



All India Institute of Medical Sciences, Jodhpur

Indicative Syllabus for the Post of Technical Officer (Technical Supervisor)

(Syllabus is only indicative. The questions can assess any aspect of knowledge, aptitude, attitude and practical skills, which is expected from a trained person to work efficiently at the advertised post)

Section A

40% Questions covering the following topics: -

General Intelligence & Reasoning: It would include questions of non-verbal type. The test will include questions on similarities and differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discriminating observation, relationship concepts, figure classification, arithmetical number series, non-verbal series etc. The test will also include questions designed to test the candidate's abilities to deal with abstract ideas and symbols and their relationship, arithmetical computation and other analytical functions.

Quantitative Aptitude: This paper will include questions on problems relating to Number Systems, Computation of Whole Numbers, Decimals and Fractions and relationship between Numbers, Fundamental arithmetical operations, Percentages, Ratio and Proportion, Averages, Interest, Profit and Loss, Discount, use of Tables and Graphs, Mensuration, Time and Distance, Ratio and Time, Time and Work, etc.

Computer Knowledge: Candidates' understanding of the Basics of Computer Knowledge, its parts, functions, emails, MS office, etc.

Section B (SUBJECT KNOWLEDGE)

60% Questions to be based on Medical Lab Technology & OT Techniques course covering the following topics: -

30% Questions to be based on Technical Officer (Medical Lab Technology)

ANATOMY

1. INTRODUCTION TO ANATOMY & HISTOLOGY, STRUCTURE OF CELL, EPITHELIAL TISSUE, MUSCULAR TISSUE, NERVOUS TISSUE.
2. SKELETAL SYSTEM, STRUCTURE OF BONES, TYPES OF BONES, NAMES AND IDENTIFICATIONS OF SOME COMMON BONES AS FEMUR, CLAVICLE ETC. VARIOUS MOVEMENTS OF JOINTS.
3. MUSCULAR SYSTEM, STRUCTURE AND TYPES OF MUSCLES IN HUMAN BODY
4. CIRCULATION SYSTEM, ARTERIAL AND VEINS NAMES AND POSITION OF MAIN BLOOD VESSELS. LYMPHATIC SYSTEM, LYMPH VESSELS, LYMPH NODES AND LYMPHOID ORGANS, THEIR STRUCTURE & FUNCTIONS.
5. DIGESTIVE SYSTEMS. PARTS OF GASTROINTESTINAL TRACT AND ASSOCIATED GLANDS.
6. RESPIRATORY SYSTEM. PARTS OF RESPIRATORY SYSTEM.
7. URINARY SYSTEM. PARTS OF URINARY SYSTEM.
8. ENDOCRINE SYSTEM. VARIOUS ENDOCRINE GLANDS, THYROID, PARATHYROID, ADRENAL GLANDS PITUITARY PANCREAS. THYMUS AND SEX GLANDS.
9. REPRODUCTIVE SYSTEM. MALE & FEMALE REPRODUCTIVE ORGANS.
10. SKIN AND SENSE ORGANS. EYE, EAR, NOSE. TASTE BUDS.
11. NERVOUS SYSTEM. PARTS OF BRAIN, SPINAL CORD, PERIPHERAL NERVES.





PHYSIOLOGY

1. BLOOD. COMPOSITION AND FUNCTION OF BLOOD, HAEMOPESIS, BLOOD COAGULATION, BLOOD GROUPS, BODY FLUID.
2. CARDIOVASCULAR SYSTEMS. CIRCULATION OF BLOOD, FUNCTION OF HEART AND BLOOD VESSELS.
3. RESPIRATORY SYSTEM. FUNCTION OF LUNGS, MECHANISM OF BREATHING AND EXCHANGE OF GASES IN THE LUNGS, REGULATION OF RESPIRATION, RESPIRATION DISORDER LIKE ANOXIA. DYSPNEA CYANOSIS ETC.
4. DIGESTIVE SYSTEMS. DIGESTION OF FOOD IN MOUTH, STOMACH & SMALL INTESTINES. ABSORPTION OF FOOD, FUNCTION OF LIVER FUNCTION TESTS.
5. EXCRETORY SYSTEMS. STRUCTURE & FUNCTION OF KIDNEY AND URINARY BLADDER. MECHANISM OF URINE FORMATION.
6. ENDOCRINE SYSTEMS. PHYSIOLOGY & FEMALE REPRODUCTIVE ORGANS.
7. NERVOUS SYSTEM. NEURONE & ITS FUNCTIONS, FUNCTION OF CENTRAL NERVOUS SYSTEM. AUTONOMIC NERVOUS SYSTEM.

