

**Syllabus
for
TWO YEARS DIPLOMA COURSE IN
ANAESTHESIA TECHNOLOGY**



**JAMMU & KASHMIR
STATE PARA-MEDICAL AND
NURSING COUNCIL**

**Government Medical College
Jammu / Srinagar**

DIPLOMA IN ANAESTHESIA TECHNOLOGY

1ST YEAR SYLLABUS

BASIC ANATOMY PAPER - A

Introduction to Anatomy

Basic Anatomical terminology

Osteology- Upper limb – clavicle, scapula, humerus, radius, ulna Lower limb - femur, hipbone, sacrum, tibia, fibula Vertebral column

Thorax – Intercostal space, pleura, bony thoracic cage, ribs sternum & thoracic vertebrae

Lungs – Trachea, bronchial tree

Heart – Surface anatomy of heart, chambers of the heart, valves of the heart, major blood vessels of heart, pericardium, coronary arteries.

Skeleto-muscular system – Muscles of thorax, muscles of upper limb (arm & fore arm) Flexor and extensor group of muscles (origin, insertion, action)

Excretory system – Kidneys, ureters, bladder

PRACTICALS**Mannequins to be provided for Teaching**

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

PHYSIOLOGY**THEORY****1) The Cell:**

(i) Cell Structure and functions of the various organelles.

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

2) The Blood:

(i) Composition of Blood, functions of the blood and plasma proteins, classification and protein.

(ii) Pathological and Physiological variation of the RBC.

(iii) Function of Hemoglobin

(iv) Erythrocyte Sedimentation Rate.

(v) Detailed description about WBC-Total count (TC), Differential count (DC) and functions.

(vi) Platelets – formation and normal level and functions

(vii) Blood groups and Rh factor

3) Cardio-Vascular System:

(i) Physiology of the heart

(ii) Heart sounds

(iii) Cardiac cycle, Cardiac output.

(iv) Auscultatory areas.

(v) Arterial pressures, blood pressure

(vi) Hypertension

(vii) Electro cardiogram (ECG)

4. Respiratory system:

(i) Respiratory movements.

(ii) Definitions and Normal values of Lung volumes and Lung capacities.

5. Excretory system:

(i) Normal Urinary output

(ii) Micturition

(iii) Renal function tests, renal disorders.

6. Reproductive system:

(i) Formation of semen and spermatogenesis.

(ii) Brief account of menstrual cycle.

7. Central Nervous system:

(i) Functions of CSF

8. Endocrine system:

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

9. Digestive system (for the students of Diploma in Scope Support Technology)

- (i) Physiological Anatomy of the GIT.
- (ii) Food Digestion in the mouth, stomach, intestine
- (iii) Absorption of foods
- (iv) Role of bile in the digestion.

PRACTICAL

- 1) Determination of Blood Groups.
- 2) Measurement of human blood pressure.
- 3) Examination of Respiratory system to count respiratory rate and measure inspiration and respiration

GENERAL PHARMACOLOGY

1. Introduction and scope of Pharmacology
2. Various routes of drug administration advantages and disadvantages.
3. Biotransformation of drugs types and definition of Bio-transformation reactions.
4. Excretion of drugs, definition and routes of drug elimination.
5. General Mechanism of drug action and factors modifying drug action.
6. Drug distribution, definition and factors, affecting drug distribution.

A. BIO-CHEMISTRY**PAPER - B***** Carbohydrates**

Glucose and Glycogen Metabolism

*** Proteins:**

Classification of proteins and functions

*** Lipids:**

Classification of lipids and functions

*** 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 – Kwashiorkar

BIOCHEMISTRY SYLLABUS FOR PRACTICALS

1. Benedict's test
2. Heat coagulation tests

B. PATHOLOGY

1. * Cellular adaptation, Cell injury & cell death.
- * Introduction to pathology.

8. **Endocrine system:**
Functions of the pituitary, thyroid, parathyroid, adrenal and pancreatic Hormones.

