

Syllabus for Technical Papers**PAPER 1 : ASSISTANT TECHNICIAN/FIELD PUBLICITY ASSISTANT**

- Safety rules and safety signs, Types and working of fire extinguishers. Basic electrical Symbol.
- Fundamentals of electricity, definitions, units & effects of electric current. Conductors and insulators. Conducting materials and their comparison.
- Joints in electrical conductors. Techniques of soldering. Types of solders and flux
- Ohm's Law; Simple electrical circuits and problems. Kirchhoff's Laws and applications.
- Series and parallel circuits. Open and short circuits in series and parallel networks.
- Laws of Resistance and various types of resistors. Wheatstone bridge; principle and its applications. Effect of variation of temperature on resistance. Different methods of measuring the values of resistance. Series and parallel combinations of resistors.
- Magnetic terms, magnetic materials and properties of magnet. Principles and laws of electro-magnetism. Self and mutually induced EMFs.
- Electrostatics: Capacitor- Different types, functions, grouping and uses. Inductive and capacitive reactance, their effect on AC circuit and related vector concepts. Comparison and Advantages of DC and AC systems. Related terms frequency, Instantaneous value, R.M.S. value Average value, Peak factor, form factor, power factor and Impedance etc.
- Sine wave, phase and phase difference. Active and Reactive power. Single Phase and three-phase system. Problems on A.C. circuits.
- Chemical effect of electric current and Laws of electrolysis. Explanation of Anodes and cathodes. Types of cells, advantages / disadvantages and their applications.
- Lead acid cell; Principle of operation and components. Types of battery charging, Safety precautions, test equipment and maintenance. Basic principles of Electro-plating and cathodic protection.
- Grouping of cells for specified voltage and current. Principle and operation of solar cell
- Types of domestic and industrial wirings. Study of wiring accessories e.g. switches, fuses, relays, MCB, ELCB, MCCB
- Importance of Earthing. Plate earthing and pipe earthing methods.
- Resistors—colour code, types and characteristics. Active and passive components. Atomic structure and semiconductor theory.
- P-N junction, classification, specifications, biasing and characteristics of diodes.
- Rectifier circuit - half wave, full wave, bridge rectifiers and filters. Principle of operation, types, characteristics and various configuration of transistor. Application of transistor as a switch, voltage regulator and amplifier.
- Basic concept of power electronics devices. IC voltage regulators Digital Electronics - Binary numbers, logic gates and combinational circuits.
- Working principle and uses of oscilloscope. Construction and working of SCR, DIAC, TRIAC and IGBT
- Modulation, types of modulation-A.M., F.M., P.M. & application. Broadcasting, Bandwidth mod index. Definition and importance of demodulation.

- Radio Receiver, Super heterodyne principle of 'frequency changing' Radio chain, term used in Radio transmission-specification.
- Basic of audio stage, type of amplification, driver stage, output stage, transistor use, tone control, volume control.
- Ionosphere, Ground wave propagations, electromagnetic wave, reflection, speed of transmission, wavelength, explanation of frequency ranges, image frequency, acceptor circuit, and rejector circuit, disadvantage of R.F. amplification. Sensitivity and selectivity, fidelity. Signal to noise ratio, block diagram of Radio Receiver.

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PAPER 2: PUBLICITY ASSISTANT

- Safety Rule and Safety Signs, Types of working of fire extinguishers.
- Fundamentals of electricity, definition, Unit and effect of electric current, Conductor and insulator, conducting materials and their comparison, technique of soldering, Type of solder and flux.
- Ohm's Law; simple electrical circuits and problems.
- Kirchhoff's Laws and applications. Series and parallel circuit, open and short circuits in series and parallel network.
- Laws of Resistance and various types of Resistors. Series and Parallel combination of Resistors.
- Magnetic terms, Magnetic materials and properties of magnet.
- Capacitors: Different types, functions, grouping and uses.
- Comparison and advantages of DC and AC system, related term, frequency, instantaneous value, R.M.S value, Average value, peak factor, form factor, power factor and impedance.
- Chemical Effect of Electric Current and law of electrolysis, explanation of anode and cathode, type of cells, advantage/disadvantage and their applications.
- Different type of wiring: Power, Control, Communication and entertainment wiring.
- Resistors-Colour code, Types and Characteristics, Active and Passive component.
- P-N Junction, Classification, Specification, Biasing and Characteristics of Diodes.
- Rectifier Circuit-Half wave, Full wave, Bridge Rectifiers and filters. Principles of operation, types, characteristics and various configuration of Transistor. Application of Transistor as switch, voltage regulator and amplifier. IC voltage regulator.
- Digital electronics: Binary number, logic gates and combinational circuits.
- Working principle and uses of oscilloscope, construction and working of SCR, DIAC, TRIAC and IGBT.

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PAPER 3 : ROAD SAFETY AND TRAFFIC SIGNAGES

Basic Road Rules, Driving methods and speed limits, Understanding Signals: Knowledge of traffic signage for road safety, Difficult driving conditions: Driving on wet surface, Driving in fog, Night driving, Running on pavement, Brake failure, Towing, Fitness to drive, Basic knowledge about provisions of the Motor Vehicle Act, Essential knowledge about vehicle pollution (Do's and Don'ts), Awareness about documents required for driving- Registration, Licensing, Insurance, Driving Offences, Fitness to drive-First aid kit, Good health & Road safety, Driving under influence of drugs/ liquors.

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PAPER 4: LIBRARY AND INFORMATION SCIENCE

i. Role of Libraries

Library as a social/Information institution.

Role of Library and Information centres in modern society.

Five law of Library Science.

ii. Types of Libraries, Professional Association and Organizations

National Library of India: Concept function and services.

Public Libraries, Academic Libraries and Special Libraries.

Professional Association: ILA, IASLIC, CILIP, ALA, ASLIB, SLA

National and International Organizations: RRRLE, UNESCO, IFLA Digital Libraries.

iii. Library Legislation

Library Legislation: Need, Purpose, Objectives and Model Library Act.

Library Legislation in India: Structure and Silent features.

Press and Registration Act, Delivery of Book (Public Libraries) Act.

iv. Information and Communication

Information: Characteristic, Nature, value and Use of Information.

Conceptual Differences between Data, Information and Knowledge.

Communication Channels, Models and Barriers.

National Knowledge Commission and Information Policy.

Information Intermediaries.

v. Library and Information Profession

Professional Skill and Competencies, Librarian as a Profession.

Ethic Issues in Librarianship.

Role of Library and Information Professional in Digital Era.

vi. Element of Library Classification

Concept Terminology, Need Purpose and Function.

Species of Classification Schemes.

vii. Approaches to Library Classification

Postulation approach and System Approach.

Fundamental Categories, Facet Analysis and Facet Sequence.

Phase Relation and Common Isolates.