HAEMATOLOGY & BLOOD BANKING

1. INTRODUCTION TO HAEMATOLOGY: (A) DEFINITION, (B) IMPORTANCE, (C) IMPORTANT EQUIPMENT USED.
2. LABORATORY ORGANIZATION AND MAINTENANCE
3. INTRODUCTION TO BLOOD, ITS COMPOSITION, FUNCTION AND NORMAL CELLULAR COMPONENTS.
4. BASIC FORMATION OF BLOOD: (A) ERYTHROPOIESIS, (B) LEUCOPOIESIS, (C) THROMBOPOIESIS.
5. COLLECTION AND PRESERVATION BLOOD SAMPLE FOR VARIOUS HAEMATOLOGICAL ESTIMATION.
6. HAEMOGLOBIN: DEFINITION AND TYPES, NORMAL VALUES, SYNTHESIS AND BREAKDOWN, HAEMOGLOBIN ESTIMATION TECHNIQUES, PRINCIPLES & PROCEDURES FOR HB ESTIMATION, ERRORS INVOLVED AND MEANS TO MINIMIZE ERRORS FOR HB ESTIMATION.
7. TOTAL LEUCOCYTES COUNT (TLC): NORMAL VALUES, CLINICAL SIGNIFICANCE, METHOD OF ESTIMATION, SOURCE OF ERRORS.
8. DIFFERENTIAL LEUCOCYTES COUNT(DLC): NORMAL VALUES, CLINICAL SIGNIFICANCE, SOURCES OF ERRORS AND MEANS TO MINIMIZE THEM
9. ERYTHROCYTE SEDIMENTATION RATE (ESR): NORMAL VALUES, DEFINITION, PRINCIPLE AND PROCEDURE TO DETERMINE ESR, FACTORS INFLUENCING ESR AND CLINICAL SIGNIFICANCE, ERRORS INCLUDED AND THEIR MINIMIZATION.
10. PACKED CELL VOLUME/HAEMATOCRIT VALUE: NORMAL VALUES, ESTIMATION BY MACRO AND MICRO METHOD, MERITS AND DEMERITS OF ESTIMATION METHOD, FACTORS INFLUENCING PCV, CLINICAL SIGNIFICANCE.
11. RED CELL INDICES (RCI): DEFINITION, PROCEDURE AND GENERAL FORMULA FOR CALCULATING INDICES, CLINICAL SIGNIFICANCE, NORMAL VALUE AND NUMERICAL PROBLEMS RELATED TO RCI.
12. ABSOLUTE EOSINOPHIL COUNT: PRINCIPLE AND PROCEDURE FOR COUNTING AEC, CLINICAL SIGNIFICANCE, NORMAL VALUE AND RISK OF ERROR INVOLVED IF ANY.
13. RETICULOCYTE COUNT: PRINCIPLE AND PROCEDURE, CLINICAL SIGNIFICANCE, NORMAL VALUE, RISK OF ERROR INVOLVED IF ANY.
14. PLATELETS COUNT: NORMAL VALUES, PROCEDURE AND ESTIMATION, CLINICAL SIGNIFICANCE, ERRORS AND RE-CORRECTION.
15. PREPARATION OF BLOOD FILMS: TYPES, METHODS OF PREPARATION.
16. ROUTINE STAINING TECHNIQUES IN HAEMATOLOGY: GIEMSA STAIN, LEISHMAN STAIN, PRINCIPLE, COMPOSITION, PREPARATION OF STAINING REAGENTS AND PROCEDURE.
17. BLOOD GROUP SYSTEM AND BLOOD GROUP INCOMPATIBILITY ABO, RH SYSTEMS, CROSS, MATCHING TEST IN EMERGENCY.
18. BLOOD BANKING PREPARATION: - BLOOD COLLECTION PROCEDURE, TRANSPORT AND STORAGE. PREPARATION AND USE OF WHOLE BLOOD AND BLOOD COMPONENTS-WASHED RED CELLS, PLASMA PREPARATION, ETC.
19. QUALITY CONTROL IN BLOOD BANKS: - SPECIMEN COLLECTION, RISK ASSESSMENT FOR AIDS AND SERUM HEPATITIS.

CLINICAL PATHOLOGY

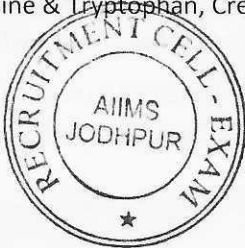
1. URINE ANALYSIS: - COMPOSITION OF NORMAL URINE, COLLECTION OF URINE SPECIMENS, ROUTINE URINE ANALYSIS-PHYSICAL, CHEMICAL & MICROSCOPIC EXAMINATION.
2. HISTOPATHOLOGY: - STEPS OF TISSUE PROCESSING INCLUDING AUTOMATED TISSUE PROCESSOR, HEMATOXYLIN AND EOSIN STAIN, COMMON HISTOCHEMICAL STAINS FOR GLYCOGEN, BACTERIA, FUNGI AND COLLAGEN. BASICS OF IMMUNOHISTOCHEMISTRY.
3. CEREBROSPINAL FLUID ANALYSIS: - COMPOSITION OF NORMAL CSF, COLLECTION AND PROCESSING OF SPECIMENS, ROUTINE CSF ANALYSIS-PHYSICAL, CHEMICAL & MICROSCOPIC EXAMINATION.
4. SEMEN ANALYSIS: - COLLECTION OF SEMEN, ROUTINE SEMEN ANALYSIS-PHYSICAL, CHEMICAL & MICROSCOPIC EXAMINATION.
5. SPUTUM ANALYSIS: - METHODS AND PRESENTATION IN COLLECTION OF SPUTUM, PHYSICAL, CHEMICAL & MICROBIOLOGICAL EXAMINATION, CONCENTRATION METHOD FOR AFB (ACID FAST BACILLUS).