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A. BIO-CHEMISTRY PAPER - B

* Carbohydrates

Glucose and Glycogen Metabolism

* Proteins:

Classification of proteins and functions

* Lipids:

Classification of lipids and functions

* 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 – Kwashiorkor

BIOCHEMISTRY SYLLABUS FOR PRACTICALS

1. Benedict's test
2. Heat coagulation tests

B. PATHOLOGY

1. * Cellular adaptation, Cell injury & cell death.
- * Introduction to pathology.

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

2. Inflammation.

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

3. Immunity disorders.

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

4. Infectious diseases.

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

5. Neoplasia.

- Definitions
- Nomenclature
- Biology of tumor growth benign and malignant

neoplasms Epidemiology
Carcinogenic agents and their cellular interactions
Clinical features of tumors

C. BASICS OF COMPUTER

COURSE CONTENT:

- Introduction to computer – I/O devices – memories – RAM and ROM – Different kinds of ROM – kilobytes. MB, GB their conversions – large computer – Medium, Micro, Mini computers – Different computer languages.
- Typing text in MS word – Manipulating text – Formatting the text – using different font sizes, bold, italics – Bullets and numbering – Pictures, file insertion – Aligning the text and justify – choosing paper size – adjusting margins – Header and footer, inserting page No's in a document – Printing a file with options – Using spell check and grammar – Find and replace – Mail merge – inserting tables in a document.
- Introduction to Internet – Using search engine – Google search – Exploring the next using Internet Explorer and Navigator – Uploading and Download of files and images – E-mail ID creation – Sending messages – Attaching files in E-mail – Introduction to "C" language – Different variables, declaration, usage – writing small programs using functions and sub – functions.

D. CSSD Procedures

1. Waste disposal collection of used items from user area, reception protective clothing and disinfections sage gaurds,
 2. Use of disinfectionts sorting and classification of equipment for cleaning purposes, sharps, blunt lighted etc. contaminated high risk baby care - delicate instruments or hot care instruments,
 3. Cleaning process - use of detergents. Mechanical cleaning apparatus, cleaning instruments, cleaning jars, receivers bowls etc. trays, basins and similar hand ware utensils. Cleaning of catheters and tubings, cleaning glass ware, cleaning syringes and needles.
 4. Materials used for wrapping and packing assembling pack contents. Types of packs prepared. Inclusion of trays andd galliparts in packs. Method of wrapping and making use of indications to show that a pack of container has been through a sterilization process date stamping.
 5. General observations principles of sterilization. Moist heat sterilization. Dry heat sterilization. EO gas sterilization. H2O2 gas plasma vapo sterilization.
- E. Regional Anaesthetic techniques.**
- a. Local anaesthetic technique
 - b. Nerve blocks
 - c. Spinal Anaesthesia
 - d. Epidural anaesthesia

Diploma
Anaesthesia Technology Course

2nd YEAR SYLLABUS

PAPER -A

Main Syllabus

1. Applied Anatomy and Physiology
2. Clinical Pharmacology
3. Clinical microbiology
4. Medical Ethics.
5. Medicine outline
6. Principles of Anaesthesia
7. Basic Anaesthetic techniques

1. APPLIED ANATOMY AND PHYSIOLOGY
RELATED TO ANAESTHESIA

I. RESPIRATORY SYSTEM

- A. Structure and function of the respiratory tract in relation to respiratory system
- | | | |
|--------------------------|---|--|
| Nose | - | Role in humidification |
| Pharynx | - | Obstruction in airways |
| Larynx | - | Movement or vocal cords, Cord palsies. |
| Trachea & Bronchial tree | - | vessels, nerve supply, respiratory tract, reflexes, bronchospasm |
| Alveoli | - | Layers, Surfactants |

B. Respiratory Physiology

- Control or breathing
- Respiratory muscles - diaphragm, intercostals
- Lung volumes - dead space, vital capacity, FRC etc.
- Pleural cavity - intrapleural pressure, pneumothorax.
- Work of breathing - airway resistance, compliance
- Respiratory movements under anaesthesia.
- Tracheal tug - signs, hiccup

C. Pulmonary Gas Exchange And Acid Base Status

- Pulmonary circulation
- Pulmonary oedema,
- Pulmonary hypertension
- Pulmonary function tests.
- Transfer of gases - oxygen & Carbon dioxide

- Acid base status, definitions, acidosis types, Alkalosis types, buffers in the body.