Devices in Library Classification

viii. Notation and Construction of Classification Numbers

Notation: Need, Purpose, Types and Qualities.

Call Number: Class Number, Book Number and Collection Number Construction of Class Numbers

ix. General and Special Classification Schemes

Dewey Decimal Classification (DDC), Universal Decimal Classification (UDC), Colon Classification and Current trend in Library Classification.

x. Fundamental Concept and Historical Development

Library Catalogue: Definition, Objective, Purpose and Function.

History and Development of Library Catalogue Codes.

Physical forms of Catalogue and type of Catalogue.

xi. Type of Catalogue Entries

Kind of Entries. Data Entries in different type of Entries.

Filling of Entries in Classified and Alphabetical Catalogues.

xii. Choice and Rendering of Heading

Personal Authors: Western and Indic Names.

Corporate Authors, Pseudonymous, Anonymous work and Uniform title, Non print resources.

xiii. Subject Cataloguing

Subject Cataloguing: Concept, Purpose and Problems.

Chain Indexing

Subject Heading List: LCSH, SHSH

xiv. Trends in Library Cataloguing

Centralized and Cooperative Cataloguing.

Bibliographic Standards: ISBD, MARC, CCF etc.

ISBN and ISSN.

xv. Fundamental Concepts

Meaning, Definition, Importance, Nature and Characteristics.

Printed and Electronic Information Sources.

Type of Information Sources and Services.

Criteria for Evaluation of Reference Sources.

xvi. Sources of Information

Primary information sources: General introduction (periodicals, conference, Patents, Standards, thesis/dissertation, trade literature etc)

Secondary information sources: Dictionaries, Encyclopaedias, Bibliographical, Geographical, Bibliographies, Indexing and Abstracting, Newspaper Indexes and Digests, Statistics, handbooks and manuals.

Tertiary information sources: Directories, Yearbooks, Almanacs, Bibliography of Bibliographies and union catalogues.

xvii. Reference and Information Services

Users and their information needs.

Theory and function of reference and information service, Enquire Techniques. Role of reference librarian and information officer in Electronic Environment. Marketing information Services.

xviii. Types of Information Services

Documentation services: Abstracting and Indexing services. Alerting services, CAS, SDI, Reprographic service, Translation service, Document Delivery and Referral service, Information services: An overview, Types of Referral, CAS, etc.

xix. Information Literacy Programme

Concepts, Objectives, Initiation of Users, User Studies.

Users and their Information needs: Categories of users, Ascertaining users information needs and information literacy products.

Marketing of Information Services.

xx. Principles of library management

Management vs. Administration, General Principles and their application, Library organisation structure and structure and Library Governance.

Library planning: Need, objectives and procedures, Basics of total quality management.

xxi. Financial and Human Resources

Library finance and Sources of finance, Library budget, Budgeting and Accounting. Human Resource Management: Selection, Recruitment, Training Development, Performance Appraisal.

xxii. Library building and Resource management

Library building, Collection Development, Acquisition of Periodicals and serials, Technical processing of documents.

xxiii. Services and maintenance of the library

Circulation work, Maintenance shelving and stock verification, Preservation, Library services, Reference and information services.

xxiv. Library Records and Statistics

Staff manual, Library statistic, Library Reports.

xxv. Introduction to Computers

Computers: Generation, types, Input and Output Devices, Computer Architecture, Data representation and storage.

Introduction to system software and Application Software.

Operating system: DOS, Windows XP, Vista, Windows NT, Linux etc.

Word Processing, Spreadsheet, Power point presentation. Graphic Software: Basic function and potential uses, Communication software.

xxvi. Library Automation

Library Automation: An introduction, Planning and implementation, Automation the Library, Library Automation Process/Package.

KOHA Software operating System and cloud base operating system.

In-House Operations: Acquisition, Cataloguing, Circulation, Serial Control, OPAC etc.
Bibliographic Standards: CCF and MARC 21.

Introduction to Metadata: Types of metadata Dublin Core.

Library Software Packages: Overview and House Keeping Operations.

Case Studies: WINISIS, Alice for window and SOUL.

xxvii. Database Management System

Database: Concept and Components, Database Structure, File Organization and Physical Design.

Database Management System: Basic function, Potential uses.

xxviii. Web Interface to WINISIS database

Introduction to Web Interface to WINISIS.

Introduction to web services: Apache server and Internet Information Server. Web Interface Software: GENESIS.

xxix. Introduction to Internet

Basic of Internet, Search Engines and Meta search Engine, Internet search Techniques.

E-resources and online Database.



PAPER 5 : HEALTH ASSISTANT

i. COMMUNITY MEDICINE

SL. NO	TOPIC
a	Trauma system-components <ul style="list-style-type: none"> • Injury prevention • Pre hospital care • Emergency department care • Inter facility Transportation • Trauma critical care
b	Personal safety
c	Civil disturbances
d	Mass casualty

ii. HUMAN ANATOMY

SL. NO	TOPIC
a	Upper Limb
b	Organs of abdomen <ul style="list-style-type: none"> • Liver • Spleen • Kidneys
c	Pelvic organs and their support
d	Lower Limb
e	Urogenital system

iii. PHYSIOLOGY

SL. NO	TOPIC
a	Fluid & electrolytes <ul style="list-style-type: none"> • Distribution of body fluid • Composition of body fluid Disturbances in body fluids and electrolytes
b	Circulatory System <ul style="list-style-type: none"> • Physiological Anatomy of CVS • Cardiac cycle, heart rate, heart sound, ECG • Cardiac output, venous return • Blood pressure: Definition, Normal Value, Regulation of blood pressure • Shock: Definition & Different types
c	Respiratory System <ul style="list-style-type: none"> • Physiological anatomy of respiratory system • Mechanism of respiration • Composition of air and transport of gases • Regulation of respiration (neural and chemical) • Applied-hypoxia and airway obstruction
d	Blood <ul style="list-style-type: none"> • Blood: Composition and Functions • Blood Formation, fate of RBC & jaundice and Anemia

	<ul style="list-style-type: none"> • Blood Group-Types, their importance & Rh incompatibility • Hemostasis • Immunity and AIDS
e	Temperature regulation <ul style="list-style-type: none"> • Normal body temperature-core & oral • Heat production & heat loss • Regulating mechanism-role of hypothalamus • Applied-fever, Hypothermia and heat stroke

iv . PHARMACOLOGY

SL NO.	TOPIC
a	Introduction of the subject, Routes of administration
b	Analgesics

v. MICROBIOLOGY

SL. NO	TOPIC
a	Introduction to infectious disease <ul style="list-style-type: none"> • Introduction • Causes of infectious disease • Mode of transmission of infectious disease • Defense against infectious disease • Prevention from infectious disease
b	Blood borne pathogen <ul style="list-style-type: none"> • Introduction • Person at risk • Pathogens • HBV • HCV • HIV
c	Biomedical Waste Management <ul style="list-style-type: none"> • Introduction • Defination of biomedical waste • Quantum of waste that is generated by a hospital • Hazards of biomedical waste • Person at risk of the hazard of medical procedures • Rules and Regulation governing the disposal of biomedical Waste • Responsibilities of health care institutions regarding biomedical waste management • Categories of waste generated in hospital and their management • Color codes and type of container used for disposal of biomedical waste • Disposal of infectious waste • Disposal of sharp • Storage of bio medical waste in hospital