MICROBIOLOGY

1. INTRODUCTION TO MEDICAL MICROBIOLOGY: - DEFINITION, HISTORY, HOST-MICROBE RELATIONSHIP.
2. SAFETY MEASURES IN CLINICAL MICROBIOLOGY
3. GLASSWARE USED IN CLINICAL MICROBIOLOGY LABORATORY: - INTRODUCTION, CARE AND HANDLING OF GLASSWARE, CLEANING OF GLASSWARE.
4. EQUIPMENTS USED IN CLINICAL MICROBIOLOGY LABORATORY: - INTRODUCTION, CARE & MAINTENANCE.
5. MICROSCOPY :- INTRODUCTION AND HISTORY, TYPES OF MICROSCOPES:- (a) LIGHT MICROSCOPE, (b) DGI, (c) FLUORESCENT, (d) PHASE CONTRAST, (e) ELECTRON MICROSCOPE:- (i) TRANSMISSION, (ii) SCANNING., PRINCIPLES OF OPERATIONAL MECHANISMS OF VARIOUS TYPES OF MICROSCOPES.
6. STERILIZATION: - DEFINITION, TYPES AND PRINCIPLES OF STERILIZATION METHODS: - (a) HEAT (DRY HEAT, MOIST HEAT WITH SPECIAL REFERENCE TO AUTOCLAVE), (b) RADIATION, (c) FILTRATION., EFFICIENCY TESTING TO VARIOUS STERILIZERS.
7. ANTISEPTICS AND DISINFECTANTS:- DEFINITION, TYPES AND PROPERTIES, MODE OF ACTION, USES OF VARIOUS DISINFECTANTS, PRECAUTIONS WHILE USING THE DISINFECTANTS, QUALITIES OF A GOOD DISINFECTANTS, TESTING EFFICIENCY OF VARIOUS DISINFECTANTS.
8. BIOMEDICAL WASTE MANAGEMENT IN A MICROBIOLOGY LABORATORY: - TYPES OF THE WASTE GENERATED, SEGREGATION, TREATMENT AND DISPOSAL.
9. GENERAL CHARACTERISTICS & CLASSIFICATION OF MICROBES:- (BACTERIA & FUNGI):- CLASSIFICATION OF MICROBES WITH SPECIAL REFERENCE TO PROKARYOTES & EUKARYOTES, MORPHOLOGICAL CLASSIFICATION OF BACTERIA, BACTERIAL ANATOMY(BACTERIAL CELL STRUCTURES)
10. GROWTH AND NUTRITION OF MICROBES:- GENERAL NUTRITIONAL & OTHER REQUIREMENTS OF THE BACTERIA, NUTRITIONAL TYPES OF THE BACTERIA AUTOTROPHS, HETEROTROPHS, PHOTOTROPHS, CHEMOTROPHS, SAPROTROPHS, ITHOTROPHS & ORGANOTROPHS, PHOTOAUTOTROPHS, CHEMOHETEROTROPHS, PHOTOORGANOTROPHIC, HETEROTROPHS, CHEMOLITHOTROPHIC AUTOTROPHS MIXOTROPHIC., PHYSICAL CONDITIONS REQUIRED FOR GROWTH, NORMAL GROWTH CYCLE OF BACTERIA(GROWTH CURVE), TYPES OF MICROBIAL CULTURES: SYNCHRONOUS, STATIC, CONTINUOUS CULTURE.

BIO-CHEMISTRY

1. **Chemistry of Carbohydrates & their related metabolism:** - Introduction, Definition, Classification, biomedical importance & properties. Brief outline of metabolism (Glycolysis, citric acid cycle, Gluconeogenesis, glycogenesis and Glycogenolysis), Glucose tolerance test. Blood sugar regulation and diabetes mellitus and hypoglycaemia.
2. **Amino acids:** Definition, Classification, essential & non-essential amino acids.
Chemistry of proteins & their related metabolism- - Introduction, Definition, Classification, biomedical importance. Metabolism of amino acids: Ammonia formation & transport, Urea cycle, catabolism of amino acids especially Phenylalanine, Tyrosine & Tryptophan, Creatine, Creatinine, Proteinuria
Metabolic disorders in urea cycle.



3. **Chemistry of LIPIDS & their related metabolism:** - Introduction, definition, Classification, biomedical importance, essential fatty acids. Brief outline of metabolism: Beta oxidation of fatty acids, fatty liver, ketosis, Cholesterol & Its clinical significance, Lipoproteins in the blood composition & their function in brief, Atherosclerosis. Names of Hypolipidemic drugs.
4. **ENZYMES:** - Definition, Classification, Factors affecting Enzymes activity, Inhibition Diagnostic use of Enzyme, Isoenzymes, enzyme inhibition, diagnostic value of serum enzymes. Enzyme kinetics
5. **Acid base balance concepts & disorders:** pH, buffers, Acidosis, Alkalosis. Nutrition, principles of nutrition, balance diet, BMR. Kwashiorkor and marasmus molecular biology Molecular biology (In brief): Replication, transcription, DNA recombinant technology, Blot techniques, PCR.

