatomy (Description and applied) Saunder's & C P Prism Publishers, Bangalore – 1991
4. ESTER. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P. Lippin Cott. Philadelphia

## **PAPER 2: HUMAN PHYSIOLOGY**

### **CONTENT:**

**Unit 1:** Blood and Muscle Physiology- Composition & Function of Blood, Erythropoiesis and Leucopoiesis, Haemostasis, Action potential and mechanism of Muscle contraction, Neuromuscular junction,

**Unit 2:** Digestive System and Excretory System- Movement and Alimentary tract, Deglutition and Mechanism of Vomiting, Digestive juices, Micturition, Mechanism of Urine formation, Regulation of acid-base balance

**Unit 3:** Cardiovascular and Respiratory System- Heart rate and sound, Blood pressure, Cardiac cycle and, output, Mechanism of breathing, Oxygen and Carbon Dioxide Transport, Pulmonary volume and capacity

**Unit 4:** Endocrinology and Reproductive System- Spermatogenesis and Menstrual cycle, Puberty, Pregnancy and Lactation, Hormones of Pituitary, Thyroid & Parathyroid Glands, Hormones of Adrenal Gland and Pancreas.

**Unit 5:** Nervous System and Special Senses- Neuron and Neuroglia, Properties of nerve fibre, Reflex mechanism and Receptors, Mechanism of vision and hearing, Taste and smell

### **PRACTICAL**

1. Estimation of Haemoglobin
2. Bleeding time
3. Clotting time
4. Blood Grouping
5. Erythrocyte Sedimentation rate
6. Packed Cell Volume
7. Arterial Blood Pressure
8. Pulse
9. Heart rate
10. Breathing rate

### **Suggested Readings**

1. Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism publishers
2. Ganong (William F) Review of Medical Physiology. Latest Ed. Appleton
3. Jain AK, Concise Physiology, Latest Ed.

## **PAPER 3: PATHOLOGY**

### **CONTENT:**

**Unit 1:** Histo Pathology- Introduction to Histo Pathology, Receiving of Specimen in the laboratory, Grossing Techniques, Mounting Techniques, various Mountants, Maintenance of records and filing of the slides. Use & care of Microscope, Various Fixatives, Mode of action, Preparation and Indication. Section Cutting, Tissue processing for routine paraffin sections, Decalcification of Tissues. Staining of tissues, H& E Staining, Bio-Medical waste management

**Unit 2:** Clinical Pathology- Introduction to Clinical Pathology, Collection, Transport, Preservation, and Processing of various clinical Specimens, Urine Examination, Collection and Preservation of urine. Physical, chemical, Microscopic Examination, Examination of CSF and other body fluids. Sputum Examination, Examination of feces

**Unit 3:** Haematology- Introduction to Haematology, Normal constituents of Blood, their structure and function, Collection of Blood samples, Various Anticoagulants used in Haematology, Various instruments and glassware used in Haematology, Preparation and use of glassware, Laboratory safety guidelines, I units and conventional units in Hospital Laboratory, Hb, PCV, ESR, Normal Haemostasis, Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time.

**Unit 4:** Blood Bank- Introduction, Blood grouping and Rh Types, Cross matching,

### **PRACTICAL**

1. Urine Examination.
2. Physical
3. Chemical
4. Microscopic
5. Blood Grouping Rh typing.
6. Hb Estimation, Packed Cell Volume[PCV], Erythrocyte Sedimentation rate{ESR}
7. Bleeding Time, Clotting Time.
8. Histopathology – Section cutting and H &E Staining.

### **Suggested Readings**

1. Silverstone: Introduction to Medical Lab. Technology
2. Bancroft: Theory and Practical of Histology techniques
3. Textbook of Clinical Blood Banking Science by Zmijewski.
4. Manual for Clinical Pathology by Sabitry Sanyal
5. Practical Pathology by Dr. P. Chakraborty & Gargi Chakraborty
6. Haematology for students and practitioners by Ramnik Sood
7. Histological techniques by K. Laxminarayan