	<ul style="list-style-type: none"> • Recyclable Waste
d	Sterilization and Disinfection <ul style="list-style-type: none"> • Introduction • Definition • Physical method to achieve sterilization and disinfection • Properties of disinfectants • Classification of disinfectants • Chlorine as high level disinfectants • Preparation of working solution of sodium hypochlorite • Sterilization of common hospital instruments • Common precaution for disinfection

vi. ANAESTHESIA

SL. NO	TOPIC
a	IV Fluids-Crystalloids and colloids
b	Blood transfusion and colloids
c	CPR including techniques and devices
d	Drowning

vii. OBSTETRICS & GYNAECOLOGY

SL. NO	TOPIC
a	Anatomy and physiology of female reproductive tract <ul style="list-style-type: none"> • Reproductive Organs
b	Normal Pregnancy <ul style="list-style-type: none"> • Onset and three stages of labor • Conduct of Delivery • Steps of conduct of normal delivery • Video presentation on conduct of normal delivery • Preterm labor and premature rupture of membranes (PROM) • Special consideration. How the management differs from normal labor
c	Bleeding during pregnancy <ul style="list-style-type: none"> • Abortions • Abruptio placenta • Rupture uterus
d	Management of delivered women <ul style="list-style-type: none"> • Care of mothers and new born baby • Post partum hemorrhage



viii. SURGERY

SL. NO	TOPIC
a	Golden Hour <ul style="list-style-type: none"> • Airway management • Control of excessive bleeding • Initial management of shock
b	Shock <ul style="list-style-type: none"> • Hypovolemic shock • Burn shock
c	Head injury <ul style="list-style-type: none"> • Pupil size and reaction of light
d	Musculoskeletal trauma: <ul style="list-style-type: none"> • Initial management and # immobilization • Major arterial hemorrhage • Compartment syndrome
e	Abdominal and pelvic trauma <ul style="list-style-type: none"> • Anatomy of abdomen • Solid organ in abdominal cavity
f	Thermometer, stethoscope, BP instrument, oro-pharyngeal airway
g	Measurement of Blood Pressure
h	Station machine, suction catheter
i	Medical gas cylinder, syringe and infusion pumps

PAPER 6 : DENTAL TECHNICIAN

1. APPLIED PHYSICS:

- Specific gravity, density, properties of matter, including cohesion, capillarity, surface tension viscosity, elasticity, diffusion and osmosis.
- Heat: Temperature and its measurements, Thermometers and Pyrometers. General account of expansion by heat of solids, liquids and gases, Thermostats, Pressure gas and hydraulic. Boyle's and Charle's Laws, Unit of heat, thermal capacity and specific Heat, Change of State: Latent heat: Melting Point.
- Properties of vapours, conduction, convection and radiation.
- Principles of electro-technology applied to dental work room, small motors, constructional features and characteristics, electric furnaces, heaters, thermostats, pyrometers, spot welders electroplating, electro-forming and anodizing, wiring regulations relating to low voltage supplies.

2. APPLIED MECHANICS:-

- Forces, Parallelogram and triangle of forces. Moments, Couples, Centre of gravity. Principles of lever and cantilever work, Energy, Power, Friction, Inclined plane, Screw Stress, Strain, Shearing Strain, Torsion, Bending movements, Strength and stiffness of materials.

3. APPLIED CHEMISTRY:-

- Distinction between physical and chemical change: elements, mixture, and compounds; composition of the atmosphere: Oxygen oxides, burning and rusting: water solvent properties and crystallization; action of water on metals: composition of water hydrogen; Laws of chemical combination; meaning of chemical symbols valency: simple chemical equations; acids, bases and salts.
- Electrolysis, The ionic theory of solution. The electropotential series, electroplating, General characteristics of the metals including an elementary study of the common metals and their alloys with special reference to those used in the dental work room.
- Alcohol, ethers, aldehydes and ketones, fatty acids and their more important derivatives, amines. Simple treatment of carbohydrates, fats and proteins, Benzene and its homologues. General characteristics of aromatic substances. Synthetic resins and plastics used in Dentistry.

4. APPLIED ORAL ANATOMY:

- Elementary anatomy and structure of denture/bearing area.
- Human dentition and occlusion.
- Functions of teeth and morphology of Crowns of teeth.
- Muscles of mastication and facial expression.
- Mastication deglutition and phonation.
- Movements of tempera—mandibular joint.

5. DENTAL MECHANICS (PRIMARY):

- Infection control measures for impressions and models.
- Impression Preservation and Boxing-in.



- Cast: Preparation, Trimming, including Orthodontic casts.
- Cast duplication - various methods.
- Construction of special trays—spacers.
- Bite blocks- base plates and wax rims.
- Articulators: Classification, daily uses, and care of articulators.
- Adjustments, Mounting of casts.
- Articulation, Occlusal plane, protrusive balance, working bite, balancing bite, curve of spee, compensating curve, lateral curve.
- Principal of selection of teeth.
- Setting of teeth and wax finishing
- Flasking, Dewaxing, Packing, curing and Deflasking.
- Finishing and polishing of dentures.
- Additions, repairs, relining and revasing of dentures.
- Immediate denture construction.
- Making of acrylic teeth.
- Kennedy's classification of partial dentures.
- Principles of partial denture, design, clasp surveyor, surveying, path of insertion and removal. Establishment of clasp seat. Clasp's. parts, classification, function and reciprocation.
- Principles of wire bending, Preparation of wrought clasps, occlusal rests and lingual bars.

6. DENTAL MECHANICS (FINAL):

- Casting machines: Centrifugal and pressure casting machines, Furnaces, principles of casting.
- Casting techniques of partial denture (Skeletal) Clasps, bars, occlusion rest.
- Setting of teeth and completion of dentures on metal skeletons.
- Mechanical principles of Orthodontic appliances, anchorage, force, tissue changes and retention.
- Stainless steel wire-preparation of clasps, springs and Arch wires for Orthodontic appliances.
- Use of various types of expansion screws.
- Designing- Implant supported Prosthesis (if facilities available for Dental Implants)
- Ceramic, laminates and Veneers.
- Fabricating- Maxillofacial prosthesis such as eye, nose ear, cheek, obturator and splint.
- Indirect Resin Restoration preparation techniques.
- Porcelain firing techniques.
- Preparation of removable Orthodontic appliances, Activators, Retention appliances and Oral screen.
- Construction of fixed Orthodontic appliances, bands, tubes and arches.
- Soldering and spot welding-Soldering of clasps, tags, Strengtheners and lingual bars.
- Inlays and Crowns —classification and construction facing & backings. - Casting Procedures.
- Principles of bridge work-types of abutments—abutments and pontics- construction of bridges using porcelain and acrylic pontics.