Instrument & Reagents

1. Chemistry of pure water, distilled & deionised water. Preparation of normal and molar solution. Synthesis of buffers. Study of weights, volumes and units, inter-conversion of units, measurements, preparation of solution.
2. Microscope – working principles & Use
3. Basic instruments of laboratory: Hot air oven, incubator, CO₂ incubator, centrifuge, hot plate and magnetic stirrer, water bath, colorimeter, spectrophotometer.

Practical

1. Safety in Biochemistry Laboratory, glassware. Routine anticoagulants, reagents, cleaning of glassware, isotonic solution, standardization of methods, preparation of solution & normal values
2. Uses, care and maintenance of various instrument of the laboratory.
3. Qualitative analysis of carbohydrates, lipids and proteins
4. Analysis of urine samples, gastric juices, CSF & semen analysis – gross and microscopic, Achromatic time of salivary amylase.

Clinical Biochemistry

1. **Introduction to Clinical Biochemistry**
2. **LABORATORY PLANNING:** - Laboratory Principles, Goals, hospital/laboratory

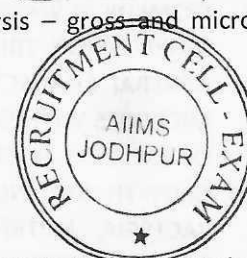
LABORATORY ORGANIZATION: - Principle Components and Functions of a Laboratory, Staffing the Laboratory, Job, Description Specifications, Work Schedule, Personnel Re-Arrangement and Work Load Assessment.

CARE OF LABORATORY GLASSWARE EQUIPMENT AND CHEMICALS: - Care and Cleaning of Glassware, Care of Equipment and Apparatus, Laboratory, Their Proper Use and Care, Laboratory Chemicals. Their Proper Use and Care. Labelling.

SPECIMEN HANDLING: - Collection Techniques and Containers, Types of Specimens, Entry, Specimen Transport, Transference Distribution and Re-Assignment Disposal, Preservation of Specimen.

LABORATORY SAFETY: - Laboratory Hazards, Safety, First Aid. Safety Measures: - Mechanical, Electrical, Chemical, Biological, Reductive. Quality Control: - Non-Analytical Functions, Analytical Functions. Laboratory errors: Pre-analytical, analytical and post analytical errors and their management. Laboratory trends, guiding principles for planning hospital laboratory services planning for a basic health laboratory.

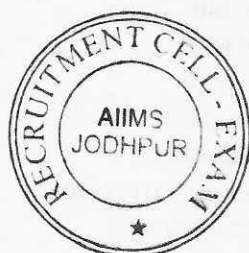
3. **Photometry:** Definitions, Laws of Photometry, absorbance, transmittance, absorption maxima, instruments, Parts of photometer, types of Photometry-colorimetry, spectrophotometry, flame photometry, fluorometry, choice of appropriate filter, measurement of solution, calculation of formula, applications.
4. **Basic analytical techniques:** Photometry, flame photometry, colorimetry, spectrophotometry (Lambert-beers law), spectrofluorimetry, ELISA, CLIA, Electrophoresis, Chromatography, Immunodiffusion Techniques, PCR.



5. **Water & Mineral Metabolism:** Distribution of fluids in the body, ECF, & ICF, water metabolism, dehydration, Mineral metabolism, macronutrients (Principal mineral elements) & trace elements.
6. **Liver Functions & their Assessment, Renal Functions Tests-** various tests, GFR and clearance.
7. **Immunodiffusion Techniques, Radioimmunoassay & ELISA Principles & Applications, Polymerase chain reaction-** Principle & Applications.
8. **Electrophoresis – principles, Types & Applications.**
9. **Auto analysers - principles & Applications.**
10. **Cardiac Profile –** In brief Hypertension, Angina, Myocardial, Infarction, pattern of Cardiac Enzymes in heart diseases.

PRACTICAL

1. Preparation of standard solution, molar solution, and other reagents
2. Analysis of normal and abnormal urine
3. Estimation of blood/plasma glucose by various methods
4. GTT
5. Blood urea estimation
6. Serum creatinine estimation
7. Serum uric acid estimation
8. Serum total protein estimation, serum albumin estimation
9. Serum globulin estimation
10. HbA1C estimation
11. Total Cholesterol estimation
12. HDL cholesterol (direct) estimation
13. LDL cholesterol (direct) estimation
14. Triglyceride estimation
15. Serum Bilirubin total estimation
16. Serum Bilirubin direct estimation
17. Serum amylase estimation
18. Serum lipase estimation
19. Serum GOT (AST) estimation
20. Serum GPT (ALT) estimation
21. Serum GGT estimation
22. Serum RF estimation
23. Alkaline phosphatase estimation
24. Acid phosphatase estimation
25. Serum sodium estimation
26. Serum potassium estimation
27. Serum chloride estimation
28. CK – NAC estimation
29. Urinary urea estimation
30. Urinary uric acid estimation
31. Urinary glucose estimation
32. Urinary electrolytes estimation
33. Tumour markers estimation like – PSA, CA-125, CEA, AFP
34. Hormonal profile including- FSH, LH, PRL, Insulin, C-peptide, PTH, Calcitriol, Cortisol, TFT etc.
35. ELISA tests for – HIV, Hepatitis B (HBsAg), Hepatitis (HCV), Malaria antigen and Tuberculosis-IgG/IgM.