D. Oxygen: properties, storage, supply, hypoxia

E. Respiratory failure, type, clinical features, causes.

II. CARDIOVASCULAR SYSTEM

Anatomy - Chambers of the heart, major vasculature.

Coronary supply, innervation. Conduction system.

Cardiac output - determinants, heart rate, preload, after load.

Coronary blood flow & myocardial oxygen supply

ECCG

Arrhythmias cardiovascular response to

Anaesthetic & surgical procedures.

Hypotension - causes, effects, management.

Cardio pulmonary resuscitation.

Myocardial infarction, hypertension.

III. FLUIDS AND ELECTROLYTES

- Body Fluids - Composition
- Water, sodium and potassium balance
- I.V. Fluids - composition & administration
- I.V. Cannulation.

IV. BLOOD TRANSFUSION

Blood grouping, storage, administration

2. Clinical Pharmacology**ANTISIALAGOGUES**

Atropine, Glycopyrrrolate

SEDATIVES / ANXIOLYTICS

Diazepam, Midazolam, Phenergan, Lorazepam, Chlorpromazine, Trichlopho

NARCOTICS

Morphine, Pethidine, Fentanyl, Pentazozine

ANTIEMETICS

Metaoclopramide, Ondanseteron, Dexamethasone

ANTACIDS

Na citrate, Gelusil, Mucaine gel.

H2 BLOCKERS

Cimetidine, Ranitidine, Famotidine

INDUCTION AGENT

Thiopentone, Diazepam, Midazolam, Ketamine, Propofol, Etomidate.

MUSCLE RELAXANTS

Depolarising - Succamethonium, Non depolarising - Pancuronium, Vecuronium, Atracurium, rocuranium

INHALATIONAL GASES

Gases - O₂, N₂O, Air

Agents - Ether-, Halothane, Isoflurane, Saeofflurane, Desflurane

REVERSAL AGENTS

Neostigmine, Glycopyrrrolate, Atropine, Nalorphine, Naloxone, Flumazenil (Diazepam)

LOCAL ANAESTHETICS

Xylocaine, Preparation, Local - Bupivacaine - Topical, Prilocaine-jelly, Emla - Ointment, Etidocaine. Ropivacaine

EMERGENCY DRUGS

- Adrenaline : Mode or administration, dilution, dosage,
- Effects, Isoprenaline
- Atropine, bicarbonate, calcium, ephedrine, xylocard,
- Ionotropes : dopamine, dobutamine, amidaron

- Aminophylline, hydrocortisone, antihistaminics, potassium.
 - Cardiovascular drugs
 - Antihypertensives
 - Antiarrhythmics
 - Beta - Blockers
 - Ca - Channel blockers.
 - Vasodilators - nitroglycerin & sodium nitroprusside
 - Respiratory system - Bronchodilators, respiratory stimulants
 - o Bronchiolytic agents
 - Renal system - Diuretics, furosemide, mannitol
 - Obstetrics - oxytocin, methergin
 - Miscellaneous - Antibiotics, paracetamol, diclofenac- IV fluids, various preparations Nacl, Ringer laccatate, haemacoeal, hetastarch heparin, protamine, insulin, analgesics, nsaid, ibuprofen, ketorolac,
3. **CLINICAL MICROBIOLOGY**
- Sterilization & decontamination - I
 - o Dry Heat
 - o Moist Heat
 - Sterilization - II
 - o Chemical methods
 - o Gaseous methods
 - o Filtration
 - Wound Infection & Urinary Tract Infections

- Blood stream Infections
 - Respiratory tract Infection
 - S. Typhi, Salmonella Paratyphi 'A', Salmonella Typhimurium
 - Catheter, IV associated Infections
 - Hospital acquired infections & prevention of hospital acquired infections
 - Hepatitis C
4. **MEDICAL ETHICS**
1. Medical ethics - Definition - Goal - Scope
 2. Code of conduct - Introduction -
 3. Basic principles of medical ethics - Confidentiality
 4. Malpractice and negligence - Rational and irrational drug therapy

2nd YEAR PAPER - B

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A. PRINCIPLES OF ANAESTHESIA

A. MEDICAL GAS SUPPLY

- Compressed gas cylinders
- Colour coding
- Cylinder valves; pin index.
- Gas piping system
- Recommendations for piping system
- Alarms & safety devices.