7. DENTAL MATERIALS AND METALLURGY:

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- Dental Materials:- Composition, Properties, Uses, Advantages & Disadvantages of the following materials:-
 - Plaster of paris; Dental Stone, Die Stone.
 - Investment Materials, . All Impression Materials.
 - Tray Materials.
 - Denture Base Materials, both for cold curing and heat curing, Tooth Materials Waxes.
 - Base Plates.
 - Zinc Oxide.
 - Dental Luting Cements.
 - Dental Ceramics and indirect resin restoration materials.
- Dental Metallurgy:
 - Metallurgical Terms,
 - General Study of:
 - (a) Metals used in Dentistry particularly Gold, Silver, Copper, Zinc, Tin, Lead and Aluminium.
 - (b) Alloys used in Dentistry particularly, Casting Gold Wrought Gold Silver Alloys, Stainless Steel, Chrome Cobalt Alloys.
 - Heat treatment - annealing and tempering.
 - Solders, Fluxes, Anti Fluxes.
 - Tarnish and Corrosion
 - Electric Deposition
 - Dental implant materials,

8. BASIC KNOWLEDGE OF COMPUTERS:

- General office routine economics, record-keeping services, Professional referrals and computing skill;
- Record keeping of materials indented and Audit of us.
- Receipt and dispatch of work from clinicians.

PAPER 7: LABORATORY ASSISTANT

ANATOMY

- i. **Basic knowledge of Human body : Basic Structural details their important functions.**
 - a) **Upper Limb:** Name of the bones of upper Limb, Various Muscles of Upper Limb, Joints, Major Vessels & Nerves and their basic functions.
 - b) **Lower Limb:** Bones of Lower Limb, Muscles, Nerves and Vessels of Lower Limb.
 - c) **Thorax:** Heart & Major Vessels, Basic Knowledge of Lungs and their function & Basic Structure. Chambers of heart and their basic functions.
 - d) **Abdomen & pelvis:** Organs of Abdomen & Pelvis, their individual functions with Major Diseases involving them.
 - e) **Head & Neck:** Sense Organs, Tongue, Mouth, Larynx, Pharynx, Nose and paranasal Sinuses.
 - f) **Brain:** Parts of Brain & Basic Functions of each and every Major part of brain.
- ii. **Human Anatomy as a Subject during under Graduate Course.**
 - a) What is Anatomy, what is the purpose of Dissection Hall & Activities done in Dissection Hall.
 - b) Basic Knowledge of communicable diseases. Mode of Spread and precautionary measures during epidemic and other non communicable diseases.
 - c) Anatomy as a part of curriculum for M.B.B.S.

PHYSIOLOGY

- i. **Introduction to human Physiology:** Cell and cell organelles, Structure and Function.
- ii. **Tissues** Definition, Classification with structure and Functions
- iii. **Blood** Composition and function of blood
- iv. **Muscular skeletal system:** Function of skeletal muscle, cardiac muscle, smooth muscle.
- v. **Respiratory system:** Pulmonary function tests
- vi. **Cardiovascular system:** Blood pressure, Heart rate
- vii. **Body fluids:** body composition, total body water and body electrolytes, homeostasis,
- viii. **Digestive System:** Functions of GIT
- ix. **Excretory System:** Structure and function of kidney,
- x. **Reproductive System:** Gametogenesis in male & female, menstrual cycle.
- xi. **Nervous system:** Function of brain & spinal cord,
- xii. **Endocrine system:** Endocrine & exocrine glands, their location, structure & functions

BIOCHEMISTRY

- i. **Fundamentals of Biochemistry-I**
 - a. **Carbohydrates & Proteins:** Classification, function, importance, structure, digestion & absorption.
 - b. **Amino acids & lipids:** Classification, Structure, Properties and Biological functions.
 - c. **Enzymes:** Definition, Classification of enzyme, Cofactor & Coenzymes, active site and action of enzymes, factor affecting enzyme activity.
 - d. **Nucleic acids:** Structure, Function.
 - e. **Vitamins & Minerals:** classification, function and diseases.



ii. **Fundamentals of Biochemistry-II**

- a. Introduction to Clinical Biochemistry and role of Medical Lab Technologist, ethics, responsibility, safety measure and hazards in clinical biochemistry lab.
- b. Principles of Incubator, Hotair oven, Colorimeter, Spectrophotometer, method of pH measurement.
- c. Preparation of solution and reagents.
- d. Specimen collection and processing of blood, urine & CSF.
- e. Qualitative test of urine for reducing sugars, protein, ketone bodies, bile Salt, bile pigments, urobilinogen.

iii. **Clinical Biochemistry-I**

- a. Basics of Metabolism, metabolism of Carbohydrates.
- b. Digestion and Absorption of Proteins, Metabolism of Proteins.
- c. Digestion and absorption of fatty acids, Metabolism of fatty acids.
- d. Principle, application of photo colorimeter, spectrophotometer, Blood Chemistry analyzer, Flame photometer, Turbidimetry.

iv. **Clinical Biochemistry-II**

- a. Liver function Tests.
- b. Renal Function Tests.
- c. Cardiac Function Tests
- d. Gastric Function Tests.
- e. Acid base balance.

v. **Clinical Enzymology, Clinical Endocrinology & Automation**

- a. Isoenzymes, their tissue distribution and clinical significance
- b. Classification of hormones, Mechanism of action.
- c. Thyroid function Tests.
- d. Basic Concepts of Automation.

PATHOLOGY

i. **HISTOPATHOLOGY AND CYTOLOGY**

- a) Definition, sources and types histological specimens, kinds of histological presentations.
- b) Labeling, fixation, properties of fixing fluids, classification and composition of fixing fluids. Advantages and disadvantages of secondary fixatives. Post chroming.
- c) Tissue processing, dehydration and cleaning.
- d) Embedding. Water soluble substances, embedding in paraffin nitrocellulose.
- e) Equipment for sectioning microtome, knife, honing and stropping. Types, care and use of microtome.