## **PAPER 4: MICROBIOLOGY CONTENT:**

- Unit 1:** Morphology- Classification of microorganisms, Size, shape and structure of bacteria. Use of microscope in the study of bacteria.
- Unit 2:** Sterilisation and Disinfection- Principles and use of equipments of sterilization namely Hot Air oven, Autoclave and serum inspissator. Pasteurization, Anti septic and disinfectants
- Unit 3:** Growth and nutrition- Nutrition, growth and multiplications of bacteria, Use of culture media in diagnostic bacteriology. Antimicrobial sensitivity test
- Unit 4:** Immunology- Infection & Immunity, Antigen, Immunoglobuline (in brief), Principles and interpretation of commonly done serological tests namely Widal, VDRL, ASO, CRP, RF & ELISA. Rapid tests for HIV and HBsAg (Technical details to be avoided), Types of Vaccine and immunization schedule
- Unit 5:** Systematic Bacteriology - Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (the classification, antigenic structure and pathogenicity to be avoided), Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheria, Clostridia, Bacillus, Shigella, Salmonella, Esch coli, Klebsiella, Proteus, Pseudomonas, Mycobacteria, Vibrio cholerae, & Spirochetes-Treponema pallidum & Leptospira.
- Unit 6:** Parasitology- Morphology, life cycle, laboratory diagnosis of following parasites, Protozoa, Ehistolytica, Plasmodium, Tape worms, Taenia, Intestinal nematodes, Round worm, Hookworm,
- Unit 7:** Mycology- Morphology, diseases caused and lab diagnosis of following fungi, Candida, Cryptococcus, Dermatophytes, opportunistic fungi.
- Unit 8:** Virology - General properties of viruses, diseases caused, lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and, Poliomyelitis.
- Unit 9:** Hospital infection- Causative agents, transmission methods, Prevention and control Hospital infection.
- Unit 10:** Principles and practice Biomedical waste management

### **PRACTICAL**

1. Compound Microscope.
2. Grams stain
3. Acid Fast staining
4. Demonstration and sterilization of equipments – Hot Air oven, Autoclave, Bacterial filters.

5. Demonstration of commonly used culture media, culture methods Nutrient broth, Nutrient agar, Blood agar, Chocolate agar, Mac conkey medium, LJ media, Robertson Cooked meat media, Potassium tellurite media with growth, Mac with LF & NLF, NA with staph
6. Demonstration of commonly used Biochemical Reactions for identification of bacteria
7. Coagulase test
8. Catalase test
9. IMViC
10. TSI
11. Urease, Oxidase
12. Antibiotic susceptibility test
13. Anaerobic culture methods.
14. Demonstration of common serological tests – Widal, VRDL, ELISA.
15. Stool exam for Helminthic ova
16. Visit to hospital for demonstration of Biomedical waste management.

### **Suggested Readings**

1. Anathanarayana & Panikar Medical Microbiology
2. Roberty Cruickshank – Medical Microbiology – The Practice of Medical Microbiology
3. Chatterjee – Parasitology – Interpretation to Clinical medicine.
4. Rippon – Medical Mycology

## SEMESTER II

### **PAPER 1: BIOCHEMISTRY**

#### **CONTENT:**

**Unit 1:** Introduction, specimen collection and Handling - Introduction to Bio-chemistry including code of ethics for Medical Lab technicians and Medical Lab Organization. Reception, Registration and Bio-chemical parameters investigated. Types of vials used in blood /specimen collection, Anticoagulants, Preservatives, Blood collection, Precautions, Safety, first aid, Biological and chemical hazards, processing of samples, Preservation, Disposal of samples, Introduction to laboratory apparatus, Pipettes, different types (Graduated, volumetric, Pasteur, Automatic etc.), Calibration of glass pipettes, Burettes, Beakers, Flasks, Funnels, Cuvettes,

**Unit 2:** Units of measurements and Basics of Instrumentation- Conventional and SI units, Molecular weight, equivalent weight of elements and compounds, normality, molarity, Preparation of molar, solutions, normal solutions, Percent solutions, Calorimetry, Spectrophotometry, Weighing, pH meter. Basic lab operations like Separation of Solids from liquids, Centrifugation, Filtration using funnel.

**Unit 3:** Carbohydrates: Definition, biological importance, classification, qualitative tests, Metabolism(brief), Blood glucose.