B. ANAESTHESIA MACHINE

- Hanger and yoke system
- Cylinder pressure gauge
- Pressure regulator
- Flow meter assembly
- Vapourizers - types, hazards, maintenance, filling and draining, etc.

C. BREATHING SYSTEM

- General considerations: humidity & heat
- Common components - connectors, adaptors, reservoir bags.
- Capnography ; etcO₂
- Pulse oximetry
- Methods of humidification.
- Classification of breathing system
- Mapleson system - a b c d e f
- Jackson Rees system, Bain circuit

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- Non rebreathing valves - ambu valves

- The circle system

- Components

- Soda lime, indicators

D. FACE MASKS & AIRWAY LARYNGOSCOPES

- Types, sizes

- Endotracheal tubes - Types, sizes.

- Cuff system

- Fixing, removing and inflating cuff, checking tube position complications.

E. ANAESTHESIA VENTILATOR AND WORKING PRINCIPLES.

F. MONITORING

- ECG
- SpO₂
- Temperature
- IBP
- CVP

G. BASIC ANAESTHETIC TECHNIQUES

HISTORY OF ANAESTHESIA

- First successful clinical demonstration:
- Pre - historic (ether) era
- Inhalational anaesthetic era
- Regional anaesthetic era
- Intravenous anaesthetic era

- Modern anaesthetic era
- Minimum standard of anaesthesia
- Who should give anaesthesia?

H. PRE-OP PREPARATION:

Pre anaesthetic assessment ~ History – , past history - disease / Surgery / and personal history
- Smoking / alcohol

General physical assessment, systemic examination – CVS, RS, CNS

I. INVESTIGATIONS

Routine - Haematological - their significance

- Urine
- E.C.G.
- Chest X - ray

Special - Endocrine, hormonal assays

- Echocardiography
- Angiography
- Liver function test
- Renal function test
- Others

Case acceptance: ASA grading - I, II, III, IV, V

J. PRE - ANAESTHETIC ORDERS:

- Patient
- Informed consent
 - NPO
 - Premedication - advantages, drugs used
 - Special instructions - if any
- Machine
- Checking the machine
 - O₂, N₂O, suction apparatus

- Laryngoscopes, et tubes, airways
- Things for IV accessibility
- Other monitoring systems

K. INTRAOPERATIVE MANAGEMENT

- Confirm the identification of the patient
- Monitoring - minimum
- Noninvasive & Invasive monitoring
- Induction - drugs used
- Endotracheal intubation
- Maintenance of anaesthesia
- Positioning of the patient
- Blood / fluid & electrolyte balance
- Reversal from anaesthesia - drugs used
- Transferring the patient
- Recovery room – set up and things needed

L. POST OPERATIVE COMPLICATIONS & MANAGEMENT

Postoperative problems

- Nausea & Vomiting
- Sore throat
- Laryngeal granuloma
- Neurological complications.
- Awareness
- Vascular complications.
- Trauma to teeth
- Headache

Backache

Ocular complications

Auditory complications

MAJOR CATASTROPHES

- o Mortality
- o Causes of death o Cerebral damage
- o Prevention.