- f) Technique for sectioning frozen section. Technique for sectioning - Paraffin embedded tissue. Errors in sectioning and remedies. Attaching blocks to carriers.
- g) Technique of processing bone for histological studies. Mounting and covering. Mounting media.
- h) Staining-theory, types of staining agent. Mordents and differentiation. H & E, staining. Types of hematoxylin and its preparation. Eosin stock stain and other counter stain used.
- i) Demonstration of collagen, reticulum, elastin and fat.
- j) Demonstration of amyloid, glycogen and mucin.
- k) Principle and methods of staining of Blood smears and bone marrow smears. Supravital stain. Reticulocyte count. Heinz bodies.
- l) Description of morphology of normal and abnormal red cells. Blood differential WBC counting. Recognition of abnormal cell. Anemia - definition etiology classification and laboratory diagnosis.
- m) Hemolytic anemia, definition, causatives, laboratory investigations. Auto hemolysis, acid hemolysis.
- n) Methods of identification of abnormal hemoglobin including spectroscopy. HB electrophoresis. Alkali denaturation Test. Sickle cell preparation.
- o) Various benign leucocyte reaction Leukocytosis. Neutrophilia, Eosinophilia, Lymphocytosis. Infectious mononucleosis. Leucopenias.
- p) Leukemias - definition, causes, classification, detection of leukemia. Total leucocyte count in leukemias. Multiple myeloma.
- q) Blood Coagulation and disorders of hemostasis. Principles and methods of assessment of coagulation. BT, CT, Prothrombin time, partial thromboplastin time, thromboplastin regeneration time.
- r) Thrombocytopenia, thrombocythemias, platelet function test, platelet count. Clot retraction test. Platelet factor III Test.
- s) LE cell-definition, morphology causative agents. Various methods of demonstrating LE cells. Blood parasites. Malaria, LD bodies, microfilaria and methods of demonstration.

MICROBIOLOGY

- i. **General Microbiology**
 - a) History of Microbiology
 - b) Classification and nomenclature of micro-organisms
 - c) Morphology of bacteria, staining methods
 - d) Principle and uses of various microscopes
 - e) Growth and nutrition of bacteria, Culture media and culture methods-aerobic and anaerobic

- f) Theory and practical of sterilization disinfection antiseptics and asepsis
- g) Metabolism of bacteria
- h) Genetics of bacteria including gene cloning and genetic engineering
- i) Bacterial toxins
- j) Antimicrobial agents, Antimicrobial susceptibility tests
- k) Quality control and safety in microbiology

ii. Immunology

- a) Immunity-innate and acquired immunity, humoral and cell mediated
- b) Antigen antibody reactions and their applications
- c) Complement
- d) Hypersensitivity
- e) Histocompatibility, autoimmunity and tumor immunity

iii. Parasitology

- a) An elementary study of the types of animal associations parasitism commensalisms and symbiosis. Types of parasites. Classification of protozoan & Helminths.
- b) An elementary knowledge of the structure like history of parasites belonging to the following genera with reference to the forms seen in human pathological material, and the methods used to identify them.
 Protozoa: Entamoeba, Dientamoeba, Iodamoeba, Embadomonas, Trichomonas, Chilomastix, Enteromonas, Trypanosomes, Leishmania, Giardia, Plasmodium, Isopora, Eimeria and Balantidium, Toxoplasma. Platyhelminthes, Diphylobothrium, Sparganum, Taenia, Echinococcus, Hymenolepis, Schistosoma, Fasciola, Fasciolopsis, Clonorchis, Paragonimus.
 Nematelminthes: Ascaris, Ancylostoma, Necator, Strongyloides, Trichinella, Enterobius, Trichuris, Wuchereria, Brugia, Loa loa, Onchocerca, Dracunculus.
- c) Collection and preservation of specimens for parasitological examination, preservation of specimens of parasitic eggs and embryos, Preserving Fluids, Transport of specimens
- d) Detection of intestinal parasites: Detection and identification of amoebae and other intestinal protozoa and other parasites
- e) Examination of Blood parasites: Thick and Thin smears for malaria and Filaria and other parasites. Concentration methods
- f) Examination of Biopsy material and other body fluids. Brief account of spleen puncture for diagnosis of kala-azar, bone marrow biopsy, lymph node puncture and skin biopsy for parasites. Examination of vaginal swabs.

iv. Entomology

- a) Role of Arthropods in the transmission of diseases
- b) Mosquito: Morphology and Bionomics of Anopheles, Culex, Aedes and Mansonia
- c) Mosquito-Borne diseases and their control
- d) Phlebotomus: Morphology, Life- History and control
- e) House fly-Morphology, Life cycle, disease relationship and control
- f) Tse-Tse fly (glossina) morphology, life-cycle and public health importance
- g) Fleas: Morphology, Life cycle, disease transmitted and control
- h) Louse: Morphology, Life cycle, disease transmitted and control
- i) Bed Bug: Life cycle and control
- j) Ticks: Morphology, Life cycle, disease transmitted and control
- k) Sarcoptes scabiei: Morphology, lifecycle, public health importance and control

- l) Cyclops and Public Health importance

v. Systematic and Applied Bacteriology

- a) Gram positive cocci - Staphylococci, Streptococci
- b) Gram negative cocci - Neisseria
- c) Gram positive bacilli - Corynebacterium, Mycobacterium, Actinomycetes, Listeria, Bacillus, Clostridia
- d) Gram negative bacilli Enterobacteriaceae, Pseudomonas, Alcaligenes, Vibrio, Aeromonas, Plesiomonas, Campylobacter, Bacteroides, Fusobacterium, Brucella, Haemophilus, Bordetella, Pasteurella, Francisella, Spirochaetes, Chlamydia, Rickettsia, Mycoplasma, L forms, etc

vi. Virology

- a) General properties of viruses-structure, replication, growth, classification, identification
- b) Common viral disease - mode of infection, spread, laboratory Diagnosis -Polio, Influenza, Para influenza, mumps, Measles, Rubella, Respiratory syncytial, Rhino, Rota, Hepatitis, arboviruses prevalent in India (Dengue, West Nile, Japanese Encephalitis, KFD), Chicken pox, Adeno, Papova, Herpes, HIV, Cytomegaloviruses, etc
- c) Elementary knowledge of viral vaccines
- d) Bacteriophage - Phage typing

vii. Mycology

- a) Fundamentals of mycology
- b) Morphology and identification of contaminant and pathogenic fungi
- c) Laboratory diagnosis of common superficial, subcutaneous, and deep Fungal infections of man

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PAPER 8: ECG TECHNICIAN

A) Basics of Anatomy:

1. Introduction to Human Anatomy 2. Cell- Tissues Properties, Different Tissues 3. Digestive System & Hepatobiliary System 4. Respiratory System 5. Cardio Vascular System 6. Lymphatic System 7. Bones and Joints 8. Nervous System 9. Endocrine System 10. Sense Organs 11. Excretory System 12. Reproductive System

B) Basics of Physiology:

Basics of Physiology 1. Introduction to Human Physiology 2. Blood 3. Cardio Vascular System 4. Lymphoid System 5. Digestive System 6. Respiratory System 7. Nervous System 8. Endocrine System 9. Excretory System 10. Reproductive System 11. Sense Organs

C) Basics of Biochemistry:

Introduction to Basics of Bio-chemistry, Reception, Registration and bio-chemical parameters investigated. Glassware and plastic ware used in a bio-chemical laboratory. Instrumental methods of Bio-chemical analysis, Basic lab operations, Water Chemicals and related substances, Prevention, Safety and first aid in lab accidents, Collection of Specimens, Urine biochemical parameters., Units of measurements, Solutions, Carbohydrates, Amino acids and Proteins Definition, Biological importance, Classification, Qualitative tests, Diagnostics tests, Vitamins and Minerals,

D) Basics of Pathology:

Introduction to Pathology in brief, Preparation of Reagents, procedure and principle of tests, Body Fluids – Differential count of Peritoneal, pericardial, pleural fluids and CSF, charging chamber, Identifying and counting the cells.