**Unit 4:** Lipids: Definition, biological importance, classification, Acid value, Iodine value, saponification value, Metabolism(brief).

**Unit 5:** Aminoacids and Proteins: Definition, biological importance, classification, qualitative tests.

**Unit 6:** Vitamins and Minerals-Vitamins, Classification of Vitamins, Sources, Daily requirements, Deficiency diseases. (In Brief) Minerals (Iron, calcium, Iodine): Sources, Daily requirements, Deficiency diseases.

**Unit 7:** Enzymes Nature, Classification and Clinical enzymes.

**Unit 8:** Nucleic acids Chemistry and functional aspects- Purine bases, Pyrimidine bases, nucleosides, Nucleotides, DNA & RNA, Their functions Brief outline of Replication, Transcription, translation.

**Unit 9:** PH, buffers, acid-base balance, disorders. Digestion and absorption of Biomolecules, Water, Chemicals and related substances, Purity of chemicals, Corrosives.

#### **PRACTICAL**

1. Reception and registration
2. Collection of Capillary blood
3. Collection of Venous blood
4. Separation of Serum from clotted blood



5. Separation of plasma from blood
6. Lab glass ware
7. Identification
8. Handling
9. Care and Maintenance
10. Uses
11. Lab instruments
12. Centrifuges
13. Balances
14. Photo Electric colorimeter
15. Spectrophotometer
16. Preparation of
17. Percentage solutions
18. Normal solutions
19. Molar solutions
20. Qualitative identification of tests of sugars
21. Qualitative identification of tests of proteins
22. Qualitative identification of tests for amino acids
23. Estimation of Blood glucose
24. Estimation of Blood urea
25. Normal and pathological urine.

### **Suggested Readings**

1. TEITZ – Clinical chemistry Vasudevan (DM) Sreekumari(S) Text book of Biochemistry for Medical students, Latest Ed
2. Varley – Clinical chemistry
3. Kaplan – Clinical chemistry

## **PAPER 2: BASIC ANAESTHESIA TECHNOLOGY**

### **CONTENT:**

**Unit 1:** Medical Gas- compressed gas cylinders, Colour coding different gas cylinder and pipe line system, Cylinder storage space and things to remember while empty and full cylinder storing, Diameter index safety system, Medical gas pipe line system and station outlets, Alarms and safety devices in pipe line gas supply

**Unit 2:** Gas administration devices- Anaesthesia masks, Types / sizes, Flow meters, Gas Regulators.

**Unit 3:** Oxygen Therapy- Definition, causes and responses to hypoxemia, Clinical signs of hypoxemia, Goals of oxygen therapy, Evaluation of patients receiving oxygen therapy, Hazards of oxygen therapy.

**Unit 4:** Anaesthesia Machine- Boyles Machine and its function, Modern anaesthesia machine, Hanger and Yoke system, Cylinder pressure gauge, Pin index, Pressure regulator, Vaporizers, TYPES, Hazards, Maintenance, Filling and drainage, Flow meter assembly.

**Unit 5:** Open, Semi closed and Closed Circuits, Classification of breathing system, Mapleson breathing system, Jackson and Rees system, Bain circuit, Non rebreathing valves, Ambu valves.

**Unit 6:** Injection Techniques- Intra muscular and insertion of Intra Venous cannulas, Handling of sterilized syringes and needles.

**Unit 7:** Fluids and Electrolytes- Type of fluid (Crystalloids & Colloids), Steps to prepare I.V. drip, Indication of specific fluid and their complication.

**Unit 8:** Gas Analyzers and monitoring- Pulse oximeter, Oxygen Analyser / sensor, EtCO<sub>2</sub> Monitor / Capnography.

**Unit 9:** Resuscitation Techniques- Basic life support (Airway, Breathing, and Circulation), Equipment utilized for it, Drugs used in CPR, Defibrillation.

**Unit 10:** Artificial Airways- Types of airways (Nasal/Oral) and features, Sizes, colour coding, and methods of insertion, Indications for use

**Unit 11:** Pre op and Post op care- Checking and preparation of Anaesthesia trolley and Eqpt, Preoperative preparation of patient, Management of pre operative and post operative rooms, Transportation Techniques of patient in conscious, semi conscious and unconscious patient to and fro, operation theatre.