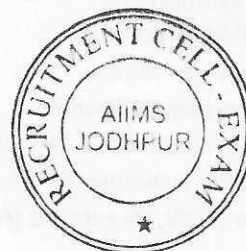


Quality management in Laboratory, Automation & Biomedical waste management

1. Introduction to Quality control, total Quality management framework, Quality laboratory processes, Quality assurance, Quality assessment, Quality control, Quality planning and Quality improvement
2. Costs of conformance and non-conformance, appraisal costs, prevention costs, internal quality control, basic steps, source of error and their correction methods, CAPA – corrective action & preventive action, Source of variation in laboratory results.
3. Quality control charts, Levy- Jennings and Cusum charts. External quality control, quality control programme, intrinsic and extrinsic and random errors, Current trends in laboratory accreditation, ISO certificate, West guard Rules, Demonstration of various methods of quality control.
4. Automation- Introduction, meaning, advantages, history, continuous flow analysers, Single channel continuous flow analysers - advantages, disadvantages. Multi-channel flow analysers, discrete auto analysers – basic features, types, semi-automated, fully automated. Batch analysers, Random access analysers (RAA), Component steps in fully automated analysers, Latest trends in automation, biochips, lab on a chip (LoC), Nano sensors -advantages and disadvantages, PCR & its applications.
5. Auto analysers based on immunoassay techniques, Micro particle enzyme immunoassay (MEIA), Centrifugal analysers, ASCA, Dry chemistry analysers, Dimension RxL clinical chemistry system. The Heterogeneous Immunoassay module components, Beckman Array 360 system, Mini Vidas analyzers, Immulite automated immunoassay analysers.

PRACTICAL

1. Estimation of Cholesterol
2. Estimation of HDL Cholesterol
3. Estimation of LDL Cholesterol
4. Estimation of Triglycerides
5. Estimation of LDH
6. Estimation of Glucose
7. Estimation of Bilirubin (Total, Direct, Total+Direct)
8. Estimation of SGPT
9. Estimation of SGOT
10. Estimation of Acid Phosphatase
11. Estimation of Alkaline Phosphatase
12. Estimation of Iron
13. Estimation of Creatinine
14. Estimation of Urea
15. Estimation of Uric acid
16. Estimation of CK-MB
17. Estimation of CK-NAC
18. Estimation of Chloride
19. Estimation of Sodium
20. Estimation of Potassium
21. Estimation of Hexagon Troponin+
22. Estimation of Phosphorus
23. Estimation of TIBC
24. Estimation of Albumin
25. Estimation of Calcium
26. Estimation of Haemoglobin
27. Estimation of Magnesium
28. Estimation of Blood Urea Nitrogen



ENDOCRINOLOGY

1. Estimation of T3

2. Estimation of T4
3. Estimation of TSH
4. Estimation of FSH
5. Estimation of LH
6. Estimation of hCG
7. Estimation of Cortisol
8. Estimation of Progesterone
9. Estimation of Testosterone

TUMOR AND CANCER MARKERS

1. Estimation of Alpha feto proteins (AFP)
2. Estimation of Carcino embryonic antigen (CEA)
3. Estimation of CA – 125
4. Estimation of Prostate specific antigen (PSA)

MOLECULAR TECHNIQUES

CANDIDATES SHOULD BE CONVERSANT WITH THE FOLLOWING TECHNIQUES. THEY SHOULD KNOW THE PRINCIPLES AND TECHNICAL APPLICATION OF THESE TECHNIQUES. THEY SHOULD HAVE HANDS ON EXPERIENCE WITH PCR.

1. PCR
2. Electrophoresis
3. Flow cytometry
4. Blotting techniques
5. Atomic absorption spectrometry
6. Sanger sequencing
7. Next generation sequencing
8. Mass spectrometry

BIOSTATISTICS

1. **BIOSTATISTICS-I:** Introduction, Tabulation of data, Measure of Central Tendency
2. **BIOSTATISTICS -II:** Measure of Variability, Probability, Correlation & Regression
3. **BIOSTATISTICS -III:** Chi-square test, Analysis of variance & covariance, Sampling.

Practical

Problem based exercises of Bio statistics.

30% Questions to be based on Technical Officer (OT Technician)

1. Applied Anatomy and physiology.

A. Cardiovascular

- i. Chambers of the heart
- ii. Heart valves
- iii. Blood flow to/from the heart
- iv. Cardiopulmonary circulation
- v. Central veins and arteries
- vi. Major veins/arteries of the:
 - a. Hand and arm
 - b. Aorta



- c. Radial/Ulnar
- d. Femoral
- e. Vena cava

B. Pulmonary

- i. Pharynx
- ii. Larynx
- iii. Epiglottis
- iv. Vocal cords
- v. Lobes of the lung
- vi. Tracheal/Bronchial Tree
- vii. Alveoli
- viii. Alveolar/capillary membrane
- ix. Diffusion of gases
- x. Gas transport
- xi. Bones of the chest
- xii. Diaphragm
- xiii. Lung volumes

C. Central Nervous system

- i. Autonomic
- ii. Neuromuscular junction
- iii. Nerve conduction
- iv. Spinal cord
 - a. Epidural space
 - b. Subarachnoid space
- v. Major nerves of the:
 - a. Upper body (e.g., brachial plexus, axillary, supraclavicular)
 - b. Lower body (e.g., femoral, sciatic, peroneal and popliteal)

D. Musculoskeletal

- i. Major/common bones (e.g., cranial, arms, legs)
- ii. Joints
- iii. Anatomic landmarks
- iv. Spine
- v. Common muscles (e.g., sternocleidomastoid, scalene, intercostals etc.)