E) Basics of Microbiology:

Introduction to Microbiology in brief, Microscopy, Sterilization and disinfection – classification and Methods of sterilization, Principle and Methods of sterilization by heat, Cleaning, drying & Sterilization of Glassware disposal of contaminated material i.e. clinical infective material inoculated culture media. Handling and Disposal of Biomedical waste, Morphology and classification of Bacteria.

F) Hospital Awareness:

A brief idea of hospital as an organization management different units of a hospital effective communication skills, communication channel Familiarization of different tables/tubes in surgical department, Surgical Awareness, preparation of patient for surgery, Patient related services.

G) Communication & Computer Skills , Audio and Visual Aids:

Process & Types of communication, Strategies for effective Communication, Barriers of communication, Presentation with the use of visual aids such as power point, Conversation, Extempore speech, usage of effective language for communication of health work, Case studies and situational analysis, Survey and Reporting, Computer basic-MS – Office, Word, Excel, Power Point, Internet Concepts- Browsing, Down- Loading, Use of Slide Projector

H) Basic Electro Cardiogram (ECG):

History of ECG, ECG Equipment details.
Basic concepts ECG Machine: Parts of ECG machine, Recording the ECG and lead placement, Interpretation of ECG, Pitfalls in taking ECGs
Interpretation of normal ECG, Rate & regularity, Rhythm, Voltage, P,Q,R,S,T, and U waves, Cardiac Electrical Activity, Cardiac impulse formation & Conduction, Recording of long axis cardiac

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electrical activity, Recording short axis cardiac electrical activity. Recording the Electrocardiogram, Evolution of frontal plane leads, Transverse plane leads, Correct & Incorrect leads placement, Electrocardiography leads placement, Display of 12 standard electrocardiogram leads. Bipolar lead (Enthovan triangle) and The 12 Lead, System, Principles of AC and DC, Types of Batteries, Ohm's Law, Watt, Joule. Ampere, ST segment and MI P wave, Risk factors for MI and heart diseases, Assessment of arrhythmias, Important cardiac diseases and its pattern. The fundamental of ECG and electricity, Safety measures, Operation and maintenance of E.C.G. machines, Identification of the basic defects and repair, Safety Standards of E.C.G.

I) Cardiovascular System Anatomy, Physiology & Pathology:

Anatomy of Circulatory System- Size of the Heart, Position, Layers of heart, Chambers & Valves of heart, Cardiac Muscles, Blood Supply, Nerve Supply, The blood Vessels, General Plan of Circulation, Pulmonary Circulation. Name of the arteries & veins, Their position with special emphasis on Coronary Circulation Position of heart, Conduction system of heart, Cardiac cycle, Heart sound, Stroke volume, Cardiac Output, Blood Pressure and its measurement. Cardiovascular disorders in general, Understand common pathological terms & terminologies used in description of heart disease and where applicable, associated electrocardiographic features.

J) Clinical Pharmacology:

Pharmacology Related To Cardiac Technology, Anti-anginal agents, Anti-failure agents, Anti-hypertensive drugs, Anti-arrhythmic agents, Antithrombotic agents, Lipid lowering and anti-atherosclerotic drugs,

K) Basics of other Cardiovascular measurement techniques

- A) Defibrillator-indications & Operations, Contra indications, Precautions, Complications and treatment.
 - B) Stress E.C.G. - Protocols, Procedure, Indications
 - C) TMT & Holter Recording-Recording and Analysis.
 - D) Cardiac Monitor
 - E) Instrumentation Study, Instrument Measurement & Critical Care equipment, ECHO, Computerized monitoring arrangement in ICCU and ICU
 - F) Operation, calibration, and servicing of E.C.G. machines.
- E.C.G. Recording – in Adult & Pediatric Patients.

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PAPER 9: OT TECHNICIAN

- 1 **Basic Science:-**

Anatomy: Introduction to Anatomy, Basic Anatomical terminology, Osteology, Thorax, Lungs, Heart, Skeleto-muscular system, Excretory system,
Physiology: The Cell, The Blood,, Cardio-Vascular System, Respiratory system, Excretory system, Reproductive system, Central Nervous system,, Digestive system
Biochemistry: Carbohydrates, Proteins, Lipids, Enzymes, Vitamins & Minerals, Acids and bases.
Pathology: Cellular adaptation, Cell injury & cell death. Introduction to pathology, Mechanisms of cell injury, Reversible and irreversible cell injury. Inflammation, General features of inflammation, Historical highlights, Acute inflammation, Chemical mediators of inflammation, Summary of acute inflammation Chronic inflammation, Immunity disorders, Disorders of the immune system, Infectious diseases, General principles of microbial pathogenesis, Viral infections, Bacterial infections, Rheumatic heart disease, Fungal infections, Parasitic infections, Neoplasia-Definitions, Nomenclature, Biology of tumor growth benign and malignant neoplasms, Epidemiology, Carcinogenic agents and their cellular interactions, Environmental and nutritional disorders, Common environmental and occupational exposures, Nutrition and disease, Coronary artery disease.
- 2 **Applied Anatomy and Physiology Related to Anaesthesia:**

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, Respiratory Physiology, Pulmonary Gas Exchange And Acid Base Status, Oxygen: properties, storage, supply, hypoxia, Respiratory failure, type, clinical features, causes, Chambers of the heart, major vasculature, Coronary supply, innervations, Conduction system. Cardiac output - determinants, heart rate, preload, after load. Coronary blood flow & myocardial oxygen supply ECG - arrhythmias cardiovascular response to anesthetic & surgical procedures. Hypotension - causes, effects, management, Cardio pulmonary resuscitation, Myocardial infarction, hypertension, fluids and electrolytes, blood transfusion,
- 3 **Clinical Pharmacology:**