**Unit 12:** Anaesthesia Equipment Maintenance / sterilization- Cleaning, Disinfection & sterilisation, Physical / chemical methods, Testing of sterilization, Critical /semicritical /Non critical devices, Levels of Disinfection.

## **PAPER 3: ADVANCED ANAESTHESIA TECHNOLOGY**

### **CONTENT:**

- Unit 1:** Anaesthesia- Evolution of modern anaesthesia, Peripheral pulse, locations, Methods of BP measurement, Dye allergies, Monitoring, Equipment options in the MRI.
- Unit 2:** Anaesthesia Gadgets Tubes- Different type of laryngoscopes and blades, Description of plain and cuffed endotracheal tubes, Indication, Method of insertion, complications, Sterilization, Specialised ET Tubes, Armored tubes, Ring, Adair and Elwyn tube (RAE), Micro laryngeal tubes, Double lumen tubes, Bronchial blocker, LMA, Supraglottic airway devices (SAD), Ambu bag, Tracheotomy.
- Unit 3:** Anaesthesia Monitoring- Monitoring during anesthesia, Multi parameter monitor, Arterial blood pressure – NIBP, IBP, Manual BP, Electrocardiogram (ECG), SpO<sub>2</sub>, EtCO<sub>2</sub>, Neuromuscular monitoring, Clinical monitoring.
- Unit 4:** Suction Apparatus- Foot operated, electrically operated suction apparatus and its General Principal, uses and care, Central pipeline suction, colour coding.
- Unit 5:** Medical Ethics- Relevant medico legal aspects, Responsibilities and duties, Ethical behaviour and conduct.
- Unit 6:** Drugs used in OT / ICU- Drugs used during General anaesthesia and Regional anaesthesia, Intravenous anaesthetic agents uses and complications, Inhalational Anaesthetics, Pre- medication indication, Type of drugs used for premedication, Doses and side effects, Narcotic agents and other Analgesics, Anti-hypertensive drugs.
- Unit 7:** Blood Transfusion- Various types of blood and blood products, Pre transfusion Checks, Blood administration set, Transfusion reactions.
- Unit 8:** Mental Sickness and Cardiology- Various ECG leads, their placement and normal ECG. Shock, Types, signs & symptoms and management, Electroconvulsive (ECT) shock therapy, drug effects on seizure duration.
- Unit 9:** Artificial Ventilation and Related Equipment- Operation room Ventilators and ICU ventilators, Complication in patients on Ventilators, General care of patient on Ventilator, Disinfection and sterilization of ventilators.
- Unit 10:** Anesthesia techniques- General Anaesthesia Technique, Regional / Local Anaesthesia Techniques, Topical Anaesthesia Technique, TIVA, Balanced Anaesthesia, MAC.

## **PAPER 4: MEDICINE RELEVANT TO OPERATION THEATRE**

### **CONTENT:**

**Unit 1:** Diabetes Mellitus- Signs and symptoms Diabetes Mellitus, Causes, Type 1, Type 2, Prevention, Management, Diabetic emergencies, Complications.

**Unit 2:** Hypertension- Signs and symptoms, Causes, Prevention.

**Unit 3:** Ischemic heart disease- Signs and symptoms IHD, Risk factors

**Unit 4:** Obesity- Classification of obesity, Effects on health, Causes

**Unit 5:** Elderly patient- Differences between adult and geriatric medicine, Aging-associated diseases

**Unit 6:** Pregnancy shock- Shock Types and Causes of pregnancy shock, Managements of various types of shocks

**Unit 7:** COPD- Signs and symptoms of COPD, Cause of COPD

**Unit 8:** Anaemia- Signs and symptoms, Causes.

**Unit 9:** Chronic renal failure- Signs and symptoms, Causes

**Unit 10:** Chronic liver disease/failure- Causes of chronic liver disease, Physical signs,

**Unit 11:** Paediatric patient infant/neonate- What is Paediatrics, Physical characteristics of new born, Internal physiological changes at birth

**Unit 12:** Epilepsy- Signs and symptoms, Causes Nice to Know, Prevention, Management.

**Unit 13:** CVA- Types of stroke, Causes.