E. Endocrine

- i. Thyroid
- ii. Pituitary
- iii. Adrenal

F. Gastrointestinal

- i. Esophagus
- ii. Stomach
- iii. Small and large bowel
- iv. Liver and gall bladder
- v. Pancreas

2. Clinical Biochemistry

- a. Carbohydrate metabolism



- b. Fat metabolism
- c. Protein metabolism

3. Pathophysiology

A. Cardiovascular

- i. Dysrhythmias
- ii. Ischemic heart disease
- iii. Myocardial infarction
- iv. Hypertension
- v. Congestive heart failure
- vi. Valvular heart disease
- vii. Cardiomyopathy
- viii. Peripheral vascular disease
- ix. Adult and pediatric heart disease

B. Respiratory

- i. Airway
- ii. Gas exchange
- iii. Asthma
- iv. Tuberculosis
- v. Pulmonary embolism
- vi. Pulmonary hypertension
- vii. Acidosis
- viii. Alkalosis
- ix. Perfusion
- x. Ventilation

C. Central Nervous System (function & basic anatomy)

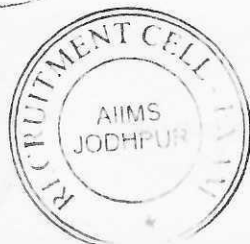
- i. Neuromuscular junction
- ii. Spinal cord
- iii. Autonomic nervous system
- iv. Seizures
- v. Cerebrovascular Accident (CVA)
- vi. Dementia/Alzheimer's
- vii. Intracranial hypertension
- viii. Neuropathy/myopathy
- ix. Spinal cord injury and disease

D. Musculoskeletal

- i. Anatomic landmarks
- ii. Fractures
- iii. Arthritis
- iv. Musculoskeletal disease
- v. Malignant hyperthermia
- vi. Endocrine
- vii. Diabetes
- viii. Thyroid disease
- ix. Pheochromocytoma

E. Hepatic

- i. Hepatitis



- ii. Hepatic failure and cirrhosis
- iii. Portal obstruction

F. Renal

- i. AKI
- ii. CKD

G. Gastrointestinal

- i. Diaphragmatic hernia
- ii. Hiatal hernia
- iii. Gastroesophageal reflux disorder (GERD)
- iv. Gallstones/gall bladder disease
- v. Pancreatitis
- vi. Bowel obstruction and perforation

H. Immune Disorders

- i. Allergic responses and anaphylaxis
- ii. AIDS/HIV
- iii. Latex allergy
- iv. Sepsis

I. Additional topics

- i. Trauma
- ii. Shock
- iii. Substance abuse
- iv. Airway difficulties
- v. Burns
- vi. Organ transplants
- vii. Infection control and disease (e.g., TB, MRSA, VRE etc.)

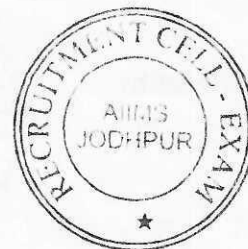
4. Physics

- A. Units of measurement
- B. Gases and gas laws
- C. Pressure and fluid flow
- D. Electricity and electrical safety
- E. Vaporization and humidification
- F. Measurement of oxygen and carbon dioxide
- G. Cautey
- H. USG, C-arm, RFA basic physics

5. Ethics:

- A. Moral aspects and duties of operating room technologist
- B. Medical ethics
- C. Code of conduct
- D. Basic principles of medical ethics – Confidentiality , Malpractice, negligence
- E. informed consent
- F. Euthanasia
- G. Organ transplantation
- H. Rational and irrational drug therapy.

6. Legal



- A. Medico legal aspects of medical records
 - B. Medico legal case
 - C. Confidentiality Privilege communication
 - D. Release of medical information
 - E. Unauthorised disclosure of medical records
 - F. Right to information act
7. Principles of infection control
- A. Clean, sterilize and perform high-level disinfecting of all reusable items (excluding disassembly and reassembly)
 - B. Describe aseptic and sterile techniques for all anaesthetic procedures
 - i. Arterial line insertion
 - ii. Central line insertion
 - iii. Swan -Ganz line insertion
 - C. Differentiate between techniques of
 - i. Cleaning
 - ii. Disinfection
 - iii. Sterilization
 - D. Differentiate between the following types of sterilization
 - i. Ethylene oxide
 - ii. Gamma radiation,
 - iii. Autoclave
 - iv. Steam
 - E. Basic wound care and dressing
 - a. Hand hygiene
 - b. Disinfectants
 - c. Dressing equipment
2. Fluid management, IV injections and IV fluid preparation
- A. Describe procedure for assisting in the establishment of vascular access
 - B. Identify equipment/supplies:
 - i. emergency infusion device
 - ii. internal jugular kits
 - iii. IV catheters
 - iv. IV fluid/blood administration sets
 - v. percutaneous introducer
 - C. Provide assistance to care provider with the identification and check-out of blood products
 - D. Type of IV fluids
 - E. Iv fluids and blood products indication
3. Basic surgical instruments and suture materials.
4. Environmental Safety in Operating Room :