Antisialagogues, Sedatives & Anxiolytics, Narcotics, Antiemetics, Induction agent, Muscle relaxants, Inhalational gases, Reversal agents, Local anaesthetics, Emergency drugs
- 4 **Sterilization Procedures/CSSD Procedures:**

Waste disposal collection of used items from user area, reception protective clothing and disinfections safety guards, use of disinfectants, sorting and classification of equipment for cleaning purposes, sharps, blunt lighted etc, contaminated high risk baby care - delicate instruments or hot care instruments, Cleaning process, Materials used for wrapping and packing assembling pack contents. Types of packs prepared, Inclusion of trays and 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, General observations principles of sterilization. Moist heat sterilization. Dry heat sterilization. EO gas sterilization. H2O2 gas plasma vapo sterilization.
- 5 **Principles of Anesthesia:**

Medical Gas Supply-Compressed gas cylinders, Colour coding, Cylinder valves, pin index, Gas piping system, Recommendations for piping system, Alarms & safety devices.
Anaesthesia Machine- Hanger and yoke system, Cylinder pressure gauge, Pressure regulator, Flow meter assembly, Vapourizers - types, hazards, maintenance, filling and draining, etc.
Breathing System - General considerations: humidity & heat Common components - connectors, adaptors, reservoir bags. Capnography , etcO₂, Pulse oximetry, Methods of humidification,

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Classification of breathing system, Mapleson system - a b c d e f, Jackson Rees system, Bain circuit, Non rebreathing valves - ambu valves, The circle system, Components, Soda lime, indicators.

Face Masks & Airway Laryngoscopes - Types, sizes, Endotracheal tubes - Types, sizes, Cuff system, Fixing, removing and inflating cuff, checking tube position complications.

Anaesthesia Ventilator And Working Principles.

Monitoring – ECG, SpO₂, Temperature, IBP, CVP, PA Pressure, LA Pressure.

6 **Basic Anaesthetic techniques:**

History Of Anaesthesia, Pre-Op Preparation- Pre anesthetic assessment, History – past history - disease / Surgery / and personal history - Smoking / alcohol General physical assessment, systemic examination – CVS, RS, CNS.

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

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.

Drugs - Emergency drugs, Anesthetic drugs

Intraoperative Management - Confirm the identification of the patient, Monitoring – minimum, Noninvasive & Invasive monitoring, Induction - drugs used, Endotracheal intubation, Maintenance of anesthesia, Positioning of the patient,

Blood / fluid & electrolyte balance, Reversal from anesthesia - drugs used, Transferring the patient, Recovery room – set up and things needed.

Post Operative Complications & Management

7 **Regional Anaesthetic techniques:**

Local anaesthetic technique, Nerve blocks, Spinal Anaesthesia, Epidural anaesthesia.

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PAPER 10: PHARMACIST

- 1 **Pharmaceutics:**
Pharmacopoeia, Packaging materials, Pharmaceutical aids, Preservatives, Unit operations, Size reduction, Tablets, Capsules, Liquid oral preparations, Topical preparations, Powders and granules, Sterile formulations, Immunological products, Basic structure, layout, sections, and activities of pharmaceutical manufacturing plants Quality control and quality assurance, Novel drug delivery systems.
- 2 **Pharmaceutical Chemistry:**
Introduction to Pharmaceutical chemistry, Sources and types of errors, Impurities in Pharmaceuticals, Volumetric analysis, Gravimetric analysis, Inorganic Pharmaceuticals-Haematinics, Gastro-intestinal Agents, Topical agents, Dental products, Medicinal gases, Drugs Acting on Central Nervous System, Drugs Acting on Autonomic Nervous System, Drugs Acting on Cardiovascular System, Diuretics, Hypoglycemic Agents, Analgesic And Anti-Inflammatory Agents, Anti-Infective Agents, Antibiotics, Anti-Neoplastic Agents
- 3 **Pharmacognosy:**
Definition, history, present status and scope of Pharmacognosy, Classification of drugs, Quality control of crude drugs, Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs, Plant fibres used as surgical dressings, Basic principles involved in the traditional systems of medicine, Herbs as health food, Herbal cosmetics, Phytochemical investigation of drugs.
- 4 **Human Anatomy & Physiology:**
Scope of Anatomy and Physiology Definition of various terminologies, Structure of Cell, Tissues of the human body, Osseous system, Haemopoietic system, Lymphatic system, Cardiovascular system, Respiratory system, Digestive system, Skeletal muscles, Nervous system, Sense organs, Urinary system, Endocrine system (Hormones and their functions), Reproductive system.
- 5 **Social Pharmacy:**
Introduction to Social Pharmacy, Preventive healthcare, Nutrition and Health, Introduction to Microbiology and common microorganisms, Epidemiology, Causative agents, epidemiology and clinical presentations and Role of Pharmacists in educating the public in prevention of the following communicable diseases, Introduction to health systems and all ongoing National Health programs in India, their objectives, functioning, outcome, and the role of pharmacists, Pharmacoeconomics – Introduction, basic terminologies, importance of pharmacoeconomics.
- 6 **Pharmacology:**
General Pharmacology, Drugs Acting on the Peripheral Nervous System, Drugs Acting on the Eye, Drugs Acting on the Central Nervous System, Drugs Acting on the Cardiovascular System, Drugs Acting on Blood and Blood Forming Organs, Drugs Acting on the Gastro Intestinal Tract , Drugs Acting on the Kidney, Hormones and Hormone Antagonists, Autocoids, Chemotherapeutic Agents, Biologicals.
- 7 **Community Pharmacy & Management:**
Community Pharmacy Practice, Professional responsibilities of community pharmacists Introduction to the concept of Good Pharmacy Practice and SOPs, Prescription and prescription handling, Communication skills, Patient counseling, Medication Adherence, Health Screening Services in Community Pharmacy, Over The Counter (OTC) Medications, Community Pharmacy Management.