M. Basic Intensive Care

1. MONITORING AND DIAGNOSTIC PROCEDURES IN I.C.U.

- Central Venous access.
- ECG monitoring.
- Invasive hemodynamic monitoring

2. GENERAL CARE OF PATIENT IN I.C.U.

- o Eye
- o Bladder Care
- o Care of mechanically ventilated patient
- o Tracheostomy, humidification
- o Vascular lines - arterial, venous line
- o Radiography
- o Physiotherapy - chest physiotherapy

N. MEDICAL ETHICS

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Confidentiality

4. Malpractice and negligence - Rational and irrational drug therapy

O. MEDICINE OUTLINES

1. Disorder of haemopoiesis - Anaemias - iron deficiency anaemia,
2. Infections diseases - Sepsis and septic stock, fever of unknown origin, infective endocarditis, infective of skin, muscle, soft tissue, infection control in hospital, diseases caused by bacteria, viruses, myobacterm, viruses, fungi and protozoa and helminthes, common secondary infection in HIV.
3. Diseases of CVS - congenital RHD - Rheumatic fever, CAD, Peripheral vascular diseases.
4. Respiratory system - asthma pneumonia
5. Kidney & Urinary tract - acute renal failure, Glomerulonephritis, Haemodialysis, Transplant, Urinary tract infection
6. Liver and biliary tract disease - Viral hepatitis, alcoholism
7. Endocrinology and metabolism - Diabetes mellitus, Hyper - and hypothyroidism

Brief Aspects to be Covered

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1. **TOPIC** Medical Gas **Domain** **Must Know**
1. compressed gas cylinders
 2. Colour coding different gas cylinder and pipe line system
 3. Cylinder storage space and things to remember while empty and full cylinder storing.
 4. Diameter index safety system.
 5. Medical gas pipe line system and station outlets.
 6. Alarms and safety devices in pipe line gas supply. **Desirable to Know**
 7. Oxygen concentrator working principle, their uses and care. **Nice to Know**
 8. Air compressor
2. **Gas administration devices** **Must Know**
1. Anaesthesia masks : Types / sizes.
 2. Flow meters
 3. Gas Regulators
- Desirable to Know**
1. Flow restrictors
3. **Oxygen Therapy** **Must Know**
1. Definition, causes and responses to hypoxemia.
 2. Clinical signs of hypoxemia.
 3. Goals of oxygen therapy.
 4. Evaluation of patients receiving oxygen therapy
 5. Hazards of oxygen therapy.
4. **Anaesthesia Machine** **Must Know** 1. Boyles Machine and its function.

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5. **Breathing System** **Must Know**
1. Open, Semi closed and Closed Circuits, Classification of breathing system
 2. Mapleson breathing system
 3. Jackson and Rees system
 4. Bain circuit
 5. Non rebreathing valves- Ambu valves
2. Modern anesthesia machine.
3. Hanger and Yoke system
 4. Cylinder pressure gauge
 5. Pin index
 6. Pressure regulator
 7. Vaporizers- TYPES, Hazards, Maintenance, Filling and drainage.
 8. Flow meter assembly
6. **Injection Techniques** **Must Know**
1. Intra muscular and insertion of Intra Venous cannulas.
 2. Handling of sterilized syringes and needles.
7. **Fluids and Electrolytes** **Must Know**
1. Type of fluid (Crystalloids & Colloids)
 2. Steps to prepare I.V. drip
 3. Indication of specific fluid and their complication
8. **Gas Analyzers and monitoring** **Must know**
1. Pulse oxymeter
 2. Oxygen Analyser / sensor
 3. EtCO₂ Monitor / Capnography
- Nice to Know**
4. Transcutaneous oxygen monitor

9. Resuscitation**Must know**
Techniques

1. Basic life support (Airway, Breathing, and Circulation)
2. Equipment utilized for it,
3. Drugs used in CPR,
4. Defibrillation

10. Artificial Airways**Must Know**

1. Types of airways (Nasal/Oral) and features,
2. Sizes, colour coding, and methods of insertion
3. Indications for use

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Pre op and Post op care**Must Know**

1. Checking and preparation of Anaesthesia trolley and Eqpt
2. Pre operative preparation of patient.
3. Management of pre operative and post operative rooms.
4. Transportation Techniques of patient in conscious, semi conscious and unconscious patient to and fro – operation theatre.

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Maintenance /sterilization

1. Cleaning, Disinfection & sterilisation
 2. Physical / chemical methods
 3. Testing of sterilization
 4. Critical /semicritical /Non critical devices
 5. Levels of Disinfection
- Desirable to Know**
1. Reusable items