- a. Proper identification of patient, patient samples, and patient laboratory results
- b. Rules and regulations for continuing education requirements
- c. Procedures and provide assistance in the transport of patients
- d. Safety procedures and principles (e.g., fire safety, infection control, radiation in OT/ICU)
- e. Describe basic principles for an electrically safe environment
- f. Biomedical waste management in accordance with infection control policy
- g. Maintain quality control records for the anesthesia and surgery
- h. Patient positioning and ensure the proper application of monitoring devices.

5. Patient Data management

- a. Record keeping and stock maintenance
- b. Communication skills and team work
- c. Basic computer skill, including hospital information system

1. Basic & clinical pharmacology:

A. General Principles

- i. Pharmacodynamics (action of drugs)
- ii. Pharmacokinetics
- iii. Anaphylaxis
- iv. Drug interactions

B. Inhalational Anesthetics

- i. Desflurane
- ii. Sevoflurane
- iii. Isoflurane
- iv. Halothane
- v. Nitrous oxide

C. Intravenous Medications

1. Opioids

- i. Morphine
- ii. Fentanyl
- iii. Alfentanil
- iv. Sufentanil
- v. Meperidine
- vi. Remifentanil

2. Benzodiazepines

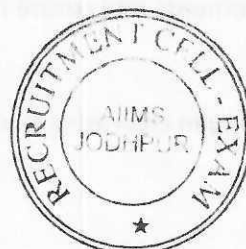
- i. Diazepam
- ii. Midazolam

3. Sedative/hypnotics

- i. Propofol
- ii. Ketamine
- iii. Etomidate
- iv. Dexmedetomidine
- v. clonidine

D. Local Anesthetics

- i. Procaine
- ii. Chlorprocaine
- iii. Tetracaine
- iv. Cocaine



- v. Benzocaine
- vi. EMLA
- vii. Bupivacaine
- viii. Lidocaine
- ix. Mepivacaine
- x. Ropivacaine

E. Muscle Relaxants

- i. Succinylcholine
- ii. Pancuronium
- iii. Vecuromium
- iv. Atracurium
- v. Rocuronium
- vi. Cisatracurium

F. Antagonists

- i. Edrophonium
- ii. Neostigmine
- iii. Naloxone
- iv. Flumazenil
- v. Pyridostigmine
- vi. Physostigmine

G. Non-steroidal Anti-inflammatory Drugs

H. Vasopressors:

- i. Ephedrine
- ii. Mephentermine
- iii. Phenylephrine
- iv. Dopamine
- v. Noradrenaline
- vi. Adrenaline.

I. Antihypertensives

- i. Beta Blockers
- ii. ACE inhibitors
- iii. Vasodilators: NTG, SNP
- iv. calcium channel blockers

j. Antiarrhythmic

K. Bronchodilators

L. Insulin

M. Diuretics

N. Antacids and gastrointestinal medications

O. Anticoagulants and thrombolytics

- i. Heparin reversal (e.g., protamine)
- ii. Heparin
- iii. Thrombolytics

P. Dantrolene

Q. Corticosteroids

R. Tocolytics (e.g., Magnesium Sulfate, Verapamil)

S. Uterotonics (e.g., Oxytocin)

T. Commonly used antibiotics

2. Basic anesthesia skills:

- A. History PAC, ASA grading
- B. preparation of OT



- C. Patient/Practitioner Safety
 - i. Patient/personal safety issues
 - ii. Anaesthesia machine check and trouble shooting
 - iii. Occupational exposure to anesthetic agents
 - a) Leak testing of anesthesia machines
 - b) Scavenging systems
- D. Case Setup and Assist
 - A. Airway management/difficult airway
 - i. Intubation
 - ii. Cricoid pressure/ Sellick's maneuver
 - iii. Mask
 - iv. Cricothyrotomy
 - v. Fiberoptic
 - E. Local/Regional Anesthesia
 - i. Subarachnoid block
 - ii. Epidural
 - iii. Combined spinal/epidural
 - iv. Caudal block
 - v. Interscalene block
 - vi. Brachial plexus block
 - vii. IV regional (Bier)
 - viii. Ankle block
 - ix. Wrist block
 - x. Digital block
 - xi. Sciatic block
 - xii. Femoral block
 - xiii. Popliteal block
 - F. Ultrasound guided nerve block
 - G. Nerve stimulator guided nerve block
 - H. Monitored anesthesia care (MAC)/ conscious sedation
 - I. Outside OR care
 - J. Positioning (e.g., technique, equipment and complications)
 - i. Prone
 - ii. Supine
 - iii. Lithotomy
 - iv. Lateral
 - v. Sitting
 - vi. Beach chair
 - vii. Trendelenburg
 - viii. Reverse Trendelenburg
 - K. Interpretation of data
 - i. Biochemistry
 - ii. Haematology
 - iii. Microbiology
 - L. Pain management
 - i. Epidural analgesia
 - ii. Infiltration nerve blocks
 - iii. Intrathecal narcotics
 - iv. Continuous infusion catheters/pumps