- 8 **Biochemistry & Clinical Pathology:**
Introduction to biochemistry, Carbohydrates, Proteins, Lipids, Nucleic acids, Enzymes, Vitamins, Metabolism, Minerals, Water and Electrolytes, Introduction to Biotechnology, Organ function tests, Introduction to Pathology of Blood and Urine.
- 9 **Pharmacotherapeutics:**
Introduction, scope, and objectives. Rational use of Medicines, Evidence Based Medicine, Essential Medicines List, Standard Treatment Guidelines (STGs), Definition, etiopathogenesis, clinical manifestations, nonpharmacological and pharmacological management of the diseases.
- 10 **Hospital & Clinical Pharmacy:**
Hospital Pharmacy Definition, scope, national and international scenario, Organisational structure, Professional responsibilities, Qualification and experience, requirements, job specifications, work load requirements and inter professional relationships, Good Pharmacy Practice (GPP) in hospital, Hospital Pharmacy Standards (FIP Basel Statements, AHSP) Introduction to NAQS guidelines and NABH Accreditation and Role of Pharmacists, Different Committees in the Hospital, Supply Chain and Inventory Control, Drug distribution, Compounding in Hospitals. Bulk compounding, IV admixture services and incompatibilities, Total parenteral nutrition, Radio Pharmaceuticals, Application of computers in Hospital Pharmacy Practice, Electronic health records, Softwares used in hospital pharmacy, Clinical Pharmacy: Definition, scope, and development - in India and other countries, Technical definitions, common terminologies used in clinical settings and their significance such as Paediatrics, Geriatric, Anti-natal Care, Post-natal Care, etc., Daily activities of clinical pharmacists, Pharmaceutical care, Medication Therapy Management, Home Medication Review, Clinical laboratory tests used in the evaluation of disease states, Poisoning, Pharmacovigilance, Medication errors, Drug Interactions.
- 11 **Pharmacy Law & Ethics:**
General Principles of Law, History and various Acts related to Drugs and Pharmacy profession, Pharmacy Act-1948 and Rules, Pharmacy Practice Regulations 2015, Drugs and Cosmetics Act 1940 and Rules 1945 and New Amendments, Manufacture of drugs, Study of schedule C and C1, G, H, H1, K, P, M, N, and X, Sale of Drugs, Administration of the Act and Rules, Narcotic Drugs and Psychotropic Substances Act 1985 and Rules, Drugs and Magic Remedies (Objectionable Advertisements) Act 1954, Drugs and Magic Remedies (Objectionable Advertisements) Act 1954, Poisons Act-1919, FSSAI (Food Safety and Standards Authority of India) Act and Rules, National Pharmaceutical Pricing Authority, Code of Pharmaceutical Ethics, Role of all the government pharma regulator bodies – Central Drugs Standards Control Organization (CDSCO), Indian Pharmacopoeia Commission (IPC), Good Regulatory practices (documentation, licenses, renewals, e-governance), Introduction to BCS system of classification, Basic concepts of Clinical Trials, ANDA, NDA, New Drug development, New Drugs and Clinical Trials Rules, 2019. Brand v/s Generic, Trade name concept, Introduction to Patent Law and Intellectual Property Rights, Emergency Use Authorization, Blood bank – basic requirements and functions, Clinical Establishment Act and Rules, Biomedical Waste Management Rules 2016, Bioethics - Basic concepts, history and principles. Brief overview of ICMR's National Ethical Guidelines for Biomedical and Health Research involving human participants, Consumer Protection Act, Disaster Management Act, Medical Devices – Categorization, basic aspects related to manufacture and sale.

PAPER 11: SURVEYING

- i. **Lettering and Numbering:** Details layout of lettering, lines & dimensioning system.
- ii. **Introduction of surveying,** types of surveying, use, application principal.
- iii. **Scales:** Knowledge of different types of scales, determine of R.F & uses of scales.
- iv. Different types of projection views orthographic, sectional, isometric view.
- v. Use & application of conventional signs & symbols.
- vi. Uses of Chain/ tape, testing of a chain & correction. Ranging (direct & indirect), Principle of chain survey, application. Terms used in chain survey, **Offset** - types of offsets, limit of offset, **field book**- types of field book, entry of field book method of chaining in slopping ground. Field procedure of chain survey errors in chain survey, plotting procedure. Calculation of area (regular & irregular figure), Knowledge of site plan.
- vii. Basic terms used in compass survey. Instrument & setting up. Conversion of bearing web to R.B. Calculation of included angle from bearing local attraction, magnetic declination and true bearing, closing error. Adjustment of closing error, precaution in using prismatic compass.
- viii. **Plane table survey,** principle, merits & demerits, Instrument used in plane table, survey setting up the plane table. (centering, levelling, orientation), Methods of plane table survey (radiation, intersection, resection, traversing), Error in plane table survey.
- ix. **Introduction to Theodolite.** Types of Theodolite, parts of Theodolite, Terms used in Theodolite survey. Temporary adjustment of Theodolite, Angle measurement process. Reading of angles, field book entry of measured angles. Permanent adjustment of Theodolite. Traversing using theodolite (closed & open), traverse computation, determination of consecutive coordinates, independent coordinates, checking & balancing of traverse, preparation of gales, traverse table, computation of area using co-ordinates, calculation of omitted measurement
- x. **Introduction to levelling-** Types of levelling instrument. Technical terms used in levelling Temporary & permanent adjustment. Different types of levelling Entry of level book. (Reduced level calculation method) Curvature & refraction effect sensitivity of bubble tube. Common error and their elimination. Degree of accuracy.
- xi. **Introduction of tachometry & terms** use advantages and disadvantages. Tachometric constants & its determination. Determination of horizontal & vertical distances by various methods.
- xii. **Contouring,** contour interval selection of contour interval, characteristics of contour, uses of contour contouring by various method. Interpolation of contour by various methods, drawing of contours, computation of volume establishment of gradient by abney level.
- xiii. **Curves,** Purpose, Types of curves – simple, compound, reverse, transition, vertical. Elements of simple curve, computation of elements of simple curve. Various methods for setting out simple, compound, reverse, transition & vertical curve.
- xiv. Familiarization with modern survey instruments. Parts of Total station, temporary adjustment of T.S, working procedure of T.S.
- xv. Familiarisation with cadastral map, term used in cadastral survey, preliminary knowledge for prepare a site plan. Calculation of area by digital planimeter.



- xvi. Types of surveys for location of a road. Points to be considered during reconnaissance survey. Classification of roads and terms used in road engineering, alignment of roads relative importance of length of road, height of embankment depth of cutting & filling, road gradients super elevation etc.
- xvii. Knowledge for preparation of topographical map. Knowledge for preparation of cadastral map. Knowledge for preparation of a road project.
- xviii. Importance of cartographic projection. Uses of various types of cartographic projection for mapping.
- xix. Introduction of GIS& GPS. Elements of GPS/DGPS. Observation principles. Sources of error & handling of error in GPS. Various type of GPS application. Concept & use of survey software.
- xx. Introduction to hydrographic survey, practice various methods of water depth measurement process, flow velocity measurement & determination of cross-sectional area of a river. Handling of echo sounder, current meter.
- xxi. Basic terms used in transmission line survey, justification criteria for constructing new line, marking process of tentative alignment, selection process of a good alignment. Process of detail survey & final location survey. Use of sag template, Various type of tower, construction of tower foundation.
- xxii. Basic terms used in railway line project survey, justification criteria for constructing new line, marking process of tentative alignment, selection process of a good alignment. Process of detail survey & final location survey.
- xxiii. Specification & uses of various types of building materials, types of foundation, knowledge of R.C.C. works, & other construction related items. Procedure of prepare a detail estimate.
- xxiv. Basic knowledge of Auto CAD