- v. Spinal cord stimulators (neuro stimulation therapy)

M. Post anesthesia care

3. Anaesthesia machine & equipment

A. Anesthetic Delivery Systems

- i. High/low pressure gas sources
- ii. Regulators/manifolds
- iii. Flow meters, valves, and floats
- iv. Vaporizers
- v. Proportioning systems
- vi. Pressure failure safety devices
- vii. Fail-safe devices
- viii. Ventilator
- ix. Carbon dioxide absorbent
- x. Anesthetic circuits
 - a. Rebreathing
 - b. Non-rebreathing
- xi. Pneumatic and electronic alarm devices

B. Airway Equipment

- i. Face masks
- ii. Laryngoscope
 - Types
- iii. Endotracheal tubes
- iv. Endobronchial (e.g., Robert-Shaw, double lumen, Univent, etc.)
- v. Airways
 - a. Nasal
 - b. Oral
- vi. Laryngeal mask airways
- vii. Jet ventilation
- viii. Lighted stylet
- ix. Others
 - a. Retrograde wire
 - b. Eschmann stylet catheter
 - c. Combitube
 - d. Cook exchange catheter

C. Monitoring Devices

- 1. Central nervous system
 - i. Intracranial pressure
 - ii. Modified EEG (BIS, PS Array)
- 2. Cardiovascular
 - i. Electrocardiogram
 - ii. Arterial pressure
 - iii. Noninvasive blood pressure
 - iv. Central venous pressure
 - v. Pulmonary artery pressure monitoring/SvO₂
 - vi. Cardiac output
 - vii. Doppler
- 3. Airway/pulmonary monitoring
 - i. Capnography/gas analysis
 - ii. Pulse oximetry.



- iii. Lung function tests.
- iv. Ventilator graphics

D. Other monitoring

- i. Peripheral nerve stimulator
- ii. Anaesthetic gases monitoring
- iii. Temperature monitoring

4. Other equipment

- i. Fluid/blood warmers
- ii. Forced air warming
- iii. Heat and moisture exchanger
- iv. Blood salvaging devices
- v. Transesophageal Echocardiography (TEE)
- vi. Intra-aortic balloon pump (IABP)
- vii. Ultrasound
- viii. Lab equipment - Thromboelastogram (TEG), Glucometer, ABG, etc.
- x. Suction device

5. Specialized surgical equipment

- i. Laparoscopic instruments
- ii. Laparoscopic accessories: insufflator, light source, monitors
- iii. Surgical robot
- iv. Endoscope
- v. Bronchoscope

6. Manifold room management

7. Resuscitation :

- a. Recognition of cardio respiratory arrest,
- b. BLS, ACLS, preparation for adult and neonatal resuscitation,
- c. Defibrillator
- d. Pacemaker

8. Radiological procedures during surgery like use of C-arm and contrast procedures

9. Basics of surgery : surgical terminology, types of incision, types of tourniquets reasons for use and duration of application, skills including handling sterilized articles in the operation theatre, Scrubbing, gowning and gloving techniques, positioning of patients, handling tissue specimens and contaminated waste

10. Care of tubes: Nasogastric tube, Inter-costal drainage tube, abdominal drains, urinary catheters

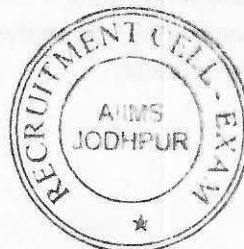
11. Basics of electro mechanical devices including electrical safety precautions in operation theatre

12. Functioning and maintenance of OT tables and OT lights

13. Engineering aspects of other operation theatre equipment's like power supplies, CVT, servo-stabilizers and UPS.

1. Functioning of operation theatre:

- A. Ventilation
- B. air conditioning



C. sterilization

2. Anesthetic and surgical requirements in various surgical specialty like:

- A. Neurosurgery
- B. Pediatric surgery
- C. Thoracic
- D. Cardiovascular surgery
- E. Transplant surgery
- F. Orthopedic surgery
- G. Gynecological surgery
- H. Urological surgery
- I. Dental surgery
- J. Ophthalmic surgery
- K. Remote locations: MRI, CT, MECT, Lithotripsy, Endoscopy, Radiotherapy etc.
- L. Emergency ward
- M. Day care surgery

3. Intensive care Unit (ICU) and High Dependency Unit (HDU)

- A. ICU equipment's
- B. gross interpretation of lab reports
- C. care of unconscious patient
- D. dialysis
- E. Blood gas : interpretation of parameters, importance, sample taking techniques

4. Pain OT Equipments, position, drugs

5. Special situation: Hbs+, HIV+, mass causality, natural calamities,

6. Laser Procedures in operating room: equipments, principle, operation etc.

